



**CLEAN DEVELOPMENT MECHANISM  
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)  
Version 03 - in effect as of: 28 July 2006**

**CONTENTS**

- A. General description of project activity
- B. Application of a baseline and monitoring methodology
- C. Duration of the project activity / crediting period
- D. Environmental impacts
- E. Stakeholders' comments

**Annexes**

- Annex 1: Contact information on participants in the project activity
- Annex 2: Information regarding public funding
- Annex 3: Baseline information
- Annex 4: Monitoring plan

**Appendix**

- Appendix 1: Contribution of CER revenues to sustainable development

**SECTION A. General description of project activity****A.1. Title of the project activity:**

&gt;&gt;

MRMPL Wind Power Project

Version: 06

Date: 14/06/2010

**A.2. Description of the project activity:**

&gt;&gt;

The project sponsor is Modern Road Makers Pvt. Ltd. (herein referred to as MRMPL). MRMPL is incorporated in the Companies Act, 1956. It is a subsidiary of IRB Infrastructure Developers Limited (IRBIDL). It is involved in the construction, operation and maintenance of roads through various infrastructure projects in the road sector and is one of the major road developers in India.

The project is the generation of electricity from wind power by installation of 16 Wind Turbine Generators (WTG) at Jaisalmer, Rajasthan. Each WTG has an installed capacity of 1.25 MW. The total installed capacity of the project is 20 MW. The purpose of the project is to produce power from clean source and to reduce the dependence on fossil fuels for energy requirements. Project proponent has signed a power purchase agreement (PPA) with “Jodhpur Vidyut Vitran Nigam Limited” (JVVNL) to export the electricity to local grid. The project displaces electricity from the grid (North East West North East (NEWNE) grid, India). This helps in significant reduction of GHG emissions as the NEWNE Grid is mostly dependent on fossil fuel generated electricity. The specifications of these machines have been briefly explained in Section A.4.3.

Prior to the project activity the electricity would have been supplied by the existing grid connected power plants. The major contributor to the grid is the fossil fuel based thermal power sources. The burning of fossil fuel to produce energy is responsible for GHG emissions into the atmosphere. The baseline scenario is the same as the pre project scenario as discussed in section B.4 of this document while information of gases & emission sources in baseline & project activity have discussed in Section B.3 of this document. Emission reductions will be claimed on the net electrical energy that is supplied to grid which will be metered using electrical meters (Main & Check meters) located at the electrical substation which is linked with the WTGs of the project activity by feeders. Details of monitoring of emission reductions and their calculation have been provided in Section B.6.1 & Section B.7.2 of this document. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. MRMPL will be developing this project keeping in consideration of the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. This is because the project activity qualifies as a CDM project as it would be feeding clean power to the electricity grid (NEWNE grid, India) thereby helping in significant reduction of GHG emissions. The project activity is also responsible for sustainable economic growth and conservation of environment through use of wind as a renewable source.

The project proponent has considered the sustainable development of the region due to the project activity. Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects:

**Social well being:**

- The project activity contributes towards local socio-economic development around its area of operation through provision of employment opportunities (direct and indirect) for local population.
- It contributes towards improving the India's power deficit situation by contributing to the power grid and making power accessible to more people.

**Environmental well being:**

- The project activity causes sustenance and improvement in regional air quality by avoiding commonly used fossil fuels for power generation. It thereby, also, results in maintenance of the ecosystem and human health due to avoidance in the use of GHG emissive fuels such as coal.
- It also leads to conservation of natural resources such as coal, oil etc.

**Economic well being:**

- By providing employment opportunities, this project activity leads to development in the local economy.
- Through bringing in revenue to India through CDM process, it demonstrates how certain real and perceived financial barriers can be overcome for implementing clean energy measures.

**Technological well being:**

The successful implementation of the project activity will result in encouraging the use of cleaner technology. This will lead to replacement of the non eco friendly sources of power generation like thermal energy which are the major sources of power in the country.

In addition to this MRMPL will also invest 2% of the CER revenues in sustainable development including society/community development. The details of the same are provided in the Appendix 1.

**A.3. Project participants:**

&gt;&gt;

| <b>Name of Host Party (*) (host)<br/>Indicates a Host Party</b> | <b>Private and/or Public entity(ies)<br/>project participants (*)<br/>(as applicable)</b> | <b>Kindly indicate whether the<br/>party involved wishes to be<br/>considered as project<br/>participant (Yes/No)</b> |
|---|---|---|
| India (Host)  | Modern Road Makers Pvt.<br>Ltd.(Private entity)   | No  |

**A.4. Technical description of the project activity:****A.4.1. Location of the project activity:**

&gt;&gt;

**A.4.1.1. Host Party (ies):**

&gt;&gt;

India

**A.4.1.2. Region/State/Province etc.:**

&gt;&gt;

State: Rajasthan

**A.4.1.3. City/Town/Community etc.:**

&gt;&gt;

District: Jaisalmer



**A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):**

>>

The project activity is located at villages Mudari, Ganesh ki Dhani, Dhava and Dedha in the district of Jaisalmer, Rajasthan. The nearest railway station and airport to reach the site is the town of Jaisalmer located approximately 30 kms from the project site. The coordinates of the WTGs have been tabled below:

