# 13.75 MW wind power project in Davangere, Karnataka, India

Document Prepared By (Sargam Retails Pvt. Limited)

| | |
|---|---|
| **Project Title** | 13.75 MW wind power project in Davangere, Karnataka, India |
| **Version** | 02 |
| **Date of Issue** | 28th July 2011 |
| **Project ID** | 3700 |
| **Monitoring Period** | 31st March 2009 to 06th January 2011 |
| **Prepared By** | Sargam Retails Pvt. Limited |
| **Contact** | Sargam Retails Pvt. Limited, Indira Gandhi Marg,<br>Malpani House,<br>Sangamner,<br>Maharashtra, ZIP- 422605<br>Telephone: +91 2425 225011<br>Email id: prafulla@malpani.com<br>URL: www.malpani.com |

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# 1 PROJECT DETAILS

## 1.1 Summary Description of Project

The project activity leads to the installation of 10 Wind Turbine Generators (WTGs) of total generating capacity of 13.75 MW (5 nos of Suzlon make S 82 WTGs each having generating capacity of 1500 kW & 5 nos of Suzlon make S 64 WTGs each having generating capacity of 1250 kW). The WTGs are located in Davangere district of Karnataka state of India.

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for supply to Karnataka Power Transmission Company Limited (KPTCL) and to contribute to climate change mitigation efforts. This renewable energy produced is partially contributing to the electricity provided by the KPTCL.

The project utilizes wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants thus, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions.

## 1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Type:
Sectoral Scope: 01 Energy Industries (renewable/non-– Renewable sources).
Type I: Renewable Energy project
Category D: “Grid connected renewable electricity generation” (Version 15).

## 1.3 Project Proponent

Contact information of the person & entity responsible for completing the monitoring report form is as below.

| | |
|---|---|
| Organization: | Sargam Retails Pvt. Limited |
| Street/P.O.Box: | Indira Gandhi Marg, |
| Building: | Malpani House, |
| City: | Sangamner |
| State/Region: | Maharashtra |
| Postcode/ZIP: | 422605 |
| Country: | India |
| Telephone: | +91 2425 225011 |
| FAX: | +91 2425 225003 |

| | |
|---|---|
| E-Mail: | prafulla@malpani.com |
| URL: | www.malpani.com |
| Represented by: | |
| Title: | Head- Wind Power Projects |
| Salutation: | Mr. |
| Last Name: | Khinvasara |
| Middle Name: | Premchand |
| First Name: | Prafulla |
| Direct Fax | +91 2425 225003 |
| Mobile: | +91 9822322145 |
| Direct tel: | +91 2425 225011 (Extension 215) |
| Personal E-Mail: | prafulla@malpani.com |

**Roles and responsibilities:**
**Director:** In the project management structure Director is responsible for the project management. He is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organising third party contractors, revenue collection from BESCOM etc.
The Director will check the monthly electricity generated and annual emission reduction calculations.
Operation and maintenance of wind generators is done by Suzlon Infrastructure Services Limited and they are responsible to Director.

**Head- Wind Power Projects:** Head- Wind Power Projects is assisting to director for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He crosschecks the log book regularly and report to Director for any abnormality.

**Shift In-charge:** Shift in charge is responsible for recording the electricity meter reading in the KPTCL meter.

**Record Handling:** OEM contractors are collecting daily report with all the related parameters. All the records is given to Director on every month. The Director has final responsibility for record keeping.
The O&M personnel are qualified engineers and are trained at the WTG manufacturing facility of Suzlon Energy Limited at Daman & Pondicherry for operating and ensuring best performance of the WTGs. The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the PPA (power purchase agreement) with KPTCL

## 1.4 Other Entities Involved in the Project

Not applicable

## 1.5 Project Start Date

The project start date is 31st March 2009 that is the date of the commissioning of first WTG.

## 1.6 Project Crediting Period

The start date of the crediting period is from 31st March 2009 that is the date of the commissioning of first WTG and the end date is 6th January 2011 that is one day prior to the date of registration of the project under CDM.

## 1.7 Project Location

The project activity is located at Davangere in the state of Karnataka.

Davangere: 14º 27'13.39''N, 75º 55'08.15''E,

**Latitude & Longitude:**

| **Location Details of M/s Sargam Retails** | | | | | |
|---|---|---|---|---|---|
| **Capacity** | **Location No.** | **R.S. No.** | **Village** | **Taluka** | **District** |
| 1.5 MW | K-543 | 111 | Yaraganal | Honnali | Davangere |
| 1.5 MW | K-544 | 111 | Yaraganal | Honnali | Davangere |
| 1.5 MW | K-549 | 28 | Kudurekonda | Honnali | Davangere |
| 1.5 MW | K-550 | 28 | Kudurekonda | Honnali | Davangere |
| 1.5 MW | K-551 | 28 | Kudurekonda | Honnali | Davangere |
| 1.25 MW | K-538 | 111 | Yaraganal | Honnali | Davangere |
| 1.25 MW | K-539 | 111 | Yaraganal | Honnali | Davangere |
| 1.25 MW | K-540 | 111 | Yaraganal | Honnali | Davangere |
| 1.25 MW | K-541 | 111 | Yaraganal | Honnali | Davangere |
| 1.25 MW | K-542 | 111 | Yaraganal | Honnali | Davangere |

| WEG | Capacity (MW) | Taluka | District | Latitude | Longitude |
|---|---|---|---|---|---|
| K-543 | 1.5 MW | Honnali | Davangere | 14°09'17.4" | 75°30'11.9" |
| K-544 | 1.5 MW | Honnali | Davangere | 14°09'10.4" | 75°30'17.6" |
| K-549 | 1.5 MW | Honnali | Davangere | 14°09'03.2" | 75°30'23.1" |
| K-550 | 1.5 MW | Honnali | Davangere | 14°08'57.2" | 75°30'29.9" |
| K-551 | 1.5 MW | Honnali | Davangere | 14°08'51.2" | 75°30'36.7" |
| K-538 | 1.25 MW | Honnali | Davangere | 14°08'45.3" | 75°30'43.7" |
| K-539 | 1.25 MW | Honnali | Davangere | 14°08'39.5" | 75°30'50.9" |
| K-540 | 1.25 MW | Honnali | Davangere | 14°08'13.3" | 75°31'32.4" |
| K-541 | 1.25 MW | Honnali | Davangere | 14°08'07.4" | 75°31'38.8" |
| K-542 | 1.25 MW | Honnali | Davangere | 14°07'59.5" | 75°31'44.1" |

In this project activity, the project boundary is composed of 10 Wind Turbine Generators and the metering equipment for the generator and substation, and the grid (Southern regional grid) which is used to transmit the generated electricity.

