

**MONITORING REPORT FORM (F-CDM-MR)**  
**Version 02.0****MONITORING REPORT**

|  |   |
|--|---|
| <b>Title of the project activity</b>   | 125MW Wind Power Project in Karnataka, India  |
| <b>Reference number of the project activity</b>  | 0315  |
| <b>Version number of the monitoring report</b>   | 1   |
| <b>Completion date of the monitoring report</b>  | 16/05/2012  |
| <b>Registration date of the project activity</b>   | 29/09/2006  |
| <b>Monitoring period number and duration of this monitoring period</b>   | Monitoring Period Number: 5<br>Duration: 01/04/2011- 31/03/2012 (first and last days included)  |
| <b>Project participant(s)</b>  | MSPL Limited  |
| <b>Host Party(ies)</b>   | India   |
| <b>Sectoral scope(s) and applied methodology(ies)</b>  | Sectoral scope 1: Energy industries (renewable/non-renewable sources)<br>Applied methodology: ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources” (Version 4.0) |
| <b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b> | 275,129 tCO <sub>2</sub> e  |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>                            | 250,033 tCO <sub>2</sub> e  |

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

&gt;&gt;

The purpose of the project activity is to mitigate greenhouse gas emissions by generating electricity from wind power. Electricity generation in conventional grid-connected power plants, which consists of primarily thermal power plants, is displaced by the project activity, thereby reducing greenhouse gas emissions.

**Brief description of the installed technology and equipments**

The project activity comprises of 107 wind turbine generators (WTGs) with total installed capacity of 125.15 MW. The project activity generates renewable power and exports it to the southern regional grid via the nearest receiving station of KPTCL. The project equipment also includes the metering, switch gear and other protection equipment. Electricity generation from the WTGs is monitored via 18 metering points (each metering point comprising of one main meter and one check meter). The WTGs are identified by their location numbers, and metering points by meter IDs. Details on each of the 18 metering points are given in annexure 1 – Energy Meter Specifications.

The project activity involves the implementation of a 125.15 MW capacity wind power installation in the state of Karnataka. The project activity displaces power generation in grid-connected plants (largely from fossil fuel based sources). Renewable energy is exported to the southern regional grid (India). The project activity consists of 107 WTGs owned by MSPL, RMMPL, and PVS & Brothers as listed below.

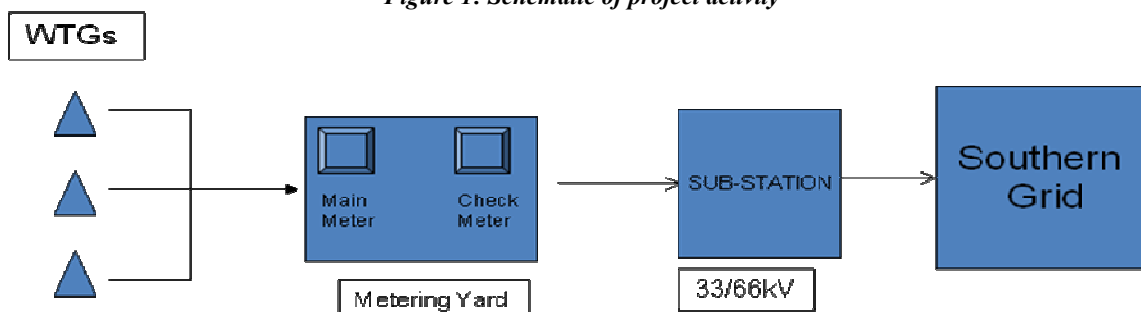
*Table 1: Technical Details of WTG's*

| Phase <sup>1</sup> | Company      | Number of WTGs | Capacity (kW per WTG) | Total Capacity (kW) | Make      | Meter IDs  |
|--------------------|--------------|----------------|-----------------------|---------------------|-----------|--|
| I                  | MSPL         | 7              | 750                   | 5,250               | NEG Micon | GRHP-01, GRHP-08, GRHP-09, GRHP-05, GRHP-06, GRHP-14, JMT-01 |
|                    |              | 17             | 950                   | 16,150              | NEG Micon |  |
|                    |              | 5              | 1,250                 | 6,250               | Suzlon    |  |
| II                 | MSPL         | 41             | 1,250                 | 51,250              | Suzlon    | MRB-03-K131,MRB-03-K140, JJK-08, JJK-05, JMT-03, JMT-05      |
| II                 | RMMPL        | 31             | 1,250                 | 38,750              | Suzlon    | JJK-07, JJK-06,MRB-03-K147,MRB-03-K161                       |
| II                 | PVS          | 6              | 1,250                 | 7,500               | Suzlon    | MRB-03-K141  |
|                    | <b>Total</b> | <b>107</b>     | -                     | <b>1,25,150</b>     | -         | -  |

<sup>1</sup> Phase I includes WTGs commissioned in 2004. Phase II includes WTGs commissioned in 2005.

The project activity exports power to the southern regional grid of India through sub-stations where the generated power is stepped up from 33kV to 66KV. This is illustrated in the schematic below:

*Figure 1: Schematic of project activity*



**Relevant dates for the project activity:**

*Table 2: Relevant dates for the project activity*

| S.No. | Activity  | Date  |
|-------|---|---|
| 1     | Start date of crediting period for the project activity | 22/03/2004  |
| 2     | Commissioning dates of WTGs                             | Please refer Table 3<br>“Commissioning dates of WTGs”<br>under section B.1 “Implementation<br>status of the project activity” |
| 3     | Registration of project activity under CDM              | 29/09/2006  |
| 4     | First Monitoring Period                                 | 22/03/2004 to 31/03/2006  |
| 5     | Second Monitoring Period                                | 01/04/2006 to 31/03/2007  |
| 6     | Third Monitoring Period                                 | 01/04/2007 to 31/03/2009  |
| 7.    | Fourth Monitoring Period                                | 01/04/2009 to 31/03/2011  |
| 8.    | Fifth Monitoring Period                                 | 01/04/2011 to 31/03/2012  |

**Total emission reduction achieved in this monitoring period:**

The total emission reductions achieved during this monitoring period i.e., from 01/04/2011 to 31/03/2012 amounts to 250,033 tCO<sub>2</sub>e.