**Table 1**

| Sr No. | Location No. | Latitude        | Longitude       |
|--------|--------------|-----------------|-----------------|
| 1      | R060         | N 26° 48' 45.8" | E 70° 44' 16.3" |
| 2      | R061         | N 26° 48' 36.8" | E 70° 44' 26.1" |
| 3      | R078         | N 26° 49' 15.4" | E 70° 51' 35.4" |
| 4      | R007         | N 26° 48' 58.4" | E 70° 51' 37.2" |
| 5      | R008         | N 26° 48' 41.7" | E 70° 51' 39.4" |
| 6      | R063         | N 26° 48' 54.6" | E 70° 43' 33.2" |
| 7      | R064         | N 26° 48' 45.1" | E 70° 43' 43.5" |
| 8      | R069         | N 26° 48' 36.8" | E 70° 43' 23.5" |
| 9      | R070         | N 26° 48' 27.3" | E 70° 43' 33.8" |
| 10     | R071         | N 26° 48' 17.7" | E 70° 43' 44.2" |
| 11     | R072         | N 26° 48' 08.2" | E 70° 43' 54.5" |
| 12     | R073         | N 26° 47' 58.6" | E 70° 44' 04.9" |
| 13     | R074         | N 26° 47' 49.1" | E 70° 44' 15.2" |
| 14     | R016         | N 26° 49' 21.4" | E 70° 49' 30.9" |
| 15     | R062         | N 26° 48' 25.3" | E 70° 44' 37.1" |
| 16     | R067         | N 26° 48' 00.3" | E 70° 44' 34.7" |

The map of the project location is shown below:



**A.4.2. Category (ies) of project activity:**

&gt;&gt;

Sectoral Scope 01: Energy Industries (renewable/non-renewable sources.).

**A.4.3. Technology to be employed by the project activity:**

&gt;&gt;

The project activity is the generation of wind power based electricity at Jaisalmer, Rajasthan. It involves the installation of 16 units of model S-66 SUZLON make 1250 kW rating Wind Turbine Generators with a total installed capacity 20 MW. The main features of the technology are given below:

**Table 2**

|  |  |
|--|--|
| <b>ROTOR</b>                               |  |
| Diameter                                   | 66 m                                       |
| No. of Rotor Blade                         | 3  |
| Rotor Blade Material                       | Epoxy bonded fibre glass                   |
| Swept Area                                 | 3421 m <sup>2</sup>                        |
| Hub Height                                 | 74.5 m                                     |
| <b>OPERATIONAL DATA</b>                    |  |
| Cut in wind speed                          | 3.0 m/s                                    |
| Rated wind speed                           | 14 m/s                                     |
| Cut off wind speed                         | 22 m/s                                     |
| <b>GEARBOX</b>                             |  |
| Type                                       | Integrated 3 Stage 1 planetary & 2 helical |
| Gear ratio                                 | 1:74:9                                     |
| Nominal Load                               | 1390 KW                                    |
| Type of Cooling                            | Oil cooling system, Forced lubrication.    |
| <b>GENERATOR</b>                           |  |
| Rotation speed                             | 1500 RPM                                   |
| Rated output                               | 1250 KW                                    |
| Rated voltage                              | 690 V – AC (phase to phase)                |
| Frequency                                  | 50 Hz                                      |
| <b>Age and Average lifetime of the WTG</b> | 20 yrs and 0 months.                       |
| <b>MONITORING EQUIPEMENT</b>               |  |
| <b>MAIN METERS</b>                         | Located at the Mada GSS.                   |
| <b>CHECK METERS</b>                        | Located at the Mada GSS.                   |

The electricity generated by the project activity will be supplied to the local grid which a part of the Northern/Eastern/Western/ North Eastern Grid (NEWNE) in India. The major contributor of electricity to



the NEWNE Grid is thermal energy based power plants which utilise fossil fuels as raw materials. Fossil fuel based electricity generation contributes to Green house gas emissions of Carbon dioxide into the atmosphere. The project activity is a clean source of energy dependent on the renewable wind source. In addition to contributing to the electricity generation to the state of Rajasthan, the project activity also helps to displace electricity generated through fossil fuels from the grid. This helps reduce the emissions to the atmosphere. Without the project activity, the electricity will continue to be generated by the fossil fuels based power stations in the grid and these emissions will continue to cause environment pollution.

The Baseline scenario is same as the existing pre project scenario. In the baseline situation the electricity generated by the project would have been generated by the operation of grid-connected power plants and by the addition of new generation sources. Emission reductions will be claimed on the net electrical energy that is supplied to grid which will be metered using meters (Main & Check meters) located at the electrical substation to which the WTGs are connected by feeders. These electrical energy meters are essentially electronic tri-vector meters of accuracy class 0.2. Since these meters are not designed to measure high voltages and currents as generated in the WTG, the WTG output is connected to these meters via transformers (CT/PT) for stepping down the generated voltage and current to ranges which the meters can record. As such, these meters have a multiplying factor which when multiplied to the meter reading provides the actual amount of electricity generated. The technology providers for the project have additionally installed an LCS meter at the WTG controller. Details of monitoring of emission reductions and their calculation have been provided in Section B.6.1 & Section B.7.2 of this document.

#### **A.4.4. Estimated amount of emission reductions over the chosen crediting period:**

&gt;&gt;

Table 3

| <b>Year</b>  | <b>Annual estimation of emission reductions in tonnes of CO<sub>2</sub> e</b> |
|--|---|
| 2010 – 2011  | 32,788  |
| 2011 – 2012  | 32,788  |
| 2012 – 2013  | 32,788  |
| 2013 – 2014  | 32,788  |
| 2014 – 2015  | 32,788  |
| 2015 – 2016  | 32,788  |
| 2016 – 2017  | 32,788  |
| 2017 – 2018  | 32,788  |
| 2018 – 2019  | 32,788  |
| 2019-2020  | 32,788  |
| <b>Total estimated reductions (tonnes of CO<sub>2</sub>e)</b>  | <b>327,880</b>  |
| <b>Total number of crediting years</b>   | <b>10</b>   |
| <b>Annual average over the crediting period of estimated reductions (tonnes of CO<sub>2</sub> e)</b> | <b>32,788</b>   |

#### **A.4.5. Public funding of the project activity:**

&gt;&gt;

No public funding is available to the project activity from parties included in Annex I.