The details of the meters at 33 kV end have been provided below:

| WTGs | WTG Location No. | Main Meter No. | Check Meter No. |
|---|---|---|---|
| 5 x 1.25 MW | K-538, K-539, K-540, K-541, K-542 | 08001351 | 08001352 |
| 5 x 1.5 MW | K-543, K-544, K-549, K-550, K-551 | 08001358 | 08001371 |

### 1.8 Title and Reference of Methodology

The project activity has applied following baseline and monitoring methodology
Title: AMS – I.D – Grid connected renewable electricity generation
Type: I – Renewable Energy project
Version: 15
Reference: The list of the small-scale CDM project activity categories contained in 'Appendix B of the simplified M&P for small-scale CDM project activities'

# 2 IMPLEMENTATION STATUS

## 2.1 Implementation Status of the Project Activity

Starting date of the operation of the project activity 31st March 2009, which is the earliest date of commissioning of the wind mill of the project activity and 29th May 2009 which is date of the commissioning of the last WTG of the project activity.

The commissioning dates of the WTGs installed in the project activity have been provided in the table below:

| Capacity | WTG Location No | Commissioning Dates |
|---|---|---|
| 1.5 MW x 05 Nos | K-543, K-544, K-549, K-550, K-551 | 31st March 2009 |
| 1.25 MW x 04 Nos | K-538, K-539, K-541, K-542 | 31st March 2009 |
| 1.25 MW x 01 Nos | K-540 | 29th May 2009 |

The project activity consists of 10 number WTG's totalling 13.75 MW capacity and supplying the entire electricity to Karnataka Power Transmission Company Limited (KPTCL). There has been no major downtime of equipments, overhaul times or exchange of equipments in the project activity during the current monitoring period.

The project activity is not an *AFOLU* type of project, hence not applicable.

## 2.2 Deviations from the Monitoring Plan

Not Applicable

## 2.3 Grouped Project

Not Applicable.

# 3 DATA AND PARAMETERS

## 3.1 Data and Parameters Available at Validation

| Data Unit / Parameter: | $EF_y$ |
|---|---|
| Data unit: | $tCO_2$ / MWh |
| Description: | Combined Margin grid emission Factor |

| | |
|---|---|
| Source of data: | CEA website Version :04 (Valid from 1st September 2008)[1] |
| Value applied: | 0.927 |
| Purpose of the data: | The value is used for the calculation of Baseline emissions. |
| Any comment: | - |

| | |
|---|---|
| Data Unit / Parameter: | **$EF_{OM,y}$** |
| Data unit: | $tCO_2$ / MWh |
| Description: | $CO_2$ Operating Margin emission factor of the grid |
| Source of data: | CEA website Version :04 (Valid from 1st September 2008)[2] |
| Value applied: | 1.00 |
| Purpose of the data: | The value is used for the calculation of Baseline emissions. |
| Any comment: | - |

| | |
|---|---|
| Data Unit / Parameter: | **$EF_{BM,y}$** |
| Data unit: | $tCO_2$ / MWh |
| Description: | $CO_2$ Built Margin emission factor of the grid |
| Source of data: | CEA website Version :04 (Valid from 1st September 2008)[3] |
| Value applied: | 0.71 |
| Purpose of the data: | The value is used for the calculation of Baseline emission. |
| Any comment: | The Emission factor is fixed ex-ante. |

### *3.2* Data and Parameters Monitored

| | |
|---|---|
| Data Unit / Parameter: | **$EG_{Net\ Exported}$ ($EG_{Net\ Exported} = EG_{Exported} - EG_{Import} - EG_{Transmission\ Losses}$)** |
| Data unit: | MWh |

[1] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

[2] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

[3] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

| | |
|---|---|
| Description: | Net Electricity Exported |
| Source of data: | Credit report sheets (As per KPTCL/BESCOM Form B) / invoices whichever is conservative |
| Description of measurement methods and procedures to be applied: | The parameter is calculated and not measured |
| Frequency of monitoring/recording: | Recording frequency is monthly. |
| Value monitored: | 56,374 |
| Monitoring equipment: | The value is calculated and not monitored. Hence not applicable. |
| QA/QC procedures to be applied: | The KPTCL meter is calibrated as per the KPTCL requirement.<br><br>Net electricity exported mentioned in Form B is cross- checked with the invoices raised by the PP for the project activity. Whichever is the conservative value is considered for emission reduction calculation during verification for the project activity. |
| Calculation method: | $EG_{Net\ Exported} = EG_{Exported} - EG_{Import} - EG_{Transmission\ Losses}$ |
| Any comment: | The data will be kept for two years after the end of the crediting period |

| | |
|---|---|
| Data Unit / Parameter: | **$EG_{Exported}$** |
| Data unit: | MWh |
| Description: | Electricity Exported |
| Source of data: | Credit report sheets (As per KPTCL/BESCOM Form B) |
| Description of measurement methods and procedures to be applied: | The monitoring is carried out by Trivector meters having accuracy class of 0.2s. |
| Frequency of monitoring/recording: | The measurement frequency of electricity exported is continuous and the recording frequency is monthly. |
| Value monitored: | 57,218 |
| Monitoring equipment: | 1. The meters installed in the project activity are electronic tri-vector meters.<br><br>2. The accuracy class of the meters of the project activity is 0.2s.<br><br>3. The details of the meter at the 33 kV end is provided below:<br><br>a. The serial number of the main meter and check meter at location K-539 (RR No-KK- 03) to which 5 Nos x 1.25 MW WTGs are connected is 08001351 and 08001352. |