## A.2. Location of project activity

>>

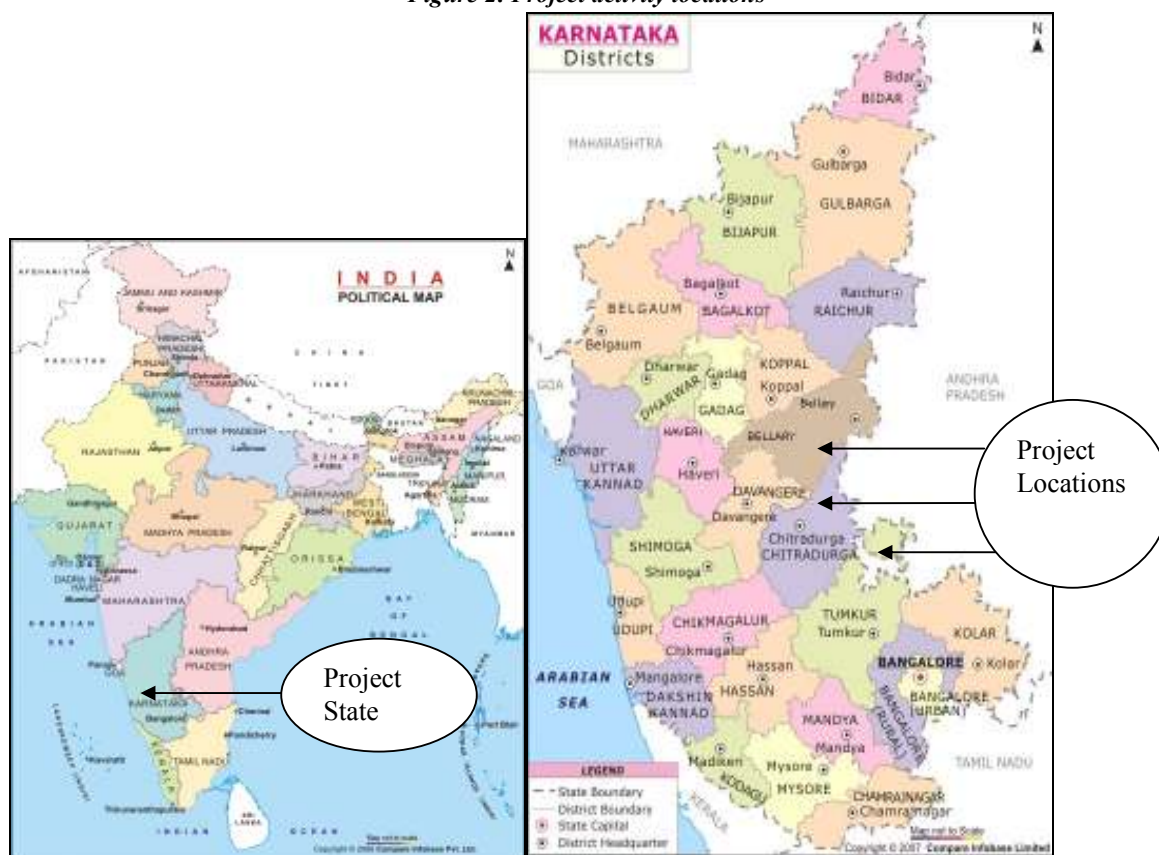
Host party : India

State : Karnataka

Districts : Bellary, Chitradurga and Davanagere

The GPS coordinates of the WTG locations are within the range of Latitude 14°11' 25''N to 14° 55' 44.1''N and Longitude 75° 57' 36.5E to 76° 25' 19.6''E. The project activity locations are marked in the maps below.

Figure 2: Project activity locations



### A.3. Parties and project participant(s)

| Party involved<br>(host) indicates a host Party) | Private and/or public entity(ies)<br>project participants<br>(as applicable) | Indicate if the Party<br>involved wishes to be<br>considered as project<br>participant (Yes/No) |
|--|--|---|
| India (Host)                                     | MSPL Limited (Private Entity)  | No  |
| Sweden   | Asian Development Bank, as<br>Trustee of the Asia Pacific Carbon<br>Fund     | No  |
| Spain  | Kingdom of Spain (Public Entity)   | No  |
| Sweden   | Government of Sweden - Swedish<br>Energy Agency (Public Entity)              | No  |

### A.4. Reference of applied methodology

>>>

The baseline and monitoring methodology applied to the project activity is: ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources” (Version 4.0)

Reference:

[https://cdm.unfccc.int/UserManagement/FileStorage/CDMWF\\_AM\\_YRBRBU2ON10D2S9SE0RFK0V1R2TNL](https://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_YRBRBU2ON10D2S9SE0RFK0V1R2TNL)

**A.5. Crediting period of project activity**

&gt;&gt;

Type of crediting period : Fixed  
 Length of crediting period : 10 years  
 Start date of crediting period : 22/03/2004  
 End date of crediting period : 21/03/2014

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

&gt;&gt;

The commissioning dates of the WTGs involved in the project activity are tabulated below:

*Table 3: Commissioning dates of the WTGs*

| Meter ID    | No. of WTGs | Capacity per WTG (kW) | Total capacity (MW) | Commissioning date | WTG Location Nos.                 |
|-------------|-------------|-----------------------|---------------------|--------------------|-----------------------------------|
| GRHP-05     | 4           | 950                   | 3.8                 | 31/03/2004         | MSPL22 to MSPL25                  |
| GRHP-06     | 3           | 950                   | 2.85                | 31/03/2004         | MSPL26 to MSPL28                  |
| GRHP-08     | 2           | 750                   | 1.5                 | 16/04/2004         | MSPL-15, MSPL-16                  |
|             | 3           | 950                   | 2.85                | 08/09/2004         | MSPL-11, MSPL-12A, MSPL-12B       |
|             | 1           | 950                   | 0.95                | 24/12/2004         | MSPL-14                           |
| GRHP-09     | 2           | 750                   | 1.5                 | 08/09/2004         | MSPL-17, MSPL-18                  |
|             | 3           | 750                   | 2.25                | 16/04/2004         | MSPL-19, MSPL-20, MSPL-21         |
| GRHP-14     | 1           | 950                   | 0.95                | 08/09/2004         | MSPL-29                           |
|             | 1           | 950                   | 0.95                | 19/05/2004         | MSPL-30                           |
| GRHP-01     | 4           | 950                   | 3.8                 | 18/03/2004         | MSPL-7, MSPL-8, MSPL-9, MSPL-10   |
| JJK-05      | 13          | 1,250                 | 16.25               | 31/03/2005         | K-188 to K-200                    |
| JJK-06      | 6           | 1,250                 | 7.5                 | 31/03/2005         | K-168 to K-172, K180              |
|             | 3           | 1,250                 | 3.75                | 31/05/2005         | K-174, K-175 & K-177              |
|             | 5           | 1,250                 | 6.25                | 30/04/2005         | K-167, K-173, K-176, K-178, K-179 |
| JJK-07      | 2           | 1,250                 | 2.5                 | 31/03/2005         | K-181, K-183                      |
|             | 1           | 1,250                 | 1.25                | 31/05/2005         | K-182                             |
| JJK-08      | 1           | 1,250                 | 1.25                | 30/04/2005         | K-184                             |
|             | 2           | 1,250                 | 2.5                 | 31/03/2005         | K-185, K-186                      |
|             | 1           | 1,250                 | 1.25                | 31/05/2005         | K-187                             |
| JMT-01      | 3           | 1,250                 | 3.75                | 31/03/2004         | K-23, K-24, K-25                  |
|             | 2           | 1,250                 | 2.5                 | 10/04/2004         | K-26, K27                         |
| JMT-03      | 3           | 1,250                 | 3.75                | 22/03/2005         | K-33 to K-35                      |
| JMT-05      | 1           | 1,250                 | 1.25                | 22/03/2005         | K-28                              |
| MRB-03-K131 | 7           | 1,250                 | 8.75                | 21/03/2005         | K-123 to K-125, K-127 to K-130    |