**SECTION B. Application of a baseline and monitoring methodology****B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:**

&gt;&gt;

Approved Consolidated Baseline and Monitoring methodology ACM0002 (Version 10 Sectoral Scope 01, EB 47)

Title: Consolidated baseline methodology for grid-connected electricity generation from renewable sources

Reference:

<http://cdm.unfccc.int/UserManagement/FileStorage/NF9EDA0V5K382HW0JR14GS7XYQUMCP>

The other references which have been taken for the preparation of the document are: Tools for the demonstration and assessment of additionality, Version 05.2, EB 39

Reference: [http://cdm.unfccc.int/Reference/tools/ls/meth\\_tool01.pdf](http://cdm.unfccc.int/Reference/tools/ls/meth_tool01.pdf) Tools to calculate the emission factor for an electricity system, Version 02, EB 50

Reference: [http://cdm.unfccc.int/Reference/tools/ls/meth\\_tool07\\_v01\\_1.pdf](http://cdm.unfccc.int/Reference/tools/ls/meth_tool07_v01_1.pdf)

**B.2. Justification of the choice of the methodology and why it is applicable to the project activity:**

&gt;&gt;

The Methodology ACM0002 is applicable to the project activity. The applicability criteria are met in the following way:

| Applicability Criteria  | Project Scenario  |
|---|---|
| The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit   | The project activity is the installation of a new wind power plant unit. Hence it fulfils the applicability criteria.   |
| In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity | The project activity is a newly installed wind power plant and does not involve capacity additions, retrofits or replacements.  |
| In case of hydro power plants, one of the following conditions must apply: <ul style="list-style-type: none"> <li>• The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or</li> </ul>  | The proposed project activity is does not involve any hydro plants. It's a wind power installation and hence this condition does not apply to this particular project activity. |



| Applicability Criteria   | Project Scenario |
|--|------------------|
| <ul style="list-style-type: none"> <li>The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>; or</li> <li>The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>.</li> </ul> |                  |

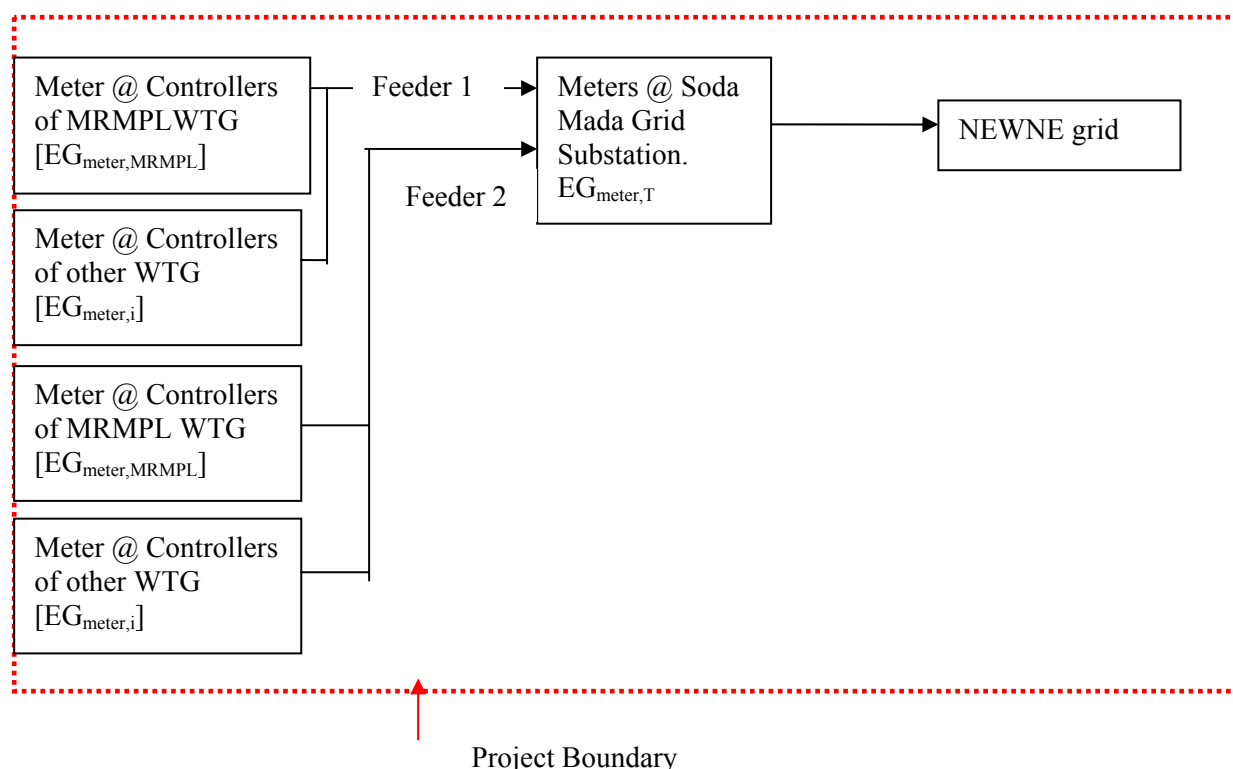
**B.3. Description of the sources and gases included in the project boundary:**