| | |
|---|---|
| | <table><tr><th>Meter No</th><th>Type</th><th>Accuracy Class</th></tr><tr><td>Main Meter 08001351</td><td>3p 4w</td><td>0.2s</td></tr><tr><td>Check Meter 08001352</td><td>3p 4w</td><td>0.2s</td></tr></table><br>b. The serial number of the main meter and check meter at location K-543 (RR No-KK- 04) to which 5 Nos x 1.5 MW WTGs are connected is 08001358 and 08001371.<br><table><tr><th>Meter No</th><th>Type</th><th>Accuracy Class</th></tr><tr><td>Main Meter 08001358</td><td>3p 4w</td><td>0.2s</td></tr><tr><td>Check Meter 08001371</td><td>3p 4w</td><td>0.2s</td></tr></table> |
| QA/QC procedures to be applied: | Archiving Policy: Paper & Electronic<br><br>Responsibility: Head (Wind Power Project) would be responsible for regular calibration of the meter.<br><br>Calibration Frequency: Once a year.<br><br><table><tr><th>Meter No</th><th>Date of Last Calibration</th></tr><tr><td>Main Meter 08001351</td><td>14th March 2009, 25th January 2010,14th October 2010</td></tr><tr><td>Check Meter 08001352</td><td>14th March 2009, 25th January 2010,14th October 2010</td></tr><tr><td>Main Meter 08001358</td><td>27th March 2009, 25th January 2010, 13th October 2010</td></tr><tr><td>Check Meter 08001371</td><td>27th March 2009, 25th January 2010, 13th October 2010</td></tr></table> |
| Calculation method: | - |
| Any comment: | The data will be kept for two years after the end of the crediting period |

| | |
|---|---|
| Data Unit / Parameter: | **$EG_{import}$** |
| Data unit: | MWh |
| Description: | Electricity Imported |
| Source of data: | Credit report sheets (As per KPTCL/BESCOM Form B) |
| Description of measurement methods and procedures to be applied: | The monitoring is carried out by Trivector meters having accuracy class of 0.2s |
| Frequency of monitoring/recording: | The measurement frequency of electricity exported is continuous and the recording frequency is monthly. |

<table>
<tr><td>Value monitored:</td><td>132</td></tr>
<tr><td>Monitoring equipment:</td><td>1. The meters installed in the project activity are electronic tri-vector meters.<br><br>2. The accuracy class of all the meters of the project activity is 0.2s<br><br>3. The details of the meter at the 33 kV end is provided below:<br><br>a. The serial number of the main meter and check meter at location K-539 (RR No-KK- 03) to which 5 Nos x 1.25 MW WTGs are connected is 08001351 and 08001352.<br><br>
<table>
<tr><th>Meter No</th><th>Type</th><th>Accuracy Class</th></tr>
<tr><td>Main Meter 08001351</td><td>3p 4w</td><td>0.2s</td></tr>
<tr><td>Check Meter 08001352</td><td>3p 4w</td><td>0.2s</td></tr>
</table>
<br>b. The serial number of the main meter and check meter at location K-543 (RR No-KK- 04) to which 5 Nos x 1.5 MW WTGs are connected is 08001358 and 08001371.<br><br>
<table>
<tr><th>Meter No</th><th>Type</th><th>Accuracy Class</th></tr>
<tr><td>Main Meter 08001358</td><td>3p 4w</td><td>0.2s</td></tr>
<tr><td>Check Meter 08001371</td><td>3p 4w</td><td>0.2s</td></tr>
</table>
</td></tr>
<tr><td>QA/QC procedures to be applied:</td><td>Archiving Policy: Paper & Electronic<br><br>Responsibility: Head (Wind Power Project) would be responsible for regular calibration of the meter.<br><br>Calibration Frequency: Once a year.<br><br>
<table>
<tr><th>Meter No</th><th>Date of Last Calibration</th></tr>
<tr><td>Main Meter 08001351</td><td>14th March 2009, 25th January 2010,14th October 2010</td></tr>
<tr><td>Check Meter 08001352</td><td>14th March 2009, 25th January 2010,14th October 2010</td></tr>
<tr><td>Main Meter 08001358</td><td>27th March 2009, 25th January 2010, 13th October 2010</td></tr>
<tr><td>Check Meter 08001371</td><td>27th March 2009, 25th January 2010, 13th October 2010</td></tr>
</table>
</td></tr>
<tr><td>Calculation method:</td><td>-</td></tr>
<tr><td>Any comment:</td><td>The data will be kept for two years after the end of the crediting period</td></tr>
</table>

<table>
<tr><td>Data Unit / Parameter:</td><td>EG Transmission Losses</td></tr>
<tr><td>Data unit:</td><td>kWh</td></tr>
<tr><td>Description:</td><td>Electricity Losses in Transmission</td></tr>
<tr><td>Source of data:</td><td>Calculated from Credit report sheets (As per KPTCL/BESCOM Form B)</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td>The monitoring is carried out by Trivector meters having accuracy class of 0.2s.</td></tr>
<tr><td>Frequency of monitoring/recording:</td><td>Recording frequency is monthly.</td></tr>
<tr><td>Value monitored:</td><td>692,936</td></tr>
<tr><td>Monitoring equipment:</td><td>The value is calculated based on measurement at meters installed at 33 kV (VCB yard) and 220 kV (Sub-Station) meters.<br><br>The detail of the meter at 33 kV end is provided below:<br>a. The serial number of the main meter and check meter at location K-539 (RR No-KK- 03) to which 5 Nos x 1.25 MW WTGs are connected is 08001351 and 08001352. The accuracy class of this meter is 0.2s.<br><br>
<table>
<tr><th>Meter No</th><th>Type</th><th>Accuracy Class</th></tr>
<tr><td>Main Meter 08001351</td><td>3p 4w</td><td>0.2s</td></tr>
<tr><td>Check Meter 08001352</td><td>3p 4w</td><td>0.2s</td></tr>
</table>
<br>b. The serial number of the main meter and check meter at location K-543 (RR No-KK- 04) to which 5 Nos x 1.5 MW WTGs are connected is 08001358 and 08001371. The accuracy class of this meter is 0.2s.<br><br>
<table>
<tr><th>Meter No</th><th>Type</th><th>Accuracy Class</th></tr>
<tr><td>Main Meter 08001358</td><td>3p 4w</td><td>0.2s</td></tr>
<tr><td>Check Meter 08001371</td><td>3p 4w</td><td>0.2s</td></tr>
</table>
<br>The details of the meters at 220 kV end is provided below:<br><br>
<table>
<tr><th>Meter No.</th><th>Type</th><th>Accuracy Class</th></tr>
<tr><td>Main meter 08001856</td><td>WR300BB11RSAL</td><td>0.2s</td></tr>
<tr><td>Check Meter 08001858</td><td>WR300BB11RSAL</td><td>0.2s</td></tr>
</table>
</td></tr>
<tr><td>QA/QC procedures to be</td><td>Archiving Policy: Paper & Electronic</td></tr>
</table>