| Meter ID     | No. of WTGs | Capacity per WTG (kW) | Total capacity (MW) | Commissioning date | WTG Location Nos.            |
|--------------|-------------|-----------------------|---------------------|--------------------|------------------------------|
|              | 4           | 1,250                 | 5                   | 28/03/2005         | K-121, K-122, K-126 & K-131  |
| MRB-03-K140  | 1           | 1,250                 | 1.25                | 31/12/2005         | K-132                        |
|              | 8           | 1,250                 | 10                  | 21/03/2005         | K-133 to K-140               |
| MRB-03-K141  | 6           | 1,250                 | 7.5                 | 28/03/2005         | K-141 to K-146               |
| MRB-03-K147  | 6           | 1,250                 | 7.5                 | 28/03/2005         | K-147 to K-150, K-153, K-154 |
|              | 2           | 1,250                 | 2.5                 | 13/06/2005         | K-155, K-156                 |
| MRB-03-K161  | 6           | 1,250                 | 7.5                 | 26/03/2005         | K-161 to K-166               |
| <b>TOTAL</b> | <b>107</b>  |                       | <b>125.15</b>       |                    |                              |

**B.2. Post registration changes****B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

&gt;&gt;&gt;

There are no temporary deviations from the registered monitoring plan or applied methodology. Hence, this section is not applicable.

**B.2.2. Corrections**

&gt;&gt;&gt;

There are no corrections. Hence, this section is not applicable.

**B.2.3. Permanent changes from registered monitoring plan or applied methodology**

&gt;&gt;&gt;

There are no changes from the registered monitoring plan or the applied methodology during the current monitoring period.

However, post the registration of the project activity, prior to submitting the request for issuance for the third monitoring period, the monitoring plan has been revised and the revision was approved by UNFCCC on 24 December, 2010.

The revised monitoring plan can be found on the project's webpage:

<https://cdm.unfccc.int/Projects/DB/DNV-CUK1142448670.58/view>

**B.2.4. Changes to project design of registered project activity**

&gt;&gt;&gt;

There are no changes to the project design of the registered project activity. Hence, this section is not applicable.

**B.2.5. Changes to start date of crediting period**

&gt;&gt;&gt;

There are no changes to the start date of the crediting period. Hence, this section is not applicable.

**B.2.6. Types of changes specific to afforestation or reforestation project activity**

&gt;&gt;&gt;

The project activity is a wind power project and hence this section is not applicable.

## SECTION C. Description of monitoring system

&gt;&gt;

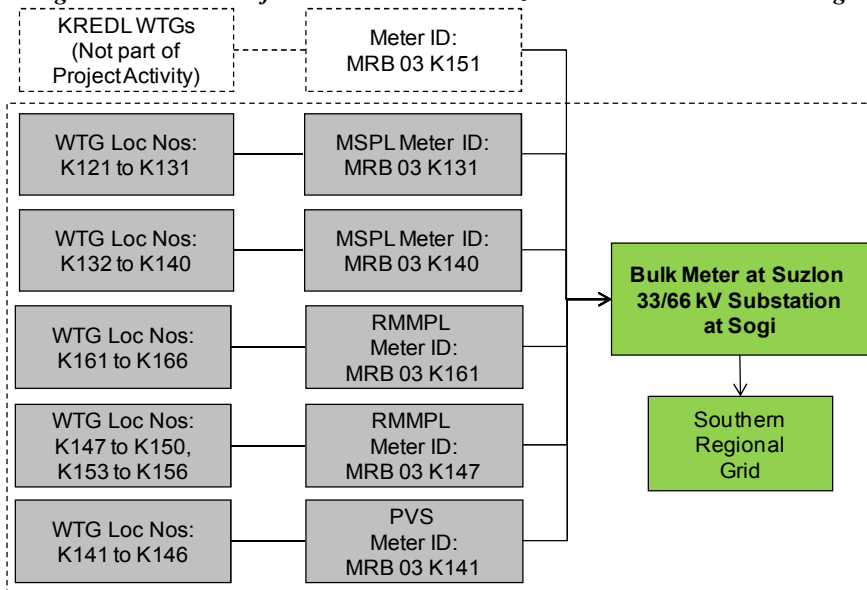
### Description of monitoring plan:

The individual/group of WTGs of the project activity is/are connected to 18 metering points (the meter IDs are provided in annexure 1: Energy Meter Specifications) which are all located at the project site. These are then, in turn, connected to 33/66 kV receiving substations. An illustration of the same is provided in figures 3 to 6, below.

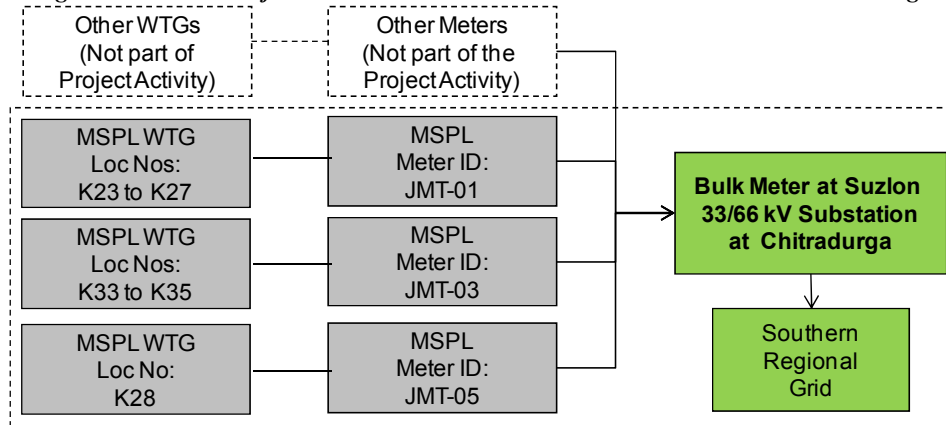
**Table 4: Connected substation**

| Metering location   | No. of WTGs | Connected substation                         |
|---|-------------|--|
| MRB-03-K131, MRB-03-K140, MRB-03-K147, MRB-03-K161, MRB-03-K141 | 40          | 33/66 kV Suzlon substation at Sogi           |
| JMT-03, JMT-05, JMT-01  | 9           | 33/66 kV Suzlon substation at Chitradurga    |
| GRHP-01, GRHP-08, GRHP-09, GRHP-05, GRHP-06, GRHP-14            | 24          | 33/66 kV NEG Micon substation at Chitradurga |
| JJK-07, JJK-06, JJK-08, JJK-05                                  | 34          | 33/66 kV Suzlon substation at Jajjikalgudda  |

