

B.7 Application of a monitoring methodology and description of the monitoring plan:**B.7.1 Data and parameters monitored:**

Data / Parameter:	EG _{y, export}
Data unit:	MWh
Description:	Gross Electricity Exported by Project Activity to the grid as per Monthly Credit Report
Source of data to be used:	Monthly Credit Report by MSEDCL
Value of data	18925
Description of measurement methods and procedures to be applied:	<p>The Main Meter & Check Meter of accuracy class (0.2s) is connected to individual feeder at the sub-station where all the WEG's (including that of the project activity) are connected. Gross Electricity Exported by all WEG's including project activity (connected to the individual feeder) are recorded every month from each Main Meter & Check Meter connected at the sub-station jointly by Project Proponents representative i.e. Suzlon Infrastructure Services Limited (here onwards SISL) & MSEDCL personnel. Based on this monthly recording MSEDCL does an apportioning (apportioning procedure described in section B.7.2) to calculate the gross electricity exported by the project activity WEG's to the grid. Reading of Main Meter is considered for calculation of Gross Electricity Exported by Project Activity to the grid and the calculated value is mentioned in Monthly Credit Report.</p> <p>The gross export is summed total of electricity export reading measured and recorded for each main meter & check meter at the sub-stations.</p> <p>Main Meter & Check Meter is owned & controlled by MSEDCL. Check Meter is placed to verify Main Meter readings. It is used as a source of reading in case of any error found in Main Meter.</p>
QA/QC procedures to be applied:	The Main and Check Meters are tested annually for accuracy with a portable calibrated standard meter by the MSEDCL.
Any comment:	The archiving of data will be maintained for crediting period + 2 years. The archiving will be done both on paper and electronically.

Data / Parameter:	EG _{y, import}
Data unit:	MWh

Description:	Gross Electricity Imported by Project Activity from the grid as per Monthly Credit Report
Source of data to be used:	Monthly Credit Report by MSEDCL
Value of data	378
Description of measurement methods and procedures to be applied:	<p>Gross electricity Imported by all the WEG's including project activity WEG's is recorded every month from each main meter and check meter of accuracy class 0.2s, which also records the gross electricity exported as explained above, jointly by Project Proponents representative (SISL) & MSEDCL personnel. Based on this monthly recording MSEDCL does an apportioning (apportioning procedure described in section B.7.2) to calculate the gross electricity imported by the project activity WEG's to the grid. Reading of Main Meter is considered for calculation of Gross Electricity Imported by Project Activity to the grid and the calculated value is mentioned in Monthly Credit Report.</p> <p>The gross import is summed total of electricity import reading measured and recorded for each main meter & check meter at the sub-stations.</p> <p>Main Meter & Check Meter is owned & controlled by MSEDCL. Check Meter is placed to verify Main Meter readings. It is used as a source of reading in case of any error found in Main Meter.</p>
QA/QC procedures to be applied:	The Main and Check Meters are tested annually for accuracy with a portable calibrated standard meter by the MSEDCL.
Any comment:	The data will be archived will be maintained for crediting period + 2 years. The archiving will be done both on paper and electronically.

Data / Parameter:	EG _y
Data unit:	MWh
Description:	Net Electricity Exported by Project Activity to the grid
Source of data to be used:	Monthly Credit Report by MSEDCL
Value of data	18547
Description of measurement methods and procedures to be applied:	<p>Net Electricity exported by the project activity WEG's to the grid is a calculated value and the calculation is done as follows,</p> $EG_y = (EG_{y, \text{export}} - EG_{y, \text{import}})$ <p>This calculated value of EG_y is also reflected in Monthly Credit Report authorized by MSEDCL, along with the Gross Electricity Export & Gross</p>

	<p>Electricity Import value. Based on this Net Electricity Exported value (EGy) the PP raises an invoice on MSEDCL subsequent to which the payments are released to the PP.</p> <p>Net Electricity Export Value (EGy) as indicated in the Monthly Credit Report issued by MSEDCL would form the basis of emission reduction calculation.</p>
QA/QC procedures to be applied:	<p>Net Electricity Exported by Project Activity to the grid mentioned in the Credit Report is cross checked with the invoice of Project Proponent which contains the reference to the period for which it is raised.</p> <p>Further payment made by the MSEDCL to Project Proponent (bank statement) is cross checked with the Invoice amount as it mentions the Net Electricity Export value. There is a difference between the Bank statement amount and Invoice amount due to Administrative charges levied by MSEDCL, in line with section 9.03 of the PPA signed between PP and MSEDCL.</p>
Any comment:	The archive of data will be maintained for crediting period + 2 years. The archiving will be done both on paper and electronically.