&gt;&gt;

|                  | Source   | Gas              | Included | Justification/Explanation  |
|------------------|--|------------------|----------|--|
| Baseline         | CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity            | CO <sub>2</sub>  | Yes      | Main emission source   |
|                  |  | CH <sub>4</sub>  | No       | Minor emission source  |
|                  |  | N <sub>2</sub> O | No       | Minor emission source  |
| Project Activity | For geothermal power plants, fugitive emissions of CH <sub>4</sub> and CO <sub>2</sub> from non-condensable gases contained in geothermal steam. | CO <sub>2</sub>  | No       | The present project activity is a greenfield wind power project. Hence, not relevant |
|                  |  | CH <sub>4</sub>  | No       |  |
|                  |  | N <sub>2</sub> O | No       |  |
|                  | CO <sub>2</sub> emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants   | CO <sub>2</sub>  | No       | The present project activity is a greenfield wind power project. Hence, not relevant |
|                  |  | CH <sub>4</sub>  | No       |  |
|                  |  | N <sub>2</sub> O | No       |  |
|                  | For hydro power plants, emissions of CH <sub>4</sub> from the reservoir.   | CO <sub>2</sub>  | No       | The present project activity is a greenfield wind power project. Hence, not relevant |
|                  |  | CH <sub>4</sub>  | No       |  |
|                  |  | N <sub>2</sub> O | No       |  |

As per the methodology, “the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to.”





The proposed project would be feeding the electricity in the NEWNE grid. The proposed project would have marginal impact on all the generation facilities in the grid. Thus all the power generation facilities connected to this grid form the project boundary for the purpose of baseline estimation. The NEWNE grid is also connected with the Southern grid, however, the net exchange of energy within the grids is comparatively small, and thus the other regional grids are not included in the boundary (however for conservative and accurate estimation, the imports of electricity from other regional grid has been included in the baseline calculation).

**B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:**

>>

**Identification of the baseline scenario**

The project activity is the installation of a new wind power plant. This project is not a modification/ retrofit of any existing electricity generation facility. Hence, in accordance to the approved methodology ACM0002, Version 10, the baseline scenario for new installation facility is described as:

*“Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system.”*

Determination of emission factor figures have been calculated and provided in section B.6.1 of this PDD.

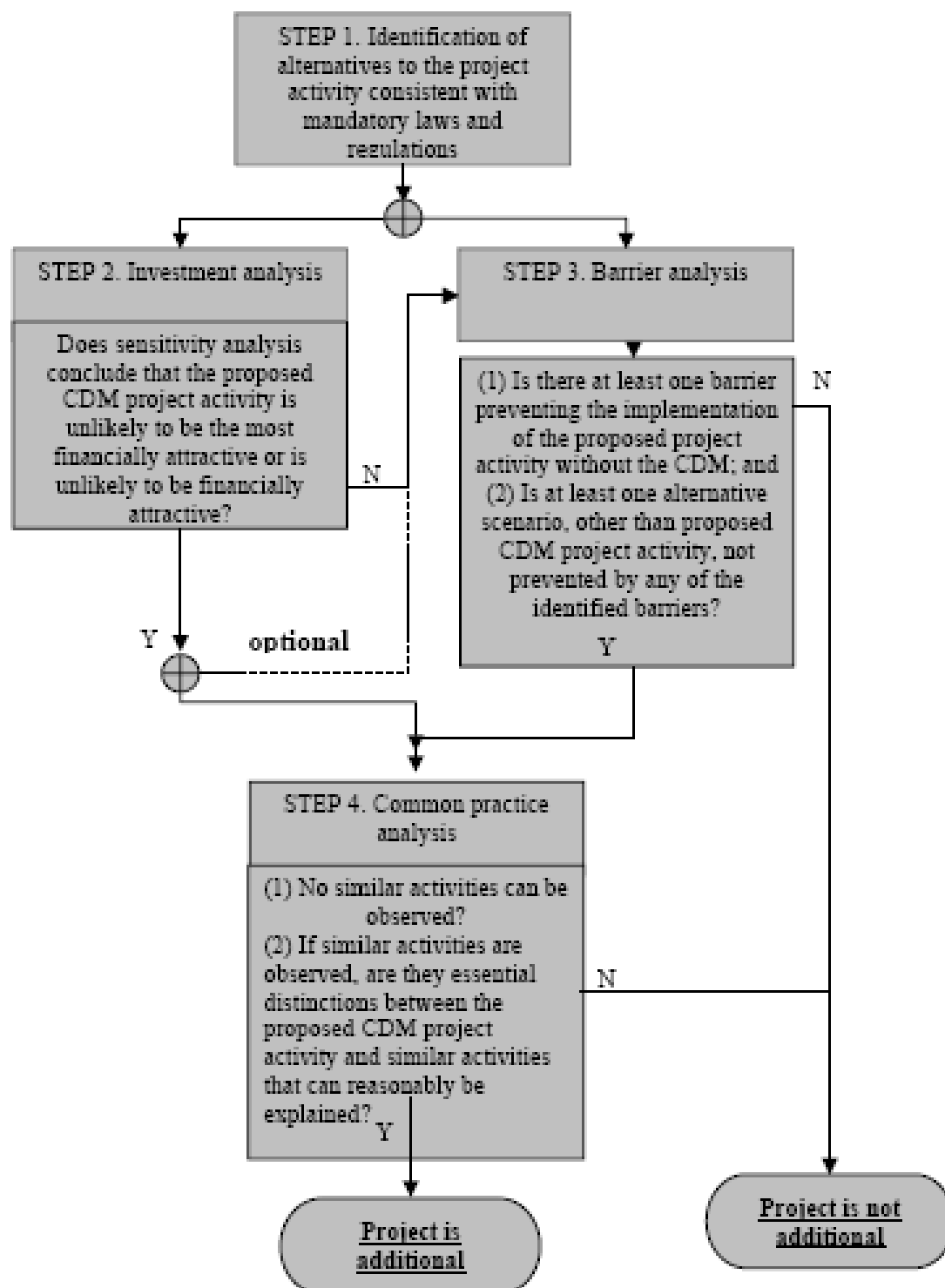


**B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):**

>>

The project activity has been conceived as a CDM project since its inception. MRMPL has taken CDM revenue right from the onset of this wind project. The evidence of the same can be verified by the Designated Operational Entities (DOE) at the time of project validation.