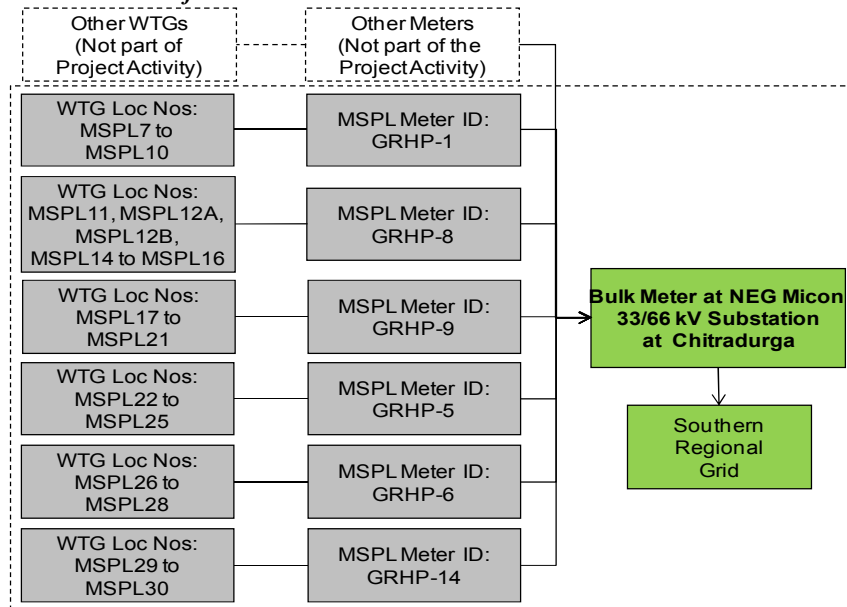
**Figure 1: Schematic of WTGS connected to Suzlon 33/66 kV Substation at Sogi**



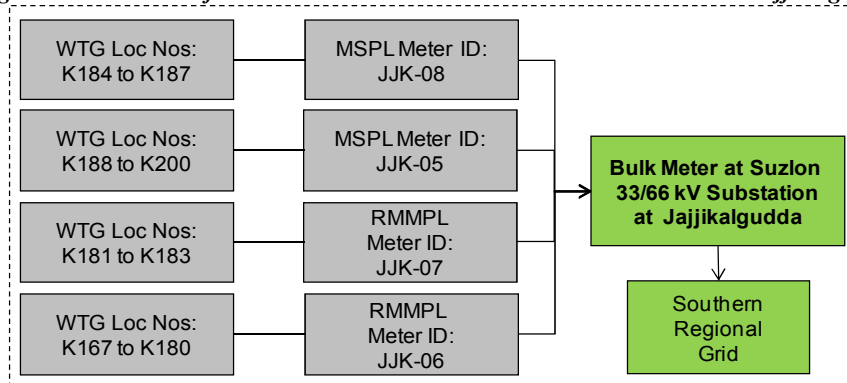
**Figure 2: Schematic of WTGs connected to Suzlon 33/66 kV Substation at Chitradurga**



**Figure 3: Schematic of WTGs connected to NEG Micon 33/66 KV Substation at Chitradurga**



**Figure 4: Schematic of WTGs connected to Suzlon 33/66 KV Substation at Jajjikalgudda**



The gross electricity export from the project activity and the electricity import by the project activity is monitored at the project site by these 18 metering points, each of which consists of a main energy meter





and a check energy meter. The meters are electronic tri vector meters of accuracy class 0.2. The energy meter readings at each metering point are recorded monthly during joint meter readings (JMRs) in presence of BESCOM/KPTCL officials and the representatives of the project promoters (RRB site representative being O&M contractor).

Calculation of transmission loss;

Apart from monitoring the electricity export and import at the 18 metering points, the electricity export at the bulk meters which is located at the 33/66 kV receiving substations, is also monitored. The purpose of monitoring the electricity export at the bulk meters is to calculate the transmission loss incurred between the metering point for the WTGs and the respective receiving stations where voltage is stepped up to 66 kV and exported to the grid. To calculate transmission losses, KPTCL also monitors electricity export from each of the metering points connected to the sub-station (including meters not part of the project activity) and determine the transmission loss percentage between the total export from all metering points and the export from the bulk meter at the receiving sub-station. The transmission loss calculation sheets are submitted by KPTCL every month along with the JMRs.

Although bulk meters are installed at sub-stations, they are fully under the purview and ownership of KPTCL. Similarly there are several other WTGs and respective metering points which are connected to the sub-station but under the ownership of different project promoters. Since MSPL does not have any ownership or control over any of these meters (bulk meter and meters of other WTGs connected to substation), they are not covered under the monitoring plan.

For calculation of transmission losses, the following equation from the PPA is applied:

Transmission losses =  $X_1 \times Z\%$

where,

$X_1$  is the reading of the energy meter installed at the Project Site

$Z$  is the percentage transmission line loss incurred in the transmission line between the project and receiving station and is determined as:

$$Z = \left\{ \frac{(X_1 + X_2 + X_3 + X_4 + \dots) - Y}{(X_1 + X_2 + X_3 + X_4 + \dots)} \right\} \times 100$$

Where,

$Y$  is the reading of the bulk energy meter installed on the 66 KV side of the receiving station

$X_2, X_3, X_4$ , etc. are the readings of the energy meters installed at the various other individual wind power projects connected to the receiving station

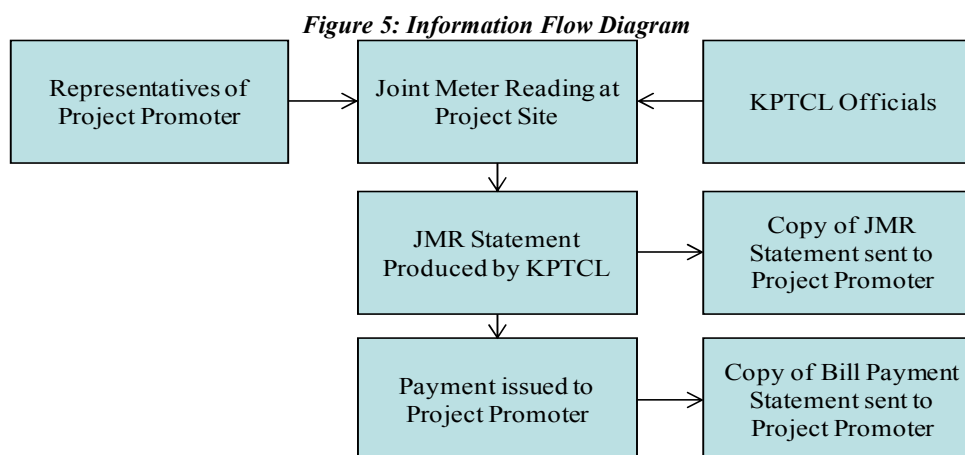
Every month, the JMR statements (Form B), reporting the electricity units exported, units imported, and transmission losses, are issued to project promoters. The same parameters are also reported in the Pro Forma Invoices (power purchase bill) issued by BESCOM at the time of releasing payments. In case of any discrepancy in values between the JMR statements and Pro Forma Invoices; the more conservative values are applied for emission reduction calculations.

The net electricity supplied to the grid, which is used to calculate the baseline emissions, is calculated by the monitoring team as the units exported less units imported less transmission losses.

**Data collection procedures:**

The monthly Joint Meter Reading (JMR) Statements issued by KPTCL, report the electricity export and import from respective metering points and also the losses from transmission of electricity to respective substations. The values reported in JMR Statements can be cross-checked with those reported in Bill Payment Statements (also referred to as Pro Forma Invoices).