<table>
<tr><td>applied:</td><td>Calibration Frequency for 220 kV meters: Yearly.<br><br><table><tr><th>Meter No</th><th>Date of Last Calibration</th></tr><tr><td>Main meter 08001856</td><td>15th June 2009,<br>30th March 2010</td></tr><tr><td>Check Meter 08001858</td><td>15th June 2009,<br>30th March 2010</td></tr></table><br>Calibration Frequency for 33 kV meters: Yearly.<br><br><table><tr><th>Meter No</th><th>Date of Last Calibration</th></tr><tr><td>Main Meter 08001351</td><td>14th March 2009, 25th January 2010,14th October 2010</td></tr><tr><td>Check Meter 08001352</td><td>14th March 2009, 25th January 2010,14th October 2010</td></tr><tr><td>Main Meter 08001358</td><td>27th March 2009, 25th January 2010, 13th October 2010</td></tr><tr><td>Check Meter 08001371</td><td>27th March 2009, 25th January 2010, 13th October 2010</td></tr></table></td></tr>
<tr><td>Calculation method:</td><td>Calculation procedure ($EG_{Transmission\ Losses}$):<br>Z= % of line losses<br>X= Cumulative of all the exported energies from all the metering points connected to the sub-station.<br>i.e X= X1+X2+X3+……..Xn<br>Y= Sub-Station Bulk meter readings<br><br>Z= [(X-Y)/X]*100<br><br>$EG_{Transmission\ Losses} = Z * EG_{exported}$</td></tr>
<tr><td>Any comment:</td><td>The data will be kept for two years after the end of the crediting period</td></tr>
</table>

| Data Unit / Parameter: | **$EG_{controller}$** |
|---|---|
| Data unit: | kWh |
| Description: | Electricity generated at Controller (MCS)[4] |
| Source of data: | Plant (Daily generation readings) |
| Description of measurement | Monitoring: Microprocessor control systems (MCS) meter is a |

[4] For the month of January for which apportioning is done

| | |
|---|---|
| methods and procedures to be applied: | micro-processor based intelligent controller which has been specially designed for control of wind turbines. 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. |
| Frequency of monitoring/recording: | The measurement frequency is continuous and recording frequency is daily. |
| Value monitored: | 2,266,678 |
| Monitoring equipment: | Monitoring Equipment: Microprocessor control systems (MCS) meter |
| QA/QC procedures to be applied: | Archiving Policy: Electronic<br><br>In case of any problem related to the MCS meter, the WTG will automatically get shut down and the meter will be replaced by a new meter immediately.<br><br>The MCS meter is digital meter and is never calibrated. |
| Calculation method: | - |
| Any comment: | The data will be kept for two years after the end of the crediting period |

## 3.3 Description of the Monitoring Plan

The project activity is in accordance with approved small scale methodology AMS I.D, and therefore, can use the monitoring methodology for type I.D of 'Appendix B of the simplified M&P for small-scale CDM project activities'-Version 15.0, - Grid connected renewable electricity generation.

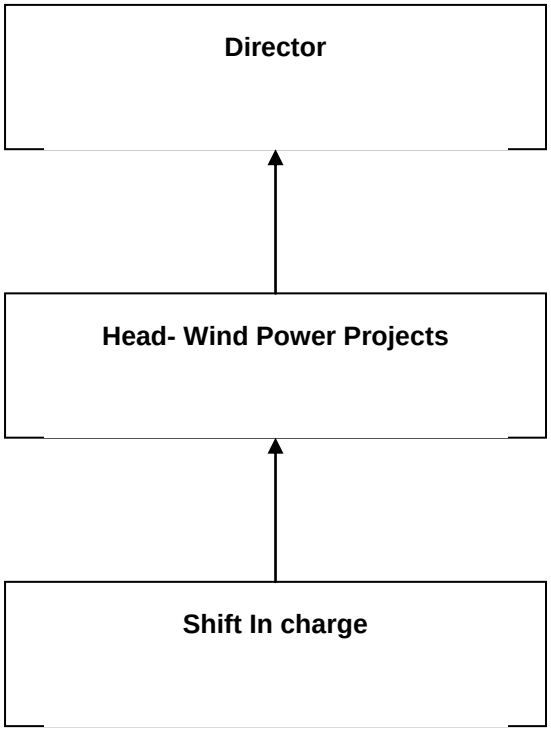
This approved monitoring methodology requires monitoring of the following:

- ✓ Net Electricity supplied from the project activity; and
- ✓ Computation of Emission Factor from published CEA database.

The monitoring methodology incorporated for project-monitoring plan consist of metering the electricity generated by the individual WTG's. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, forms the baseline for the project activity. Since the baseline methodology is based on ex ante determination of the Emission factor, the monitoring of baseline emission factor is not required. The sole parameter for monitoring is the electricity supplied to the grid.

The Project is operated and managed by M/s Suzlon Energy Limited and/ or its Associate Companies. The operational and management structure implemented by the project participant monitors the emission reductions generated by the project activity:

Total electricity exported is the most important parameter required for the financial reporting and sustainability of the project and monitored with due care by both the parties (project proponent and KPTCL). For emission reductions project proponents has implemented the following structure.




**Roles and responsibilities:**
**Director:** In the project management structure Director is responsible for the project management. He is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organizing third party contractors, revenue collection from BESCOM etc.
The Director checks the monthly electricity generated and annual emission reduction calculations.
Operation and maintenance of wind generators is done by Suzlon Infrastructure Services Limited and they are responsible to Director.
**Head- Wind Power Projects:** Head- Wind Power Projects is assisting to director for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He crosschecks the log book regularly and report to Director for any abnormality.
**Shift In-charge:** Shift in charge is responsible for recording the electricity meter reading in the KPTCL meter.
**Record Handling:** O & M contractors collect daily report with all the related parameters. All the records is given to Director on every month. The Director has final responsibility for record keeping.
The O&M personnel are qualified engineers and are trained at the WTG manufacturing facility of Suzlon Energy Limited at Daman & Pondicherry for operating and ensuring best performance of the WTGs. The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication is as per the PPA (power purchase agreement) with KPTCL.

1. **Metering:** The Delivered Energy is metered by the Parties at the high voltage side of the step up transformer installed at the Receiving Station. The electricity generated by the Project is metered by the Parties at the high voltage side of the step up transformer installed at the Project Site. The WTGs of a single customer (SRPL in this case) at a particular site are connected to a Vacuum Circuit Breaker metering yard (VCB) which in turn connects to a feeder that ultimately leads to the shared main KPTCL meter at the substation maintained by Suzlon Power Infrastructure Limited . Data monitoring takes place at the VCB metering yard and WEG (through SCADA system). The

electricity metered at the KPTCL meter is proportionally divided among the customers connected to the meter on the basis of the prorata readings taken at the VCB end. The emission reduction calculations are done on the basis of the KPTCL Main meter reading.