Data / Parameter:	EG _{controller}
Data unit:	MWh
Description:	Electricity Generated (MWh) at the WEG's SCS controller of the project activity WEG's
Source of data to be used:	SCS Controller's Daily Generation Report
Value of data	-
Description of measurement methods and procedures to be applied:	<p>Generation data from individual WEG's of the project activity are transferred from SCS controller to CMS (Central Monitoring station) via Wireless Radio Frequency Network (RF) SCADA. The system is totally automated. The generation for 24 hrs is recorded on the controller. SCS controller readings are archived electronically & on paper. After every 24 Hrs, system automatically generates the new file for the next day. The created file is then accessed from the CMS (Central Monitoring Station) & the same is forwarded to individual customer on daily basis through auto generated mail. SCS Controller has capability of maintaining daily and monthly meter readings.</p> <p>This parameter value would only be used to arrive to deduce an apportioning ratio in case the dates of the billing cycle do not match with the verification period.</p>
QA/QC procedures to be applied:	In case of Malfunctioning of the SCS controller, the WEG is programmed for automatic shut-down. Hence probability of error in SCS controller's generation data is negligible.

Any comment:	The data will be archived and will be maintained for crediting period + 2 years. The archiving will be done both on paper and electronically.
--------------	--

B.7.2 Description of the monitoring plan:

The project participant signed an operation and maintenance agreement with the supplier of the wind turbines i.e. SISL. The agreement is for a period of 10 years. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is responsibility of SISL and are organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor i.e. SISL.

Management Services:

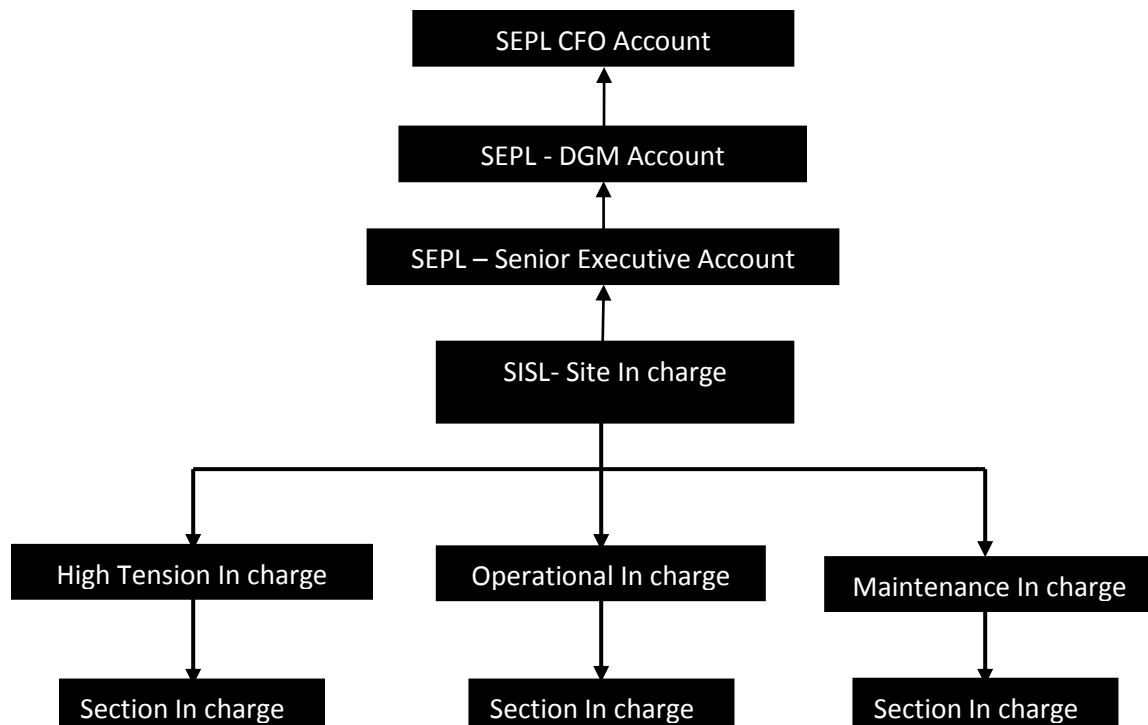
- Data logging in for power generation, grid availability, machine availability.
- Preparation and submission of monthly performance report in agreed format.
- Taking monthly meter reading jointly with utility of power generated at Wind Farm and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Technical Services:

- Visual inspection of the WEG's and all parts thereof.
- Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

Although it is being anticipated that there would be no unintended emissions/leakages from this project, however, if any such condition arises, and leakage effect is found due to the project, such leakage will be accounted accordingly as mentioned in the chosen applied baseline methodology.

The organizational hierarchy of Project Proponent & SISL Project management is as follows –



Metering System at the site: The project activity WEG's are connected to individual feeder connected to different sub-station¹. There is Main & Check meter of accuracy class 0.2s connected to individual feeder at both the sub-station. Gross electricity exported & imported are measured & recorded by the main meter & check meter connected to each feeder at substation. Based on this reading, the Net Electricity value is calculated as Gross Electricity export – Gross Electricity Import. The Net Electricity Exported by the project activity to the Grid would be the sum total of the Net Electricity Exported calculated at both the substation.

The meter readings at the Metering Point are undertaken jointly by the representatives of the MSEDCL and the representative of Project Proponent i.e. SISL in every month.

The metering equipment (Consisting of the Main Meter and the Check Meter) is duly approved, tested and sealed by MSEDCL and is in complete control of MSEDCL only. The meter readings are jointly certified by representatives of the MSEDCL and PP (SISL). However, it is the reading of the Main Meter that is considered for billing & emission reduction purpose. In case of error/failure in the Main Meter, the Check Meter reading is taken and the Main Meter is immediately calibrated /replaced by MSEDCL.

After the Main Meter readings are checked and cleared by MSEDCL authorities, Credit Report are prepared & issued to the customer. The Net electricity supplied values as provided in Credit Report by MSEDCL is used for calculating the emission reductions from the Project activity.

Project activity shares the same metering equipment(s) (main meter & check meter) at each feeder with other wind energy generator that doesn't belong to this project activity. An apportioning approach is taken by the Maharashtra State Electricity Distribution Company Limited (MSEDCL) to calculate the share of Net Electricity Exported to the grid by the Individual Investors. The detailed procedure for this apportioning is explained below viz;

Main & check meters (or Bulk meter) installed at the sub-station are sealed and are in the custody of MSEDCL. The monthly joint meter readings (JMR), taken and signed by the representatives of the Project Participant and MSEDCL at the main meter in the Sub-station. This reading is the total electricity generated by project activities connected to the feeder which has WEG's of the project activity as well as non-project activities.

JMR records electrical parameters such as export, import etc. JMR gives the readings of both main meter and check meter separately. However, it is the reading of the main meter that is considered while preparing the invoice. In case of malfunction of main meter then reading of check meter is used.

This JMR copy is then submitted by the MSEDCL representatives to the O & M Circle office of MSEDCL. The MSEDCL O & M Circle Office, based on this reading mentioned above, issues a feeder-wise Break up Energy Report of the electricity received at each sub-station to SISL. After receipt of the feeder-wise Break up Energy Report, the SISL of the Wind WEG provide a generation bifurcation of individual WEG as per the PPA signed between the Project Participant and MSEDCL.

In line with the PPA guideline, SISL, acting on behalf of the Project Participant as its representative, prepares and submits a generation bifurcation statement to MSEDCL O & M Circle office. This generation bifurcation statement, based on the JMR readings and the LCS controller readings of the individual WEG's (both project as well as non project WEG's),_ indicates the net electricity supplied by

¹ The Feeder & sub-station to which Main Meter & Check Meter of project activity are currently connected may be shifted to other substation in the future for load sharing. Load sharing activity is under complete control of MSEDCL.

the individual WEG's that are connected to the same feeder at the sub-station. Thus individual generation bifurcation statements would be prepared for individual WEG's (both, project activity as well as non project activity) and SISL would be involved in preparation and submission of all the generation bifurcation statements, for the project activity as well as non-project WEG's to MSEDCL.