Joint meter readings at the metering points are taken by KPTCL officials and representatives of the project promoters (operation & maintenance contractors). JMR Statements are generated for each of the metering points by KPTCL and copies are sent to the respective project promoters. Against the JMR Statements, the Bill Payment Statements are generated by BESCOM and copies are sent to respective project promoters. Payments against sale of electricity are released by BESCOM to project promoters as per the Bill Payment Statements. This procedure is illustrated in the following diagram:

**Quality Control and Quality Assurance procedures:**

18 main meters and check meters are installed for monitoring the energy exported. Each meter is jointly inspected and sealed by both parties (project promoter and MESCOM/KPTCL) and shall not be interfered with by either of the Party except in the presence of the other Party or its accredited representatives. The calibration of main and check meters is carried out on an annual basis. The meters shall be deemed to be working satisfactorily, if the errors are within 0.2% for the 0.2 accuracy class energy meters. If the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the limits, the main meter reading is considered as usual and the check meter is calibrated immediately. If the main meter is found to be beyond the permissible limits of error, but corresponding check meter is within limits, then the check meter reading is adopted for that period and the main meter is calibrated immediately. During the monitoring period, all the main and check meters were found to be working satisfactorily and were within the required accuracy limit. However, there were instances where the check meter or the main meter malfunctioned (due to error in display, etc.) during the monitoring period. Wherever the main meters readings could not be considered due to the malfunction, the check meter readings were used for billing and for calculation of emission reductions. These instances have been marked in the monitoring data spreadsheet submitted to the DOE. The relevant details of the energy meter replacements are given in 'Annexure 1: Energy meter specifications' and have been highlighted in yellow.

**Meter calibration:**

As per the monitoring plan, the energy meters have to be calibrated annually. In case of delay in calibration of any energy meters, as a conservative measure, emission reductions have to be adjusted to account for this delay. It can be found, however, that during the monitoring period, all meters were calibrated within the required frequency of one year. The details of the calibration are tabulated below:

*Table 5: Energy meter calibration details*

| Meter ID            | Date of last calibration of meters | Scheduled date of next calibration | Actual Calibration date                | Delay in calibration |
|---------------------|------------------------------------|------------------------------------|--|----------------------|
| RR NO. MRB-03-K-131 | 01 July,2010                       | 01 July,2011                       | 11 April,2011                          | No delay             |
| RR NO. MRB-03-K-140 | 01 July,2010                       | 01 July,2011                       | 17 June,2011                           | No delay             |
| RR NO. MRB-03-K141  | 1 July,2010                        | 1 July,2011                        | 17 June,2011                           | No delay             |
| RR NO MRB-03-K147   | 30 June,2010                       | 30 June,2011                       | 17 June,2011                           | No delay             |
| RR NO MRB-03-K-161  | 1 July,2010                        | 1 July,2011                        | 17 June,2011                           | No delay             |
| RR NO JJK-05        | 26 June,2010                       | 26 June,2011                       | 10 June,2011                           | No delay             |
| RR NO JJK-06        | 21 June,2010                       | 21 June,2011                       | 10 June,2011                           | No delay             |
| RR NO JJK-07        | 22 June,2010                       | 22 June,2011                       | 10 June,2011                           | No delay             |
| RR NO JJK- 08       | 21 June,2010                       | 21 June,2011                       | 10 June,2011                           | No delay             |
| RR NO JMT-01        | 19 November,2010                   | 19 November,2011                   | 18 February,2011 and 28 December,2011  | No delay             |
| RR NO JMT-03        | 19 November,2010                   | 19 November,2011                   | 20 June,2011                           | No delay             |
| RR NO JMT-05        | 28 December,2010                   | 28 December,2011                   | 15 August,2011<br>28 December,2012     | No delay             |
| RR NO. GRHP-01      | 26 November,2010                   | 26 November,2011                   | 10 August,2011                         | No delay             |
| RR NO. GRHP-05      | 12 November,2010                   | 12 November,2011                   | 11 May,2011                            | No delay             |
| RR NO. GRHP-06      | 28 April,2010                      | 28 April,2011                      | 11 February,2011 and 25 November, 2011 | No delay             |
| RR NO. GRHP-08      | 26 November,2010                   | 26 November,2011                   | 13 May,2011                            | No delay             |
| RR NO. GRHP-09      | 29 November,2010                   | 29 November,2011                   | 17 May,2011                            | No delay             |
| RR NO. GRHP-14      | 26 November,2010                   | 26 November,2011                   | 13 May,2011                            | No delay             |

**Management Roles & Responsibilities:**

The Wind Division of MSPL reports to the Business Head of the Wind Division who reports directly to the Board of MSPL Limited. The Management and Corporate Staff of the MSPL Wind Division are responsible for coordinating with Site Personnel as well as the O&M contractors and the power off-takers (KPTCL & BESCOM). Site personnel are located at individual sites and are responsible for collection and transfer of monitored data from respective sites to the corporate office. The CDM team has the following overall functions:

- Collection of monitoring data for power generation by the project activity
- Maintenance of records and backup of relevant data for verification
- Coordination with KPTCL for maintenance and calibration of monitoring equipment
- Coordination with O&M contractors to ensure continuous functioning of WTGs

**Emergency Preparedness:**

The operation and maintenance team is responsible for maintaining the physical and functional integrity of the project equipment. At every WTG location Tower/control room, the transformer yard has all necessary fire fighting equipments like fire buckets with sand and fire extinguishers. Fire extinguishers have been placed at each Monitoring stations/control room permanently. No emergency situations were reported during the monitoring period.

**SECTION D. Data and parameters****D.1. Data and parameters fixed ex ante or at renewal of crediting period**

| Data/Parameter     | EF <sub>y</sub>  |
|--------------------|--|
| Unit               | tCO <sub>2</sub> /MWh  |
| Description        | CO <sub>2</sub> emission factor of the grid  |
| Source of data     | KPTCL/CEA  |
| Value(s) applied   | 0.9071   |
| Purpose of data    | Calculation of baseline emissions  |
| Additional comment | This parameter is calculated once at the beginning of the crediting period (i.e. fixed ex-ante). |

| Data/Parameter     | EF <sub>OM,y</sub>   |
|--------------------|--|
| Unit               | tCO <sub>2</sub> /MWh  |
| Description        | CO <sub>2</sub> operating margin emission factor of the grid                                     |
| Source of data     | KPTCL/CEA  |
| Value(s) applied   | 1.18519  |
| Purpose of data    | Calculation of baseline emissions  |
| Additional comment | This parameter is calculated once at the beginning of the crediting period (i.e. fixed ex-ante). |

| Data/Parameter     | EF <sub>BM,y</sub>   |
|--------------------|--|
| Unit               | tCO <sub>2</sub> /MWh  |
| Description        | CO <sub>2</sub> build margin emission factor of the grid   |
| Source of data     | KPTCL/CEA  |
| Value(s) applied   | 0.629  |
| Purpose of data    | Calculation of baseline emissions  |
| Additional comment | This parameter is calculated once at the beginning of the crediting period (i.e. fixed ex-ante). |