2. **Metering Equipment:** Metering equipment are electronic trivector meters of accuracy class 0.2% required for the Project (both main and check meters). Dedicated core of both CT's and PT's of required accuracy is made available by the Company to Corporation. The metering equipment is maintained in accordance with electricity standards. This equipment has the capability of recording a month's reading.

3. **Meter Readings:** The monthly meter readings (both main and check meters) at the Project Site and the Receiving Station is taken simultaneously and jointly by the Parties on the first day of the following month. The recorded metering data is downloaded through meter recording Instrument by KPTCL officer as and when required.

4. **Inspection of Energy Meters:** All the main and check energy meters (export and import) 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 cannot not be interfered with by either Party except in the presence of the other Party or its accredited representatives.

**Data Adjustments and Uncertainties:**

5. **Meter Test Checking:** All the main and check meters is tested for accuracy as per requirement with reference to a portable standard meter which is of the accuracy class of 0.1%. The portable standard meter is owned by the Corporation at its own cost and expense and tested and certified at least once every year or as per requirement against an accepted laboratory standard meter in accordance with electricity standards. The meters are 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 holds good for the purpose of billing as long as the error in the main meter is within the permissible limits.

   a. If during the tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.

   b. If during the tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month upto the date and time of such test shall be as per the check meter. The main meter shall be calibrated immediately and billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.

   c. If during the quarterly tests, both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for billing purposes for the period from the last month's meter reading upto the current test. Billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.

   d. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2 % accuracy class, all the meters shall be re-tested and calibrated immediately

6. **Records:** O&M Contractor Suzlon maintains an accurate and up-to-date operating log at the wind farm site with records of:

   a. Main meter and Check meter readings and any other data mutually agreed.

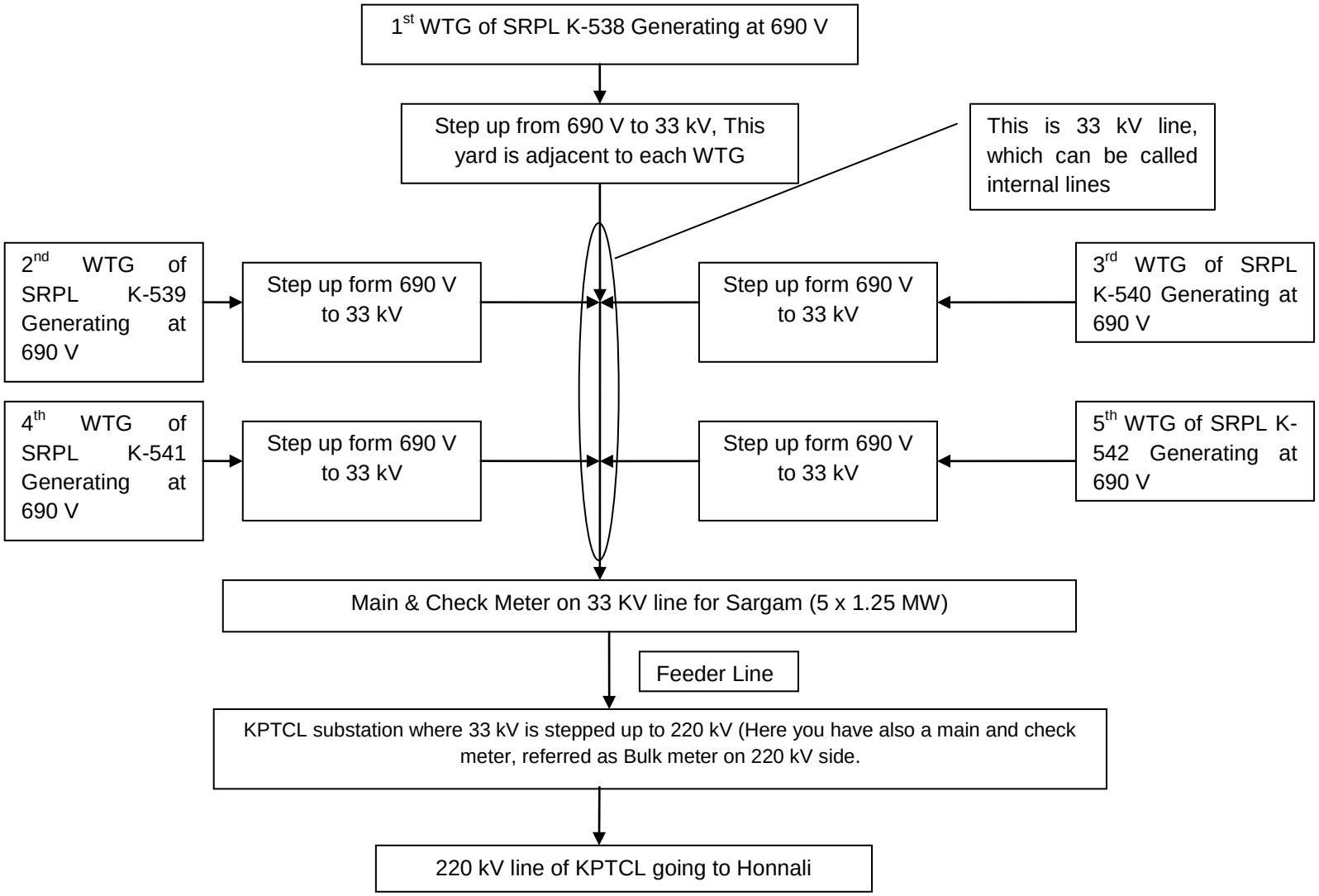
b. Any unusual conditions found during operation/inspections

