

B.7 Application of the monitoring methodology and description of the monitoring plan:	
B.7.1 Data and parameters monitored:	
Data / Parameter:	EGy
Data unit:	MWh (Mega-watt hour)
Description:	Net electricity supplied to the grid by the Project activity.
Source of data to be used:	As per the Joint Meter Readings (JMR).
Value of data.	5.75 Million kWh/year
Description of measurement methods and procedures to be applied:	Metering system for the project activity consists of one main and check meter at 33 kV metering location at the wind farm. Both meters are two-way trivector meters capable of recording import and export of electricity. In addition to this there is one more set of bulk meter and its check meter at 66 kV metering point at the pooling (herein after referred as “RRB”) substation. The bulk meter is connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore in order to determine the electricity supplied to the grid by the project activity at high voltage (66 kV) side of RRB substation, the state utility (herein after referred to as “KPTCL/BESCOM”) applies the transmission loss between 33 kV metering point and 66 kV metering point to the meter reading recorded at the 33 KV metering point. The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of BEL (PP) and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR (Form B) recorded at 33kV metering point. Frequency of recording data: Monthly Recording: The values of net energy delivered to the grid is sourced from JMR(Form B) for 2.5 MW at 33 kV metering point. Responsibility: Joint responsibility of BEL (PP) and state utility. Refer section B.7.2 and Annex – 4 for an illustration of the provisions for measurement methods.
QA/QC procedures to be applied:	. QA/QC procedures will be as implemented by state utility pursuant to the provisions of the wheeling and banking agreement except or otherwise explicitly stated in the PDD. Refer Annex – 4 for an illustration of the provisions for QA/QC procedures.
Any comment:	. The data (electricity supplied to the grid) will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter:	EGexport
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity Export recorded at meters (one main and one check) connecting 5 machines of the project activity.
Source of data to be used:	Electricity export to the grid as per joint meter reading (FormB) taken at 33 kV metering point.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This value will be taken from the JMR (Form B) taken at 33kV metering point and will be applied directly.
Description of measurement methods and procedures to be applied:	Monitoring: Electricity export to the grid will be recorded by the meters (one main and one check) connecting 5 turbines at 33kV point. Refer section B.7.2 and Annex – 4 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The values electricity export to the grid is sourced from one JMR for 2.5 MW at 33 kV metering point. Responsibility: Joint responsibility of PP and state utility
QA/QC procedures to be applied:	QA/QC procedures will be as implemented by state utility except or otherwise explicitly stated in the PDD. Refer Annex – 4 for an illustration of the provisions for QA/QC procedures.
Any comment:	The data will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter:	EGimport
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity Import recorded at the meters (one main and one check) connecting 5 machines of the project activity.
Source of data to be used:	Electricity import from the grid as per joint meter reading taken at 33kV metering point.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This value will be taken from the JMR (Form B) taken at 33 kV metering point and will be applied directly.
Description of measurement methods and procedures to be applied:	Monitoring: Electricity import from the grid will be recorded by meters (one main and one check) connected to the 5 machines at 33kV point. Refer section B.7.2 and Annex – 4 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The values electricity import to the grid is sourced from one JMR for 2.5 MW at 33 kV metering point. Responsibility: Joint responsibility of PP and state utility

QA/QC procedures to be applied:	QA/QC procedures will be as implemented by state utility except or otherwise explicitly stated in the PDD. Refer section B.7.2 Annex – 4 for an illustration of the provisions for QA/QC procedures.
Any comment:	The data will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter:	T_E
Data unit:	MWh (Mega-Watt hour)
Description:	Transmission loss for export between the metering location at 33 kV point and the metering location at 66 kV at the RRB substation.
Source of data to be used:	Transmission Loss for export will be sourced from the joint meter reading (Form B) taken at 33kV metering point for the project activity.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This value is certified by the State utility in the JMR (Form B). This value will be directly sourced from the JMR (Form B).
Description of measurement methods and procedures to be applied:	Monitoring: Transmission loss between metering location at 33 kV and the metering location at 66 kV at RRB substation is applied to the meter reading taken at meters connected at 33 KV point for the project activity. RRB Substation is connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore transmission loss is applied by the state utility as reflected in the JMR (Form B) taken at 33kV point. The JMR is signed by the representatives of PP and the state utility. Refer section B.7.2 and Annex – 4 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The value of transmission loss is sourced from JMR for 2.5 MW at 33 kV metering point. Responsibility: Joint responsibility of PP and state utility Refer section B.7.2 and Annex – 4 for an illustration of the provisions for measurement methods.
QA/QC procedures to be applied:	QA/QC procedures will be as implemented by state utility . Refer section B.7.2 and Annex – 4 for an illustration of the provisions for QA/QC procedures.
Any comment:	The data will be stored in hard format and values will be taken from JMR.