The additionality of the proposed project activity has been demonstrated below in accordance with the “Tool for the demonstration and assessment of additionality, Version 05.2 and as described in the following flow chart. This is followed by the descriptions of baseline and project scenarios and how emission reductions would occur in the project activity. The steps as per the additional tool are provided in the figure below:





| Steps  | Additionality Requirements  | Status of Additionality Check  |
|--|---|--|
| <b>1. Identification of alternatives to the project activity consistent with mandatory laws and regulations</b>              |   |  |
| Sub-step 1(a): Define alternatives to the project activity<br>Sub-step 1(b): Consistency with mandatory laws and regulations | <p>MRMPL has set up a 20 MW wind power project in order to generate electricity and supply the same to the state electricity grid. As per approved methodology ACM 0002 Version 10:</p> <p><i>“If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:</i></p> <p><i>Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.</i>”</p> <p>Further, the project activity conforms to all the applicable laws and regulations in India:</p> <ul style="list-style-type: none"> <li>• Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.</li> <li>• The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.</li> <li>• There is no legal requirement on the choice of a particular technology for power generation.</li> </ul> | <p>The additionality check has crossed Step 1 and may proceed to Step 2 (Investment Analysis) followed by Step 3 (Barrier Analysis) and Step 4 (Common Practice Analysis).</p> <p>In the project case, Step 2 has been used for additionality check, followed by Step 3 and 4.</p> |
| <b>Step 2: Investment Analysis</b>   |   |  |
| Step 2 (a): Determine appropriate analysis method  | <p>The project proponent proposes to generate the revenue by selling electricity to state electricity board. Hence a simple cost analysis is not applicable in the present situation.</p> <p>Amongst the other two options, Investment Comparison Option and Benchmark analysis, the benchmark analysis has been adopted. Here, the Internal Rate of Return (IRR) on the project activity serves as a benchmark to assess the financial attractiveness of the project activity.</p>   | <p>The additionality check has crossed Step 2(a). and can proceed to Step 2(b)</p>   |
| Step 2(b): Option III: Apply benchmark analysis  | <p>This is the first project activity being undertaken by MRMPL with the motive of being an independent wind power producer exporting the generated electricity from its wind farm to the regional electricity system. Since there is no precedence of a decision to invest in renewable energy based power generation, MRMPL consecutively sought a project returns based benchmark applicable to independent power producers in the country implementing similar projects.</p> <p>An investment analysis of the project activity was conducted with post tax project Internal Rate of Return (IRR) as the financial indicator. IRR is one of the known financial indicators used by</p>   |  |

<sup>1</sup> [RBI weekly statistical supplement dated 11/07/2008](#)