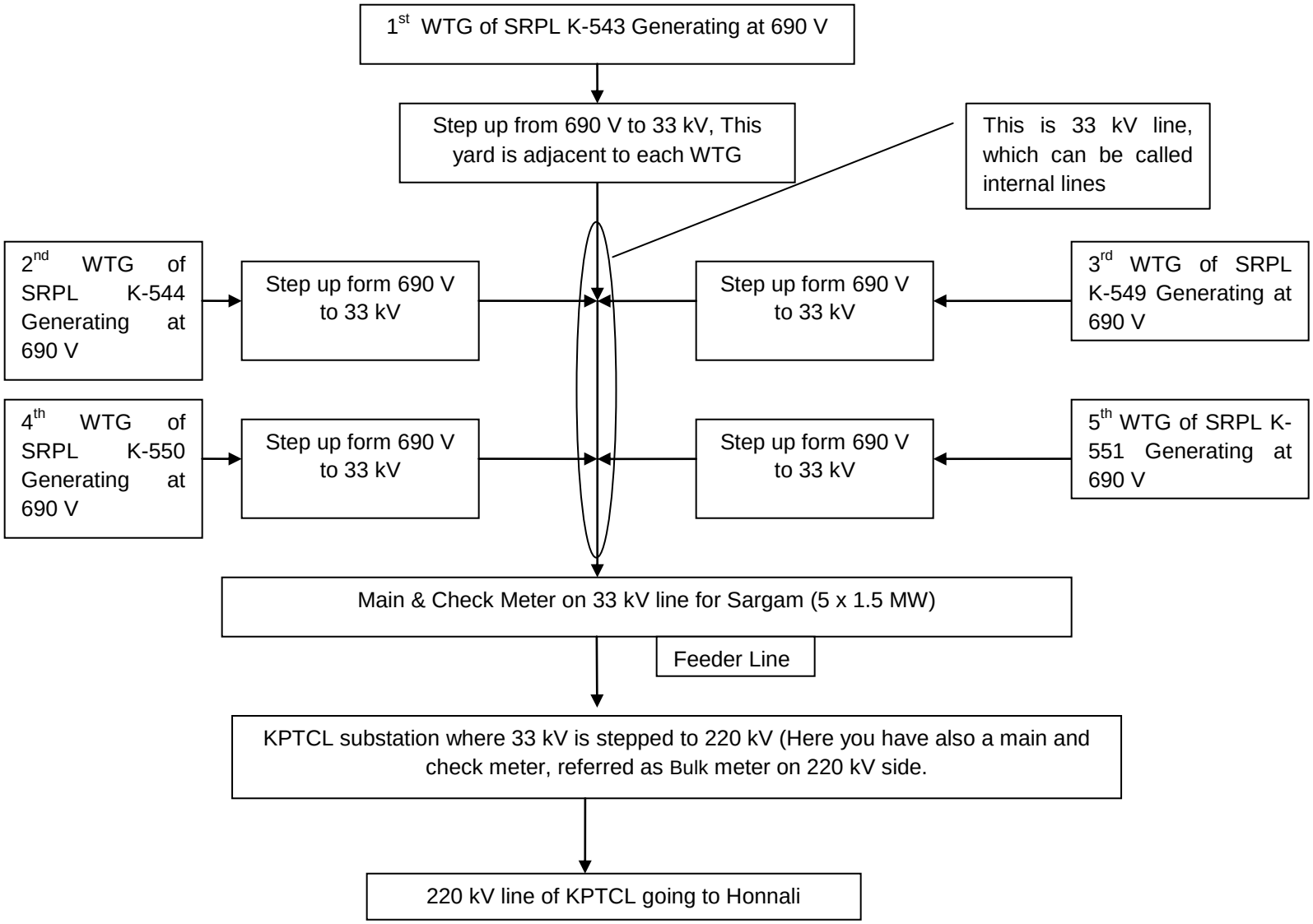
c. Chart and printout of event loggers, if any, for system disturbances/outages

d. All the records will be preserved for 2 years beyond the crediting period.

7. The billing is on monthly basis. The BESCOM is billed by Sargam Retails Pvt Ltd based on statement given by BESCOM at the end of each month for the energy supplied.

M/s Suzlon Infrastructure Services Limited (SEL) has a designated Site-In-Charge (O&M) on site who is responsible for monitoring the emission reductions of the project activity. The electrical layout of the WTGs is as follows:


1st WTG of SRPL K-538 Generating at 690 V
Step up from 690 V to 33 kV, This yard is adjacent to each WTG
This is 33 kV line, which can be called internal lines
2nd WTG of SRPL K-539 Generating at 690 V
Step up form 690 V to 33 kV
Step up form 690 V to 33 kV
3rd WTG of SRPL K-540 Generating at 690 V
4th WTG of SRPL K-541 Generating at 690 V
Step up form 690 V to 33 kV
Step up form 690 V to 33 kV
5th WTG of SRPL K-542 Generating at 690 V
Main & Check Meter on 33 KV line for Sargam (5 x 1.25 MW)
Feeder Line
KPTCL substation where 33 kV is stepped up to 220 kV (Here you have also a main and check meter, referred as Bulk meter on 220 kV side.
220 kV line of KPTCL going to Honnali


1st WTG of SRPL K-543 Generating at 690 V
Step up from 690 V to 33 kV, This yard is adjacent to each WTG
This is 33 kV line, which can be called internal lines
2nd WTG of SRPL K-544 Generating at 690 V
Step up form 690 V to 33 kV
Step up form 690 V to 33 kV
3rd WTG of SRPL K-549 Generating at 690 V
4th WTG of SRPL K-550 Generating at 690 V
Step up form 690 V to 33 kV
Step up form 690 V to 33 kV
5th WTG of SRPL K-551 Generating at 690 V
Main & Check Meter on 33 kV line for Sargam (5 x 1.5 MW)
Feeder Line
KPTCL substation where 33 kV is stepped to 220 kV (Here you have also a main and check meter, referred as Bulk meter on 220 kV side.
220 kV line of KPTCL going to Honnali

On the 1st of every month, the KPTCL designated official arrives at the site and record the readings of meters placed at the 33/220 kV Sub-Station and as well as at the individual customer metering point. Keeping in view, the total generation supplied to Grid from the sub-station, the electricity generation data for every particular customer is computed on ***Form B*** as per the apportioning procedure mentioned below:

SRPL (Head- Wind Power Projects & Director) keeps the daily / monthly data generated from all the WEG's provided by Suzlon.

***Internal audits & Performance review***

The records are regularly audited and checked by the SRPL representatives during their site visit. The SRPL representative visits once in a year and audit the records. The SRPL representatives crosschecks the emissions reductions claimed in PDD with respect to actual emissions reduction. For any deviation from the actual emission reduction values and reported values corrective action is suggested by SRPL representatives to calculate the conservative emission reduction. All corrective actions is recorded in the log book. The person taking readings at site are adequately trained and go through training procedures regularly.