The data will be stored in hard format and soft format by PP at the project site office. Joint meter reading is taken in the presence of the persons representing PP [Operation and Maintenance Contractor]. The archive will be kept for the period up to two years after the completion of the crediting period.

B.7.2 Description of the monitoring plan:

Approved monitoring methodology ACM0002 / Version 06 sectoral Scope: 1, “Consolidated methodology for 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 ante 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. There is one main and check meter dedicated to project activity at 33 kV metering point for the project activity. In addition to this there is one set of main and check meters (bulk meters) at 66 kV metering point at the RRB pooling substation and are connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore in order to determine the electricity supplied to the grid by the project at 66 kV at the RRB substation, the state utility applies the transmission loss to the meter reading recorded at the 33 KV metering point. The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of PP and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR (Form B) recorded at 33kV metering point. Electricity supplied to the grid is calculated by applying transmission loss to the meter readings taken at 33 kV metering location of the project activity.

The procedure for calculation of transmission loss as given in the JMR is set-out below:

$$Z = \frac{(X1+X2+X3...+Xn)-Y}{(X1+X2+X3...+Xn)} \times 100$$

Z = Percentage transmission loss for export incurred in transmission line between the meter located at 33 kV metering point and the meters located at 66kV metering point (two bulk meters) high voltage side of receiving sub-station.

Xi = Energy Export Reading of energy meter installed at 33kV metering point

Y = Energy Export Readings at bulk meters (two in number) installed at high voltage side of transformer of the receiving station at 66 kV.

X1, X2, X3,...Xn are the meters that are installed at 33kV metering point and are connected to the receiving substation by internally connected lines to the receiving station.

The Export Reading Xi is adjusted for transmission loss that is determined by the state utility and is applied directly to the JMR (Form B) taken at 33 kV metering point. This can be checked from the JMR signed jointly by the representatives of PP and the state utility.

Transmission Loss in Export (TE) = Transmission Loss (Z) * Energy Export at 33kV metering point (EGExport)

Empirical Formula for Energy Export after adjustment of transmission loss (Equation 1)

Net Energy Export after adjustment of transmission loss = EGexport – Transmission Loss (TE)

The transmission loss in export is generally less than 5%. However in case of Energy Import, the state utility conservatively applies adjustment of 15% to the import values noted at 33 kV metering point.

Transmission Loss in Import (**T_I**) = 15% * Energy Import at 33kV metering point (**E_{Gimport}**)

Empirical Formula for Energy Import after adjustment of transmission loss (Equation 2)

Net Energy Import after adjustment of transmission loss = **E_{Gimport} + 15%*E_{Gimport}**
= **115%* E_{Gimport}**

Therefore Energy Supplied to Grid after adjustment of transmission loss is difference of equation 1 and 2 as given in the JMR (Form B) signed jointly by representatives of PP and the state utility.

E_{Gy} = E_{Gexport} – 115%*E_{Gimport} – Transmission Loss (T_E)

The Joint meter reading noted at 33 KV metering location contains the following data:-

1. Electricity Export (**E_{Gexport}**)
2. Electricity Import (**E_{Gimport}**)
3. Transmission Loss (**T_E**) between 33 kV metering point and 66 kV metering point (two bulk meters) at RRB pooling substation