|                           |  |
|---------------------------|--|
| <b>Data/Parameter</b>     | <b><math>F_{i,j,y}</math></b>  |
| <b>Unit</b>               | Tons   |
| <b>Description</b>        | Amount of fossil fuel $i$ , consumed by each power source/plant in year $y$                      |
| <b>Source of data</b>     | KPTCL/CEA  |
| <b>Value(s) applied</b>   | Refer annexure 2 “Ex-ante Values”  |
| <b>Purpose of data</b>    | Calculation of baseline emissions  |
| <b>Additional comment</b> | This parameter is calculated once at the beginning of the crediting period (i.e. fixed ex-ante). |

|                           |  |
|---------------------------|--|
| <b>Data/Parameter</b>     | <b><math>COEF_{i,j,y}</math></b>   |
| <b>Unit</b>               | tCO <sub>2</sub> /ton of fuel  |
| <b>Description</b>        | CO <sub>2</sub> emission factor of each fuel type $i$  |
| <b>Source of data</b>     | IPCC/local   |
| <b>Value(s) applied</b>   | Refer annexure 2 “Ex-ante Values”  |
| <b>Purpose of data</b>    | Calculation of baseline emissions  |
| <b>Additional comment</b> | This parameter is calculated once at the beginning of the crediting period (i.e. fixed ex-ante). |

|                           |  |
|---------------------------|--|
| <b>Data/Parameter</b>     | <b><math>GEN_{j,y}</math></b>  |
| <b>Unit</b>               | MWh/annum  |
| <b>Description</b>        | Electricity delivered to the grid by power source $j$ in year $y$                                |
| <b>Source of data</b>     | KPTCL/CEA  |
| <b>Value(s) applied</b>   | Refer annexure 2 “Ex-ante Values”  |
| <b>Purpose of data</b>    | Calculation of baseline emissions  |
| <b>Additional comment</b> | This parameter is calculated once at the beginning of the crediting period (i.e. fixed ex-ante). |

**D.2. Data and parameters monitored**

|  |  |
|--|--|
| <b>Data/Parameter</b>                        | <b>EG<sub>y</sub></b>  |
| <b>Unit</b>                                  | MWh  |
| <b>Description</b>                           | Electricity supplied to the grid by the project activity   |
| <b>Measured/Calculated/Default</b>           | Calculated   |
| <b>Source of data</b>                        | KPTCL and BESCO records  |
| <b>Value(s) of monitored parameter</b>       | 275,640.984<br>(month-wise values can be found in the electronic spreadsheet for emission reductions)  |
| <b>Monitoring equipment</b>                  | The parameter is a calculated figure based on the values of gross electricity export from the project activity, electricity import by the project activity and transmission losses. The monitoring equipment used to measure the electricity export and the electricity import has been described in the relevant section. |
| <b>Measuring/Reading/Recording frequency</b> | Monthly recording  |
| <b>Calculation method (if applicable)</b>    | The electricity supplied to the grid by the project activity is calculated as follows:<br>$EG_y = E_{EXP,y} - E_{TL,y} - 115\% * E_{IMP,y}$ Where,<br>$E_{EXP,y}$ = Gross electricity export from the project activity<br>$E_{TL,y}$ = Transmission losses<br>$E_{IMP,y}$ = Electricity import by the project activity     |
| <b>QA/QC procedures</b>                      | There are no QA/QC procedures to be followed as the data parameter is a calculated figure.   |
| <b>Purpose of data</b>                       | Calculation of baseline emissions  |
| <b>Additional comment</b>                    | -  |



|  |   |
|--|---|
| <b>Data/Parameter</b>                        | <b>E<sub>EXP,y</sub></b>  |
| <b>Unit</b>                                  | <b>MWh</b>  |
| <b>Description</b>                           | Gross electricity export from the project activity  |
| <b>Measured/Calculated/Default</b>           | Measured  |
| <b>Source of data</b>                        | KPTCL and BESCO records   |
| <b>Value(s) of monitored parameter</b>       | 280,652.160<br>(month-wise values can be found in the electronic spreadsheet for emission reductions)   |
| <b>Monitoring equipment</b>                  | All the energy meters are electronic tri-vector meters of accuracy class 0.2%. Other energy meter details (such as serial numbers & meter make) are provided in Annexure 1: Energy meter specification and energy meter calibration details are provided in Table 5 in Section C of this MR.  |
| <b>Measuring/Reading/Recording frequency</b> | Recording frequency: On a monthly basis, joint meter readings (JMRs) of the energy meters located at the 18 metering points are recorded by representatives of the project promoter and the respective government authorities.  |
| <b>Calculation method (if applicable)</b>    | Not Applicable  |
| <b>QA/QC procedures</b>                      | The values of gross electricity export from the project activity in JMR statements are compared with values in proforma invoices and the more conservative (i.e. lower) among the two have been considered. It is to be noted that during the monitoring period, there are no differences observed in the values of gross electricity export recorded in the JMR and in the proforma invoice. |
| <b>Purpose of data</b>                       | Calculation of baseline emissions   |
| <b>Additional comment</b>                    | -   |



|  |  |
|--|--|
| <b>Data/Parameter</b>                        | <b>E<sub>IMP,y</sub></b>   |
| <b>Unit</b>                                  | <b>MWh</b>   |
| <b>Description</b>                           | Electricity import by the project activity   |
| <b>Measured/Calculated/Default</b>           | Measured   |
| <b>Source of data</b>                        | KPTCL and BESCO records  |
| <b>Value(s) of monitored parameter</b>       | 558.885<br>(month-wise values can be found in the electronic spreadsheet for emission reductions)  |
| <b>Monitoring equipment</b>                  | All the energy meters are electronic tri-vector meters of accuracy class 0.2%. Other energy meter details (such as serial numbers & meter make) are provided in Annexure 1: Energy meter specification and energy meter calibration details are provided in Table 5 in Section C of this MR.   |
| <b>Measuring/Reading/Recording frequency</b> | Recording frequency: On a monthly basis, joint meter readings (JMRs) of the energy meters located at the 18 metering points are recorded by representatives of the project promoter and the respective government authorities.   |
| <b>Calculation method (if applicable)</b>    | Not Applicable   |
| <b>QA/QC procedures</b>                      | The values of electricity import from the project activity in JMR statements are compared with values in proforma invoices and the more conservative (i.e. higher) among the two have been considered. It is to be noted that during the monitoring period, there are no differences observed in the values of electricity import recorded in the JMR and in the proforma invoice. |
| <b>Purpose of data</b>                       | Calculation of baseline emissions  |
| <b>Additional comment</b>                    | -  |