**Apportioning Procedure:**

The following generation apportioning procedure is followed, if the crediting period date of the project activity falls in – between the billing cycles of KPTCL:

Partial days generation of the Month at Controller (kWh): X

Total generation at Controller (kWh) for the same month: Y (kWh/month)

% Generation for partial days of generation (%): Z= (X/Y) *100

Generation as per BULK metering point KPTCL generation report for the month: G (kWh/month)

Partial days of generation as per KPTCL generation report: (G*Z/100)

Form B, which contains the generation data, is certified by the Site-in-Charge (O&M) for SEL and also by the Asst. Executive Engineer of KPTCL. The Form B is now forwarded to Executive Engineer of KPTCL and is certified thereof. Copies of this document are forwarded to the State Load Dispatch Center of Karnataka Power Transmission Company Limited (KPTCL), Asst. Electrical Engineer of KPTCL and the customer (in this case, Sargam Retails Pvt. Ltd. - SRPL). The monthly generation is derived from Form B and the same is used in monitoring report and during verification. Head - Wind power projects of SRPL is responsible for keeping the copies of Form B sent to SRPL from KPTCL.

# 4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

## 4.1 Baseline Emissions

The baseline emission is calculated as $\mathbf{BE_y = EG_y * EF_y}$

Where:

$\mathbf{BE_y}$ = Baseline Emissions due to displacement of electricity during the year y (in tons of $CO^2$)

$\mathbf{EG_y}$ = Net units of electricity due to substituted in the grid during the year y (in MWh)

**$EF_y$** = Emission Factor of the grid (in $tCO_2$/ MWh) and y is any year within the crediting period of the project activity.

Net Electricity exported from the project activity = 56,373,581 kWh

**$EF_y$** = 0.927 $tCO_2$ / MWh

**Formula for Baseline Emissions:**

Thus Baseline emissions = (0.927 * 56,373,581 ) /1000 **= 52,258 tCO2e**

## 4.2 Project Emissions

The project activity being a wind project falls under the category of renewable energy project as defined in the methodology AMS I.D

For most renewable energy project activities $PE_y = 0$

Hence for the project activity, $PE_y = 0$

## 4.3 Leakage

The project activity does not involve transfer of the energy generating equipment as these are newly installed WTG's

Leakage Emissions $LE_y = 0$ (since there is no transfer of equipments from or to the project activity) as per AMS I. D.

## 4.4 Summary of GHG Emission Reductions and Removals

Total emission reductions: Emission reduction calculation is done based on following formula:

Emission reduction ($ER_y$) = Baseline Emisions ($BE_y$) – Project Emissions ($PE_y$) – Leakage Emissions ($LE_y$)

Total baseline emissions: 52,258 $tCO_2e$

Total project emissions: 0

Total leakage: 0

= **52,258** -0-0
= **52,258** tCO2e

# 5 ADDITIONAL INFORMATION

**Apportioning procedure for the current monitoring period:**

The following generation apportioning procedure is followed, if the crediting period date of the project activity falls in – between the billing cycles of KPTCL:

Partial days generation of the Month at Controller (kWh): X

Total generation at Controller (kWh) for the same month: Y (kWh/month)

% Generation for partial days of generation (%): Z= (X/Y) *100Generation as per BULK metering point KPTCL generation report for the month: G (kWh/month)

Partial days of generation as per KPTCL generation report: (G*Z/100)

PP has incorporated the above apportioning procedure for the following period as described below:

| **Apportioning for the month of January (1.01.11 to 6.01.11) for 5 Nos x 1.25 MW** | | |
|---|---|---|
| Partial Days Generation for of the Month at Controller (1.01.11 to 6.01.11) (X) | kWh | 120,295 |
| Total generation at the controller (Y) | kWh/month | 2,266,678 |
| % Generation for partial days of generation (Z) | % | 5.31 |
| | | |
| Generation as per Bulk Metering point BESCOM generation report for the month (1.01.11 to 31.01.11) (G) | kWh/month | 832,534.4 |
| Partial days of generation as per BESCOM generation report (G*Z/100) | | **44,183** |
| **Apportioning for the month of January (1.01.11 to 6.01.11) for 5 Nos x 1.5 MW** | | |
| Partial Days Generation for of the Month at Controller (1.01.11 to 6.01.11) (X) | kWh | 223,022 |
| Total generation at the controller (Y) | kWh/month | 2,266,678 |
| % Generation for partial days of generation (Z) | % | 9.84 |
| Generation as per Bulk Metering point BESCOM generation report for the month (1.01.11 to 31.01.11) (G) | kWh/month | 1,374,423.5 |
| Partial days of generation as per BESCOM generation report (G*Z/100) | | **135,232** |

The electricity exported by 1.25 MW x 5 Nos to the grid has been provided in the table below:

| | **Net Export to BESCOM (kWh)** |
|---|---|

| Year 2009 | Electricity Exported | Electricity Imported | Transmission Loss | Net Quantity of Electricity supplied | Net Quantity of Electricity supplied as per Invoices | Net Quantity of Electricity supplied (Conservative of both) |
|---|---|---|---|---|---|---|
| **Month** | kWh | kWh | kWh | Export kWh - Import kWh- Transmission Loss kWh | kWh | kWh |
| **March** | 900.00 | 0 | 141 | 759 | 759 | 759 |
| **April** | 322,650 | 900 | 9,052 | 312698 | 312581 | 312581 |
| **May** | 787,500 | 1,350 | 2,470 | 783680 | 783483 | 783483 |
| **June** | 1,062,000 | 1350 | 11,257 | 1049393 | 1049213 | 1049213 |
| **July** | 2,718,000 | - | 28,625 | 2689375 | 2689375 | 2689375 |
| **August** | 1,269,000 | 1,350 | 13,927 | 1253723 | 1253521 | 1253521 |
| **September** | 1,056,600 | 3,150 | 12,128 | 1041322 | 1040849 | 1040849 |
| **October** | 953,100 | 2,700 | 11,963 | 938437 | 938032 | 938032 |
| **November** | 965,700 | 1,350 | 10,087 | 954263 | 954061 | 954061 |
| **December** | 871,200 | 3,150 | 9,124 | 858926 | 858454 | 858454 |
| **Total** | | | | **9882576** | **9880327** | **9880327** |
| | | | | | | |
| **Year 2010** | | | | | | |
| **January** | 542,250 | 3,150 | 6,594 | 532506 | 532034 | 532034 |
| **February** | 382,050 | 6,300 | 5,432 | 370318 | 369373 | 369373 |
| **March** | 462,150 | 4,500 | 6,861 | 450789 | 450115 | 450115 |
| **April** | 601,650 | 5,400 | 8,394 | 587856 | 587046 | 587046 |
| **May** | 1,249,650 | 2,250 | 16,117 | 1231283 | 1230945 | 1230945 |
| **June** | 1,642,500 | 450 | 18840.1 | 1623210 | 1623142 | 1623142 |
| **July** | 1,952,100 | 450 | 22,911 | 1928739 | 1928671 | 1928671 |
| **August** | 1,399,500 | 900 | 16275.94 | 1382324 | 1382189 | 1382189 |
| **Septemb** | | 2700 | 10498.11 | 911552 | 911147 | 911147 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **er** | 924,750 | | | | | |
| **October** | 688,950 | 2700 | 8174.48 | 678076 | 677671 | 677671 |
| **Novembe r** | 490,500 | 3150 | 7742.58 | 479607 | 479135 | 479135 |
| **Decembe r** | 659,700 | 3150 | 8000.57 | 648549 | 648077 | 648077 |
| **Total** | | | | **10824809** | **10819544** | **10819544** |
| | | | | | | |
| **Year 2011** | | | | | | |
| **January** | 44,183 | 1800 | 9865.58 | 32518 | 32234 | 32234 |
| | | | | **32518** | **3224** | **32234** |
| **Total** | **21,046,583** | **52,200** | **254,480** | **20,739,903** | **20,699,871** | **20732104** |
| **Total (In MW)** | **21,047** | **52** | **254** | **20,740** | **20,700** | **20732** |