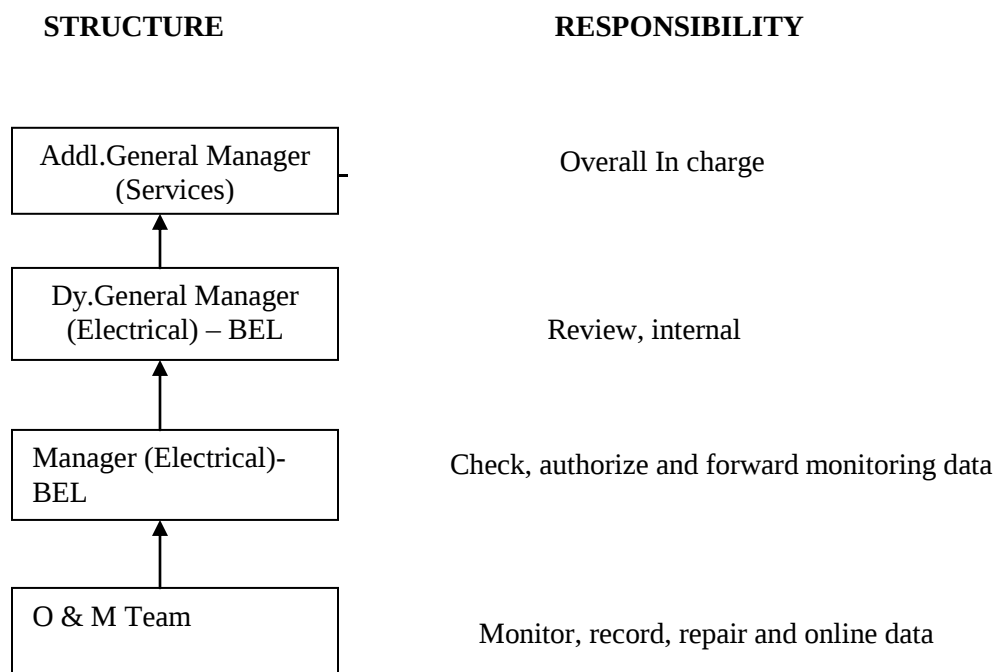
Electricity supplied to the Grid [**E_{Gexport}-115%*E_{Gimport}-T_E**]

JMR is signed by the representatives of PP and the state utility. The meter readings (both export and import), transmission loss and electricity supplied to the grid are recorded in the JMR (33 KV metering point). Hence all these values will be reproduced from the JMR for calculation of emission reductions.

In addition to the JMR (Form B) at 33kV metering location for the project activity, the following documents will also be provided to the DoE for verification:

1. JMR (Form B) at PP 66kV metering point (two bulk meters) at RRB substation
2. Transmission loss calculation endorsed / confirmed jointly by the representatives of PP and the state utility.

The Project is operated and managed by BEL (PP). The operational and management structure implemented by BEL is as follows:



Annex 4

MONITORING INFORMATION

For the purpose of monitoring, the project proponent has entered into an operation and maintenance Agreement with the supplier of machines M/s Vestas RRB India Ltd. for a period of twenty years from the date of commissioning.

The contractor shall draw the preventive maintenance schedules and attend to the breakdowns keeping in view that machine availability would be minimum 95%.

THE DETAILS ARE AS BELOW.

- **Metering:** Electricity supplied to the grid is metered jointly by state utility and BEL through one main and one check meter at 33 kV metering point connecting exclusively the machines of project activity.

In addition to this there is one more set of main and check meters (Bulk meters) at 66 KV metering point at the RRB pooling substation covering machines of the project activity and machines of other project developers. The schematic diagram showing location of meters for the project activity is attached as Appendix 1.

- **Metering Equipment:** Metering system for the project activity consists of one main and one check meter at 33kV metering point and one set of bulk and its check meters at 66 kV metering point. All the meters are **two-way Trivector meters capable of recording import and export of electricity**. The meters installed are capable of recording and storing half hourly readings of all electrical parameters for a minimum period of 35 days with digital output.
- **Meter Readings:** The electricity supplied to the grid is recorded by taking JMR for 2.5 MW at 33kV metering point in the presence of representatives of state utility and PP for the purpose of calculating the net energy delivered to the grid of the project activity. This JMR is certified by state utility and PP. Transmission loss is calculated using the JMR of the bulk and its check meter at the 66kv RRB substation.
- **Inspection of Energy Meters:** All main and check energy meters 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 authorized representatives.
- **Meter Test Checking:** All main and check meters are tested for accuracy with reference to a portable standard meter. The portable standard meter is owned by state utility. The main and check meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The consumption registered by the main meters alone will hold good for the purpose of metering electricity supplied to the grid as long as the error in the main meters is within the permissible limits. All the meters will be tested / calibrated for accuracy annually.

If during the meter test checking,

- The main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then the meter reading will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
- The main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible of error, then the meter reading for the month up to the date and time of such test shall be as per the check meter. There will be a revision in the meter reading for the period from the previous calibration test up to the current test based on the readings of the check meter. The main meter shall be calibrated immediately and meter reading for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
- Both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the main meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive the correct reading of energy supplied for metering electricity supplied to the grid for the period from the last month's meter reading up to the current test. Meter reading for the period thereafter till the next monthly reading shall be as per the calibrated main meter.

APPENDIX-I