| Steps   | Additionality Requirements   | Status of Additionality Check                |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
|---|--|--|-------|--|------------------------------|-------------------|--|-----------------------------|-------------|--|---------------------|----|---------------------------------|-------------------|----|---------------------------------|------------------------------------|--------------------|------------|------------------|--------------------|---------------------------------|----------------------------------|----|---------------------------------|--|--------------|--------------------------|---|--------------|--------------------------|---|--------------|--------------------------|------------------------------------|----------|----------------------------------|--------------------|----------------|------------|------|--------------------------|--|--|
|   | banks, lending institutions and project developers for decision making. The benchmark is taken as per the Reserve bank of India (RBI) Benchmark Prime lending rate (BPLR) for the time when the investment decision was being taken. The BPLR at the time of decision making was 12.25-12.75 % <sup>1</sup> .  |  |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Step 2 (c):<br>Calculation and comparison of financial indicators       | <p>The following assumptions have been made for conducting the financial analysis:<br/>(Note: 1 Lakh INR= 100,000 INR)</p> <table border="1"> <tr> <td>Capacity of the wind project</td><td>20 MW</td><td></td></tr> <tr> <td>No. and capacity of machines</td><td>16 Nos. X 1.25 MW</td><td></td></tr> <tr> <td>Gross Annual Generation/WTG</td><td>26 Lakh kWh</td><td>Quotes provided by WTG provider<sup>2</sup></td></tr> <tr> <td>Transmission losses</td><td>3%</td><td>Quotes provided by WTG provider</td></tr> <tr> <td>Grid Availability</td><td>4%</td><td>Quotes provided by WTG provider</td></tr> <tr> <td>Net Annual Generation incl. losses</td><td>24.21 Lakh kWh/WTG</td><td>Calculated</td></tr> <tr> <td>Annual O&amp;M Costs</td><td>INR 12.60 Lakh/WTG</td><td>Quotes provided by WTG provider</td></tr> <tr> <td>% Escalation in O&amp;M charges p.a.</td><td>5%</td><td>Quotes provided by WTG provider</td></tr> <tr> <td>Power Tariff (in 1<sup>st</sup> year)</td><td>INR 3.59/kWh</td><td>Power Purchase Agreement</td></tr> <tr> <td>Escalation in power tariff from 2<sup>nd</sup> – 12<sup>th</sup> year</td><td>INR 0.02/kWh</td><td>Power Purchase Agreement</td></tr> <tr> <td>Escalation in power tariff from 13<sup>th</sup> year</td><td>INR 0.01/kWh</td><td>Power Purchase Agreement</td></tr> <tr> <td>Tax holiday u/s 80IA available for</td><td>10 years</td><td><a href="#">IT Section 80-IA</a></td></tr> <tr> <td>Total Project Cost</td><td>INR 10400 Lakh</td><td>Calculated</td></tr> <tr> <td>Fund</td><td>Equity 100 %<br/>Debt 0 %</td><td></td></tr> </table> | Capacity of the wind project                 | 20 MW |  | No. and capacity of machines | 16 Nos. X 1.25 MW |  | Gross Annual Generation/WTG | 26 Lakh kWh | Quotes provided by WTG provider <sup>2</sup> | Transmission losses | 3% | Quotes provided by WTG provider | Grid Availability | 4% | Quotes provided by WTG provider | Net Annual Generation incl. losses | 24.21 Lakh kWh/WTG | Calculated | Annual O&M Costs | INR 12.60 Lakh/WTG | Quotes provided by WTG provider | % Escalation in O&M charges p.a. | 5% | Quotes provided by WTG provider | Power Tariff (in 1 <sup>st</sup> year) | INR 3.59/kWh | Power Purchase Agreement | Escalation in power tariff from 2 <sup>nd</sup> – 12 <sup>th</sup> year | INR 0.02/kWh | Power Purchase Agreement | Escalation in power tariff from 13 <sup>th</sup> year | INR 0.01/kWh | Power Purchase Agreement | Tax holiday u/s 80IA available for | 10 years | <a href="#">IT Section 80-IA</a> | Total Project Cost | INR 10400 Lakh | Calculated | Fund | Equity 100 %<br>Debt 0 % |  |  |
| Capacity of the wind project  | 20 MW  |  |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| No. and capacity of machines  | 16 Nos. X 1.25 MW  |  |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Gross Annual Generation/WTG   | 26 Lakh kWh  | Quotes provided by WTG provider <sup>2</sup> |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Transmission losses   | 3%   | Quotes provided by WTG provider              |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Grid Availability   | 4%   | Quotes provided by WTG provider              |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Net Annual Generation incl. losses                                      | 24.21 Lakh kWh/WTG   | Calculated                                   |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Annual O&M Costs  | INR 12.60 Lakh/WTG   | Quotes provided by WTG provider              |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| % Escalation in O&M charges p.a.  | 5%   | Quotes provided by WTG provider              |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Power Tariff (in 1 <sup>st</sup> year)                                  | INR 3.59/kWh   | Power Purchase Agreement                     |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Escalation in power tariff from 2 <sup>nd</sup> – 12 <sup>th</sup> year | INR 0.02/kWh   | Power Purchase Agreement                     |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Escalation in power tariff from 13 <sup>th</sup> year                   | INR 0.01/kWh   | Power Purchase Agreement                     |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Tax holiday u/s 80IA available for                                      | 10 years   | <a href="#">IT Section 80-IA</a>             |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Total Project Cost  | INR 10400 Lakh   | Calculated                                   |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |
| Fund  | Equity 100 %<br>Debt 0 %   |  |       |  |                              |                   |  |                             |             |  |                     |    |                                 |                   |    |                                 |                                    |                    |            |                  |                    |                                 |                                  |    |                                 |  |              |                          |   |              |                          |   |              |                          |                                    |          |                                  |                    |                |            |      |                          |  |  |

<sup>2</sup> It may be noted here that as per “Guidelines for the reporting and validation of plant load factors” Version 01, a wind assessment study had been conducted by the project proponent, which states a generation value lower than that mentioned in the quote. However, for conservativeness, the quote figures have been taken into consideration during investment analysis.



| Steps  | Additionality Requirements   | Status of Additionality Check    |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
|--|--|----------------------------------|-----------|--|-----|------|------------|-------|-------|-----|-------|-------|--------|-------|-------|--------------|-------|-------|--|
|  | The Project IRR works out to 8.15% keeping the above data in consideration without CDM Revenues.   |                                  |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| Step 2 (d): Sensitivity Analysis                                 | <p>The project activity has been found sensitive to the following parameters for which the project IRR without CDM revenues have been calculated:</p> <table border="1"> <thead> <tr> <th rowspan="2">Parameter Varied for IRR w/o CDM</th><th colspan="2">Variation</th></tr> <tr> <th>10%</th><th>-10%</th></tr> </thead> <tbody> <tr> <td>Generation</td><td>9.80%</td><td>6.41%</td></tr> <tr> <td>O&amp;M</td><td>7.85%</td><td>8.45%</td></tr> <tr> <td>Tariff</td><td>9.75%</td><td>6.47%</td></tr> <tr> <td>Capital Cost</td><td>6.86%</td><td>9.67%</td></tr> </tbody> </table> <p>The purpose of the sensitivity analysis is to demonstrate the sensitivity of the return on project due to uncertainty in the plant load factor and project costs as well as the uncertainty in unit rate of power sale. As can be seen from the above analysis there is significant risk associated with the project activity that impacts the viability of the project activity. It is also evident that without CDM benefits, the project has no or very less financial viability. With loan facilities, the feasibility has improved but has still not met the benchmark.</p> <p>Thus the project activity is not the most financially attractive option.</p> | Parameter Varied for IRR w/o CDM | Variation |  | 10% | -10% | Generation | 9.80% | 6.41% | O&M | 7.85% | 8.45% | Tariff | 9.75% | 6.47% | Capital Cost | 6.86% | 9.67% |  |
| Parameter Varied for IRR w/o CDM                                 | Variation  |                                  |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
|  | 10%  | -10%                             |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| Generation   | 9.80%  | 6.41%                            |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| O&M  | 7.85%  | 8.45%                            |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| Tariff   | 9.75%  | 6.47%                            |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| Capital Cost   | 6.86%  | 9.67%                            |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| <b>Step 4: Common Practice Analysis</b>                          |  |                                  |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |
| a) Analyze other activities similar to proposed project activity | <p>As per the approved methodological tool, common practice analysis includes:</p> <p><i>“Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities (registered project activities and project activities which have been</i></p>  |                                  |           |  |     |      |            |       |       |     |       |       |        |       |       |              |       |       |  |