Formula for deriving electricity generation for each WEG for a given month is given as follows,

Net electricity Generation of a WEG @ EB (Electricity Board) =

$$\frac{\text{Controller Generation @ Individual WEG} \times \text{Total Net Generation @ EB (S/s Feeder)}}{\text{Total Controller Generation of WEG's Connected On a Feeder}}$$

i.e. Net Generation of a WEG @ EB (Electricity Board) =

$$\frac{\text{EG}_{\text{controller}} \times \text{Total (EG}_{\text{import}} - \text{EG}_{\text{export}}) \text{ @EB (S/s Feeder)}}{\text{EG}_{\text{controller, total}} \text{ s/s feeder}}$$

Where,

$\text{EG}_{\text{controller}}$ = Controller generation @individual WEG

$\text{EG}_{\text{import}}$ = Total import at s/s feeder

$\text{EG}_{\text{export}}$ = Total export at s/s feeder

$\text{EG}_{\text{controller, total}}$ s/s feeder = Total controller import of all WEG's connected on a feeder

Above steps for apportioning of electricity amongst the individual investors are controlled and conducted by the MSEDCL and the Project Proponent has no role in the entire procedure of apportioning.

Procedures for Data Uncertainty:

The accuracy class of Main and Check Meters is 0.2s. The Main & Check Meter are tested annually by the MSEDCL authority. The meters shall be deemed to be working satisfactorily if the errors are within Specifications of the meters i.e. $\pm 0.2\%$. The generation registered by the Main Meter alone will be used for the purpose of billing and emission reduction as long as the error in the Main Meter is within the permissible limits i.e. $\pm 0.2\%$. The procedures or steps followed in case of uncertainties are listed below:

1. The main and check meter readings are measured and recorded every month by MSEDCL & representative of Project Proponent (SISL). MSEDCL authority will compare the readings of the main & check meter. In case of differences in the readings of main meter and check meter exceeds by $\pm 0.2\%$, MSEDCL authority does testing of the Check meter & Main meter, the meter with error will be identified, then MSEDCL goes for calibration for the meter showing error. If the error is with main meter, then for that particular month check meter reading will be used for preparing the feeder wise Break up energy report & Monthly Credit Report.
2. If during the joint monthly meter reading the error is found in check meter, the main meter reading will only be used in Break up energy report preparation and check meter will be corrected for the identified error. The generation registered by the main meters alone will be used for the purpose of credit report preparation by MSEDCL as long as the error in the main meter is within the permissible limits.
3. In case of any error identified during annual testing, correction will be applied by the project proponent and CER value will be corrected to achieve conservativeness. Based on testing record of main & check meter, the highest error - either of main or check meter - will be applied to all

the readings available in credit report issued by MSEDCL since the date of last testing. This will give conservative estimate of CER.

Distinction between Testing and Calibration:

Accuracy tests are conducted by MSEDCL personnel on Main Meter & Check Meter, on an annual basis, at the sub-station itself. These tests are conducted with the help of a calibrated standard meter, at the sub-station itself, to verify whether the error in the Main Meter & Check Meter is within the permissible limits.

Calibration is conducted by MSEDCL personnel in case the sub-station Main Meter or Check Meter is found to be outside the permissible limits of accuracy (identified during the annual accuracy testing). The meter with the identified error is removed from site and taken by MSEDCL to the laboratory where calibration is conducted.

Cross -checking the measured data (EG_y):

Net Electricity Exported by Project Activity to the grid mentioned in the Credit Report is cross checked with the invoice of Project Proponent which contains the reference to the period for which it is raised. Further payment made by the MSEDCL to Project Proponent (bank statement) is cross checked with the Invoice amount as it mentions the Net Electricity Export Value. There is a difference between the Bank statement amount and Invoice amount due to Administrative charges levied by MSEDCL, in line with section 9.03 of the PPA signed between PP and MSEDCL.

Apportioning of electricity supplied to Grid where dates of monitoring period are not matching with billing cycle dates:

This procedure for apportioning is different from the apportioning procedure explained above because this apportioning is conducted by the PP only for the purpose of CDM verification; where as the above procedure of apportioning is conducted by MSEDCL authorities to deduce the net electricity exported by the individual WEG's connected to feeder.