|  |  |
|--|--|
| <b>Data/Parameter</b>                        | $E_{TL,y}$   |
| <b>Unit</b>                                  | MWh  |
| <b>Description</b>                           | Transmission losses  |
| <b>Measured/Calculated/Default</b>           | Calculated<br>(month-wise values can be found in the electronic spreadsheet for emission reductions)   |
| <b>Source of data</b>                        | KPTCL and BESCOM records   |
| <b>Value(s) of monitored parameter</b>       | 4,368.458  |
| <b>Monitoring equipment</b>                  | This is a calculated parameter.  |
| <b>Measuring/Reading/Recording frequency</b> | Monthly recording  |
| <b>Calculation method (if applicable)</b>    | This parameter is calculated based on the measured values of electricity export from the bulk meter at the substation and export from individual meters connected to the substation. These electricity export values are measured on an hourly basis and are recorded on a monthly basis. The transmission losses have been calculated from these monthly recordings of electricity export and the transmission loss calculation sheets are submitted by KPTCL every month along with the JMRs. Details on calculation of transmission losses are provided under “Calculation of transmission losses” under section C. “Description of the monitoring system” of this monitoring report. |
| <b>QA/QC procedures</b>                      | The values of transmission losses in JMR statements are compared with values in proforma invoices and the more conservative (i.e. higher) among the two have been considered. It is to be noted that during the monitoring period, there are no differences observed in the values of transmission loss recorded in the JMR and in the proforma invoice.   |
| <b>Purpose of data</b>                       | Calculation of baseline emissions  |
| <b>Additional comment</b>                    | -  |

### D.3. Implementation of sampling plan

>>

All data and parameters are monitored completely. No sampling approach has been used to determine any of the data or parameters. Hence this section is not applicable.

## SECTION E. Calculation of emission reductions or GHG removals by sinks

### E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

The baseline emissions are calculated as the product of the electricity supplied to the grid by the project activity ( $EG_y$ ) in MWh and the Baseline Emission Factor ( $EF_y$ ) of the Southern Regional grid of India in  $tCO_2/MWh$ . The baseline emission factor was fixed ex-ante as 907.1  $tCO_2/MU$  or 0.9071  $tCO_2/MWh$ . Therefore baseline emissions are calculated as:



$$BE_y = EG_y * EF_y = 275,640.984 * 0.9071 = 250,033$$

*Table 6: Summary of baseline emissions calculations*

| Parameter  | Units                 | Period: April 2011 - March 2012 |
|--|-----------------------|---------------------------------|
| Gross electricity export from the project activity ( $E_{EXP,y}$ )     | MWh                   | 280,652.160                     |
| Electricity import by the project activity ( $E_{IMP,y}$ )             | MWh                   | 558.885                         |
| Transmission losses ( $E_{TL,y}$ )                                     | MWh                   | 4,368.458                       |
| Electricity supplied to the grid by the project activity ( $EG_y$ )    | MWh                   | 275,640.984                     |
| CO <sub>2</sub> emission factor of the grid (fixed ex-ante) ( $EF_y$ ) | tCO <sub>2</sub> /MWh | 0.9071                          |
| Baseline Emissions ( $BE_y$ )  | tCO <sub>2</sub> /MWh | 250,033                         |

The detailed monitoring data spreadsheet showing the energy meter readings and calculation of emission reductions has been submitted to the DOE.

## E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

In accordance with the applied methodology and the registered PDD, there are no project emissions for the project activity.

Therefore,  $PE_y = 0$  tCO<sub>2</sub>e

## E.3. Calculation of leakage

>>

In accordance with the applied methodology and the registered PDD, there are no leakage emissions for the project activity.

Therefore,  $L_y = 0$  tCO<sub>2</sub>e

## E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

| Time Period  | Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e) | Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e) | Leakage (tCO <sub>2</sub> e) | Emission reductions or net anthropogenic GHG removals by sinks (tCO <sub>2</sub> e) |
|--------------|---|--|------------------------------|---|
| <b>Total</b> | 250,033   | 0  | 0                            | 250,033   |

## E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

| Item   | Values estimated in ex-ante calculation of registered PDD | Actual values achieved during this monitoring period |
|--|---|--|
| <b>Emission reductions or GHG removals by sinks (tCO<sub>2</sub>e)</b> | 275,129   | 250,033  |

## E.6. Remarks on difference from estimated value in registered PDD

>>

As can be observed in the table, the actual emission reductions achieved during the current monitoring period are lower than that stated in the registered CDM-PDD. The difference in emission reductions can be attributed to the difference between the ex-ante estimation of PLF and the actual PLF for the



monitoring period. The annual electricity export to KPTCL considered in the registered PDD is 303.3 Million Units. This corresponds to a PLF of 27.67%. The PLF achieved during the monitoring period is 25.60%. These values are calculated based on the gross electricity export from project activity for the relevant periods.

Wind is an intermittent source of energy, which may vary from season to season, and is a primary determining factor for PLF. Because of this intermittent nature of wind, the actual PLF attained by the project activity during the monitoring period is lower than the ex-ante estimation of the PLF.

-----

**ANNEXURE I: ENERGY METER SPECIFICATION**

| Sl.No | Meter ID            | No. of WTGs | Connected WTG Location Nos                 | Connected Capacity (MW) | Substation                                  | Main Meter No.                 | Check Meter No.                | Accuracy class | Energy Meter Make | Calibration agency (External / Internal)                        |
|-------|---------------------|-------------|--|-------------------------|---|--------------------------------|--------------------------------|----------------|-------------------|---|
| 1     | RR NO. MRB-03-K-131 | 11          | K121 to K131                               | 13.75                   | Suzlon 33/66 KV Substation at Sogi          | 4249306                        | 4249312                        | ±0.2%          | L&T               | External (Gulbarga Electricity Supply Company Limited (GESCOM)) |
| 2     | RR NO. MRB-03-K-140 | 9           | K132 to K140                               | 11.25                   | Suzlon 33/66 KV Substation at Sogi          | 4249330                        | 4249308                        | ±0.2%          | L&T               | External (Gulbarga Electricity Supply Company Limited (GESCOM)) |
| 3     | RR NO. MRB-03-K-141 | 6           | K141 to K146                               | 7.5                     | Suzlon 33/66 KV Substation at Sogi          | 4249305                        | 4249310                        | ±0.2%          | L&T               | External (Gulbarga Electricity Supply Company Limited (GESCOM)) |
| 4     | RR NO MRB-03-K-147  | 8           | K147 to K150 & K153 to K156                | 10                      | Suzlon 33/66 KV Substation at Sogi          | 4249359                        | 4249354                        | ±0.2%          | L&T               | External (Gulbarga Electricity Supply Company Limited (GESCOM)) |
| 5     | RR NO MRB-03-K-161  | 6           | K161 to K166                               | 7.5                     | Suzlon 33/66 KV Substation at Sogi          | 4249295                        | 4249296                        | ±0.2%          | L&T               | External (Gulbarga Electricity Supply Company Limited (GESCOM)) |
| 6     | RR NO JJK-06        | 14          | K167 to K180                               | 17.5                    | Suzlon 33/66 KV Substation at Jajjikalgudda | 6604982                        | 4249329                        | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 7     | RR NO JJK-07        | 3           | K181 to K183                               | 3.75                    | Suzlon 33/66 KV Substation at Jajjikalgudda | 4249320                        | 4249360                        | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 8     | RR NO JJK-08        | 4           | K184 to K187                               | 5                       | Suzlon 33/66 KV Substation at Jajjikalgudda | 4249346                        | 4249340                        | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 9     | RR NO JJK-05        | 13          | K188 to K200                               | 16.25                   | Suzlon 33/66 KV Substation at Jajjikalgudda | 4249322                        | 4249323                        | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 10    | RR NO JMT-05        | 1           | K28  | 1.25                    | Suzlon 33/66 KV Substation at Jogimatti     | Old: 04249341<br>New: 09142614 | Old: 04249345<br>New: 11068954 | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 11    | RR NO JMT-03        | 3           | K33 to K35                                 | 3.75                    | Suzlon 33/66 KV Substation at Jogimatti     | Old: 04249362<br>New: 09142201 | 8001367                        | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 12    | RR NO. GRHP-01      | 4           | MSPL7 to MSPL10                            | 3.8                     | NEG MICON 33/66 KV Substation at G.R. Halli | 2307542                        | 2307543                        | ±0.2%          | ABB               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |
| 13    | RR NO. GRHP-08      | 6           | MSPL11, MSPL12A, MSPL12B, MSPL14 to MSPL16 | 5.3                     | NEG MICON 33/66 KV Substation at G.R. Halli | 4186306                        | 4186299                        | ±0.2%          | L&T               | External (Karnataka Power Transmission Corporation Ltd (KPTCL)) |