<sup>3</sup> <http://cdm.unfccc.int/Projects/Validation/DB/9YLS582SWXX4SAZD8P7ZC75KKJMV4Y/view.html>

<sup>4</sup> <http://cdm.unfccc.int/Projects/Validation/DB/PCJIT7PAL4J6YNVIKGGN9XVJP6UZHA/view.html>

<sup>5</sup> <http://cdm.unfccc.int/Projects/DB/SGS-UKL1181742063.57/view>

<sup>6</sup> <http://cdm.unfccc.int/Projects/Validation/DB/H88VQDBMZDVS37NPUUWXHR25K08FR/view.html>

<sup>7</sup> <http://cdm.unfccc.int/Projects/Validation/DB/RA6L3V9EWLLXCYTDYQJEE1QYAKT31/view.html>

<sup>8</sup> <http://cdm.unfccc.int/Projects/Validation/DB/9K96F1AVNBCPWHZA103MFZZAEFC345/view.html>

<sup>9</sup> <http://cdm.unfccc.int/Projects/Validation/DB/Y8W0UMSG3DAI1VHPT2U3Y4IF9N7S4G/view.html>

<sup>10</sup> <http://cdm.unfccc.int/Projects/DB/BVQI1201770524.09/view>

<sup>11</sup> <http://cdm.unfccc.int/Projects/DB/DNV-CUK1243661243.16/view>

<sup>12</sup> <http://cdm.unfccc.int/Projects/Validation/DB/KG5ZE4KPHD24WFY7DAP2BAK8UPLCN/view.html>

<sup>13</sup> <http://www.hinduonnet.com/thehindu/2004/06/24/stories/2004062406491600.htm>

<sup>14</sup> <http://cdm.unfccc.int/Projects/DB/DNV-CUK1143050217.74>



| Steps | Additionality Requirements   | Status of Additionality Check |
|-------|--|-------------------------------|
|       | <p><i>published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis”</i></p> <p>The “Directory – Indian Windpower 2009”, an official compendium of wind power projects in India, has been consulted to provide a list of project activities in Rajasthan. For arriving at the exhaustive list of project activities, the following considerations were made to identify similar project activities occurring under similar conditions:</p> <ul style="list-style-type: none"><li>• The wind power project should be set up by a single project proponent</li><li>• The project activity should have an installation of at least 15MW</li><li>• The project should be located wholly in Rajasthan and after the Electricity Act, 2003 came into effect to justify that such activities, if any, are subject to similar regulatory frameworks and investment climate – It may be noted here that prior to the Electricity Act, 2003, there was no uniform regulation for determination of tariff for generation &amp; sale of power. Moreover, power sale tariff and power purchase agreements for all states in India are based upon the guidelines in this Act. Hence, all prospective project owners since 2003 have to include the effect of this Act (i.e., State-wise power sale tariff orders) during taking investment decision. This option was not available to project owners prior to 2003 and hence, in accordance to the approved methodological tool, projects after 2003 have a “<i>similar regulatory frameworks and investment climate</i>”</li></ul> <p>The Wind Power Directory provides installation of wind turbines by a project owner along with information on WTG capacity, total installation, location &amp; date of commissioning (in yy-mm format). However, it was not possible to determine, based on the date of commissioning, whether the project activity was any one of the following:</p> <ul style="list-style-type: none"><li>• Total capacity of more than 15 MW is a single project activity</li><li>• Total capacity of more than 15 MW are individual small scale project activities</li></ul> <p>Hence, as a conservative measure, all project owners having installation of more than 15 MW in Rajasthan have been taken in the purview of this analysis.</p> |                               |



| Steps   | Additionality Requirements   | Status of Additionality Check |
|---|--|-------------------------------|
|   | <p>Following are the project owners who have wind projects in Rajasthan with a cumulative capacity of more than 15 MW installed after 2003:</p> <ol style="list-style-type: none"> <li>1. DLF Home Developers Ltd.</li> <li>2. Enercon Wind Farms (Raj) Pvt. Ltd.</li> <li>3. Enercon Windfarms Hindustan P. Ltd.</li> <li>4. Hindustan Petroleum Corporation Ltd.</li> <li>5. IDFC</li> <li>6. K S Oils Ltd.</li> <li>7. Power Finance Corp.</li> <li>8. Rajasthan Ren. Energy Corp. Ltd.</li> <li>9. Rajasthan State Mines &amp; Mineral Ltd.</li> </ol> <p>Among the 9 project activities listed above, the following have applied for CDM revenues:</p> <ol style="list-style-type: none"> <li>1. DLF Home Developers Ltd.<sup>3</sup></li> <li>2. Enercon Wind Farms (Raj) Pvt. Ltd.<sup>4</sup></li> <li>3. Enercon Windfarms Hindustan P. Ltd.<sup>5</sup></li> <li>4. Hindustan Petroleum Corporation Ltd.<sup>6</sup></li> <li>5. K S Oils Ltd. (as two separate small scale projects<sup>7, 8</sup>)</li> <li>6. Rajasthan Ren. Energy Corp. Ltd.<sup>9</sup></li> <li>7. Rajasthan State Mines &amp; Mineral Ltd. (as three separate large scale projects<sup>10, 11, 12</sup>)</li> </ol> <p>It may be noted here that the project activity of Power Finance Corporation (PFC) has been actually setup by Enercon Wind Farms (Jaisalmer)<sup>13</sup> and PFC had financed the project. This project activity is also registered at UNFCCC<sup>14</sup>. With regards to the IDFC project activity, no further information is available.</p> |                               |
| Step 4b:<br>Discuss any similar options that are occurring: | <p>From the foregoing, it should be evident that wind projects are not a common practice. In view of this, the 20 MW Wind project is not a common practice project, the project is additional and not the same as baseline scenario and would not have occurred without the CDM.</p> <p>The approval and registration of the proposed project activity as a CDM project would lead to additional revenue thereby improving the returns from the project activity alleviating investment and regulatory policy risk to a certain extent. The successful registration also provides an incentive for other proponents to invest in wind power projects. Thus the CDM revenue acts as a risk mitigation tool in overcoming barriers.</p>  |                               |