In the CDM verification cycle, there are instances when the claim of emission reduction could start in middle of any month and since the MSEDCL monthly credit report provides the data for entire month, an apportioning will have to be done to arrive at electricity exported reading for that entire period. The following generation apportioning procedure will be followed, if the crediting period date of the project activity falls in – between the billing cycles of MSEDCL.

The apportioning will be done based on the ratio of generation at SCS Controller of particular WEG. The daily generation of SCS Controller is recorded by SISL and sent to the WEG owner. The detail of SCS Controller is provided below:

Meter at Controller end: SCS (Suzlon Control Systems) (Suzlon Make) meter is a microprocessor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current / voltage is converted into digital signal internally using A/D Converters at very

high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVARh and kWh.

Generation data from each location controller is transferred to CMS (Central Monitoring station) via Wireless Radio Frequency Network (RF) SCADA. The system is totally automated. Suzlon uses the PLC based system for the controller. The generation for 24 hrs is recorded on the controller. SCS readings are archived electronically & paper. After every 24 Hrs, system automatically generates the new file for the next day. The created file then accessed from the CMS (Central Monitoring Station) & the same is forwarded to individual customer on daily basis through auto generated mail. This meter has capability of maintaining daily and monthly meter readings.

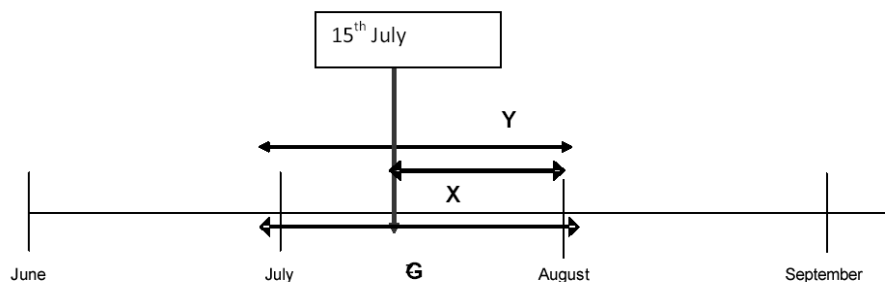
In case of any problem related to the SCS Controller, the WEG will automatically get shut down and the meter will be replaced by a new meter immediately.

The SISL prepares daily generation report (Controller meter readings) and also send the same on monthly basis to project proponent.

Example for apportioning for WEG (K – 259) of the Project Activity:

Partial days generation of the Month at Controller for WEG's (K-259 of Project activity) (kWh).	:	X
Total generation at Controller for WEG's (K-259 of Project activity) (kWh) for the corresponding month.	:	Y
Ratio for the Partial days	:	$Z = (X/Y)$ Project activity) for the corresponding month (kWh).
Generation as per MSEDCL Credit Report for WEG's (K-259 of Project activity)		G
Generation for calculating emission reduction for partial days (K-259of Project activity)	:	$G*Z$

Similar apportioning procedure will be carried for other WEG's of the project activity. For example consider PP claiming emission reduction in middle of any month. For example 15th July onwards.



1. X = Partial days of generation at controller (kWh) from 15th July to 31st July.

2. Y= Total generation at Controller of Project activity (kWh) for the same month (1st July to 31st July).
3. G = Generation as per MSEDCL Credit Report for the Project activity for the month July (1st July to 31st July) (kWh).
4. Z= Ratio for the Partial days (X/Y).

Generation for calculating emission reduction for partial days (kWh) = $G \cdot Z$ for the period 15th July to 31st July.

Abbreviations

1)	SCS	Suzlon Control System
2)	MSEDCL	Maharashtra State Electricity Distribution Company Limited
3)	SISL	Suzlon Infrastructure Services Limited
4)	CMS	Central Monitoring Station
5)	RF	Radio Frequency
6)	WEG	Wind Electric Generator
7)	PPA	Power Purchase Agreement
8)	RTGS	Real time gross Settlement
9)	PP	Project Proponent
10)	SEPL	Shahi Exports Pvt. Ltd.

Annex 4

MONITORING INFORMATION

Information related to Monitoring of project activity is described in section B.7.1 & B.7.2