| Sl.No | Meter ID       | No. of<br>WTGs | Connected WTG<br>Location Nos | Connected<br>Capacity<br>(MW) | Substation                                     | Main Meter<br>No.              | Check Meter<br>No. | Accur<br>acy<br>class | Energy<br>Meter<br>Make | Calibration agency<br>(External / Internal)                        |
|-------|----------------|----------------|-------------------------------|-------------------------------|--|--------------------------------|--------------------|-----------------------|-------------------------|--|
| 14    | RR NO. GRHP-09 | 5              | MSPL17 to MSPL21              | 3.75                          | NEG MICON 33/66 KV<br>Substation at G.R. Halli | 9141515                        | 4186304            | ±0.2%                 | L&T                     | External (Karnataka Power Transmission<br>Corporation Ltd (KPTCL)) |
| 15    | RR NO. GRHP-05 | 4              | MSPL22 to MSPL25              | 3.8                           | NEG MICON 33/66 KV<br>Substation at G.R. Halli | 9142205                        | 4179678            | ±0.2%                 | L&T                     | External (Karnataka Power Transmission<br>Corporation Ltd (KPTCL)) |
| 16    | RR NO. GRHP-06 | 3              | MSPL26 to MSPL28              | 2.85                          | NEG MICON 33/66 KV<br>Substation at G.R. Halli | 4179664                        | 4179679            | ±0.2%                 | L&T                     | External (Karnataka Power Transmission<br>Corporation Ltd (KPTCL)) |
| 17    | RR NO. GRHP-14 | 2              | MSPL29 to MSPL30              | 1.9                           | NEG MICON 33/66 KV<br>Substation at G.R. Halli | 4186311                        | 4186289            | ±0.2%                 | L&T                     | External (Karnataka Power Transmission<br>Corporation Ltd (KPTCL)) |
| 18    | RR NO JMT-01   | 5              | K23 to K27                    | 6.25                          | Suzlon 33/66 KV<br>Substation at Jogimatti     | Old: 04179551<br>New: 04186263 | 4186263            | ±0.2%                 | L&T                     | External (Karnataka Power Transmission<br>Corporation Ltd (KPTCL)) |
| TOTAL |                | 107            |                               | 125.15                        |  |                                |                    |                       |                         |  |

ANNEXURE II: EX-ANTE VALUES<sup>2</sup>Amount of fossil fuel *i*, consumed by each power source/plant ( $F_{i,j,y}$ )

| Parameter   | Year    | Coal      | Furnace oil | Diesel oil | LSHS (steam) | Gas                  | Naphtha   | HSD (gas stations) | Natural Gas                  | Diesel    | LSHS (diesel) | Lignite   |
|-------------|---------|-----------|-------------|------------|--------------|----------------------|-----------|--------------------|------------------------------|-----------|---------------|-----------|
| $F_{i,j,y}$ | Unit    | Tons/year | Tons/year   | Tons/year  | Tons/year    | m <sup>3</sup> /year | Tons/year | Tons/year          | Million m <sup>3</sup> /year | Tons/year | Tons/year     | Tons/year |
|             | 2001-02 | 53107000  | 115103.7    | 5821.65    | 7321.6       | 0.00                 | 149197.41 | 4614.65            | 3230                         | 648561.05 | 0             | 17318250  |
|             | 2002-03 | 65997000  | 103163.46   | 7145.95    | 5361.84      | 0                    | 322854.84 | 233853.7           | 3130                         | 736047.3  | 0             | 17738000  |
|             | 2003-04 | 52985000  | 50275.21    | 28076.35   | 4672.8       | 1932274000           | 478596.51 | 192933.85          | 2010                         | 12667.55  | 569756.88     | 20755000  |

CO<sub>2</sub> emission factor of each fuel type *i* ( $COEF_{i,j,y}$ )

| Parameter      | Year    | Coal                          | Furnace oil                   | Diesel oil                    | LSHS (steam)                  | Gas                                      | Naphtha                       | HSD (gas stations)            | Natural Gas                                     | Diesel                        | LSHS (diesel)                 | Lignite                       |
|----------------|---------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--|-------------------------------|-------------------------------|---|-------------------------------|-------------------------------|-------------------------------|
| $COEF_{i,j,y}$ | Unit    | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /ton of fuel | kgCO <sub>2</sub> /m <sup>3</sup> of gas | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /million m <sup>3</sup> of gas | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /ton of fuel | tCO <sub>2</sub> /ton of fuel |
|                | 2001-02 | 1.91                          | 3.19                          | 3.16                          | 3.18                          | NA                                       | 3.284                         | 3.160                         | 2120.024  | 3.16                          | 3.18                          | 1.09                          |
|                | 2002-03 | 1.64                          | 3.26                          | 3.00                          | 3.20                          | NA                                       | 3.284                         | 2.996                         | 2120.024  | 3.00                          | 3.20                          | 1.12                          |
|                | 2003-04 | 1.51                          | 3.15                          | 3.13                          | 3.13                          | 0.47                                     | 3.284                         | 3.127                         | 2120.024  | 3.13                          | 3.13                          | 1.14                          |

Electricity delivered to the grid by power source *j* in year *y* ( $GEN_{j,y}$ )

| Parameter   | Year    | Coal & Lignite | Gas      | Diesel  |
|-------------|---------|----------------|----------|---------|
| $GEN_{j,y}$ | Unit    | MWh            | MWh      | MWh     |
|             | 2001-02 | 84031.63       | 10329.45 | 4135.12 |
|             | 2002-03 | 92053.19       | 13950.10 | 4358.50 |
|             | 2003-04 | 95898.00       | 16949.00 | 3225.00 |

<sup>2</sup> All values are taken from the registered PDD