Error of 0.2% has been applied for that period

The electricity exported by 1.5 MW x 5 Nos to the grid has been provided in the table below:

| | **Net Export to BESCOM (kWh)** | | | | | |
|---|---|---|---|---|---|---|
| **Year 2009** | **Electricity Exported** | **Electricity Imported** | **Transmission Loss** | **Net Quantity of Electricity supplied** | **Net Quantity of Electricity supplied as per Invoices** | **Net Quantity of Electricity supplied (Conservative of both)** |
| **Month** | kWh | kWh | kWh | Export kWh - Import kWh- Transmission Loss kWh | kWh | kWh |
| **March** | 1575 | 525 | 246 | 803.6082 | 725.4 | 725.4 |
| **April** | 671,364 | 2,143 | 18,836 | 650385.2036 | 650101.4 | 650101.4 |
| **May** | 1,464,750 | 3,150 | 4,594 | 1457006.131 | 1456542.8 | 1456542.8 |
| **June** | 2,005,500 | 1050 | 21,257 | 1983192.871 | 1983077.8 | 1983077.8 |
| **July** | 3,787,875 | - | 39,893 | 3747982.2 | 3747982.2 | 3747982.2 |
| **August** | 2,214,975 | 2,625 | 24,309 | 2188041.4 | 2187647.61 | 2187647.6 |
| **September** | 1,880,550 | 4,200 | 21,586 | 1854763.7 | 1854133.7 | 1854133.7 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **October** | 1,548,750 | 4,200 | 19,440 | 1525110.5 | 1524480.5 | 1524480.5 |
| **November** | 1,824,900 | 2,100 | 19,062 | 1803738.4 | 1803423.4 | 1803423.4 |
| **December** | 1,518,825 | 3,675 | 15,906 | 1499244.1 | 1498692.9 | 1498692.9 |
| | | | | **16710268.11** | **16706807.7** | **16706807.7** |
| **Year 2010** | | | | | | |
| **January** | 948,675 | 4,725 | 11,536 | 932414.5 | 931705.4 | 931705.4 |
| **February** | 685,650 | 7,350 | 9,749 | 668551 | 667448.5 | 667448.5 |
| **March** | 954,975 | 6,300 | 14,177 | 934498.5 | 933553.5 | 933553.5 |
| **April** | 1,158,150 | 6,300 | 16,159 | 1135691.3 | 1134746.3 | 1134746.3 |
| **May** | 2,140,425 | 2,625 | 27,606 | 2110194.3 | 2109800.6 | 2109800.6 |
| **June** | 2,688,000 | 1,050 | 30,832 | 2656117.6 | 2655960.1 | 2655960.1 |
| **July** | 3,026,100 | 1,050 | 35,517 | 2989533.2 | 2989375.7 | 2989375.7 |
| **August** | 2,410,800 | 2,625 | 28,037 | 2380137.8 | 2379744.1 | 2379744.1 |
| **September** | 1,688,925 | 4,200 | 19,173 | 1665551.7 | 1664921.7 | 1664921.7 |
| **October** | 1,341,375 | 4,200 | 15,916 | 1321259.4 | 1320629.4 | 1320629.4 |
| **November** | 868,350 | 6,300 | 13,707 | 848343 | 847398.0 | 847398.0 |
| **December** | 1,205,400 | 4,725 | 14,618.60 | 1,186,056.4 | 1185347.7 | 1185347.7 |
| | | | | **18,828,348.7** | **18820631.0** | **18820631.0** |
| **Year 2011** | | | | | | |
| **January** | 135,232 | 4,200 | 16,301.50 | 114,730.2 | 114038.2 | 114038.2 |
| | | | | **114,730.2** | **114038.2** | **114038.2** |
| **Total** | **36171121** | **79318** | **438455.687** | **35653347** | **35641477** | **35641477** |
| **Total (In MW)** | 36171 | 79 | 438 | 35653 | 35641 | 35641 |

Error of 0.2% has been applied for that period

**Comparison of the actual emission reductions during the monitoring period with the estimated value as per the CDM registered:**

PP is claiming emission reduction for 647 days (31$^{th}$ March 2009 to 6$^{th}$ January 2011). As per the registered

PDD the estimated emission reduction for a period of 365 days is 26,475 $tCO_2$. Thus for 647 days the estimated emission reduction (as per registered PDD) would be 46,930 $tCO_2$. There is an increment of 11% of the estimated CER as in PDD to actual.

The electricity generation from wind turbine is based on three parameters viz.

- Wind availability,
- Grid availability
- and Machine availability.

The peak season in Karnataka is from May to September and in this monitoring period there are two peak seasons one in 2009 and another in 2010. It can be seen from the above table that the generation has increased during this period. This justifies the increase in emission reduction.

Wind availability is totally seasonal and nature driven. Grid availability and Machine availability is also a variable component. PP has no control over these parameters. Thus the increase in the generation is directly proportional to these above parameters.