A brief chronological sequence of the project activity is as follows:

| Sl. No. | Event                      | Date       |
|---------|----------------------------|------------|
| 1.      | Board Approval for project | 15/07/2008 |
| 2.      | Purchase Order for WTG     | 19/08/2008 |
| 3.      | Appointment of consultant  | 03/11/2008 |
| 4.      | Intimation to UNFCCC       | 19/11/2008 |
| 5.      | Stakeholders' Consultation | 24/12/2008 |
| 6.      | Appointment of DOE         | 12/03/2009 |
| 7.      | Host Country Approval      | 17/11/2009 |

#### B.6. Emission reductions:

##### B.6.1. Explanation of methodological choices:

>>

**Method of calculation of combined margin emission factor:** *“Tool to calculate the emission factor for an electricity system”, Version 02, EB 50.*

The combined margin calculations estimate the baseline emission factor for grid. It consists of a combination of operation margin (OM) and build margin (BM) factors obtained from publication issued by Central Electricity Authority (CEA) of India- CO<sub>2</sub> Baseline Database for the Indian Power Sector, Version 04, dated September 1, 2008.

#### Calculation of the Baseline Emission Factor

##### **Step 1: Identifying the relevant electricity systems**

A “project electricity system” is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

A “connected electricity system” is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. The tool requires the following considerations while determining whether significant transmission constraints exist or not:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5% between the systems during 60% or more of the hours of the year.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

In the Indian context, as no well established spot markets exist, the first criterion is not applicable. Similarly, a transmission line fulfilling the second criteria is an exception in Indian Context. Hence the use of these criteria does not result in a clear grid boundary. In such a scenario, the use of a regional grid definition in case of large countries with layered dispatch systems (e.g. provincial, regional/national) is recommended. Further, it states that a provincial grid definition may in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity.

Of the two regional grids of the Indian Electricity system, i.e., the North-East-West-North East (NEWNE) grid and the Southern grid, the latter covers four states and two Union Territories while the NEWNE grid covers the rest of India. The project is located in the state of Rajasthan which is connected to NEWNE grid.



Each state in a regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional grid in which it is located. Hence for the purpose of estimation of the baseline emission factor, the NEWNE Regional grid has been chosen as the relevant electricity system. For the purpose of determining the operating margin emission factor, one of the following options is to be used to determine the CO<sub>2</sub> emission factor(s) for net electricity imports from a connected electricity system within India:

- (a) 0 tCO<sub>2</sub>/MWh; or
- (b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 below;

For imports from connected electricity systems located in another host country (ies), the emission factor is 0 tons CO<sub>2</sub> per MWh.

**Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)**

The project proponent wishes to include only grid power plants in the calculation, while off-grid plants will be excluded.

**Step 3: Select a method to determine the operating margin (OM)**

The project proponent wishes to use the Simple Operating Margin (OM) method for the estimation of the Operating Margin Emission Factor. The use of the Simple OM method is justified as the share of the low cost/ must run resources constitute less than 50% of the total grid generation. The data pertaining to the total grid generation and the low/cost must run resources have been included in Annex 3. The Ex ante option has been chosen where in a three year generation weighted average based on the most recent data has been calculated ex ante and would be fixed for the entire crediting period. Hence, the parameters for the calculation of OM do not need to be monitored and the OM does not need to be calculated during the chosen entire crediting period of ten years.

**Step 4: Calculation of the Operating Margin Emission Factor according to the Simple OM method**

The simple OM emission factor is calculated as the generation-weighted average CO<sub>2</sub> emissions per unit net electricity generation (tCO<sub>2</sub>/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

Option A: Based on the net electricity generation and a CO<sub>2</sub> emission factor of each power unit

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. This option can only be used if:

- a) The necessary data for Option A is not available; and
- b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

Net electricity generation and fuel consumption of each power plant is available through the data provided by the Central Electricity Authority (CEA), an official data source<sup>15</sup>. The same has been detailed

<sup>15</sup> <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>



in Annex 3. CEA database, Version 5, dated 1<sup>st</sup> November, 2009 is the latest version at the time of commencement of validation and hence, has been used.

**Assumptions:**

The following assumptions have been made in case of unavailability of data at station level:

- Net generation: In case of stations where only gross generation is available, CEA standard values for auxiliary consumption have been applied to calculate the net generation data.
- GCV: Default GCV values for some thermal power stations have been used for cases where station specific data was unavailable.

The following assumptions have been in case of unavailability of data at unit level:

Net generation: The data is not monitored at a unit level and hence the following assumptions have been made

1. The auxiliary consumption (in % of gross generation) of the unit was assumed to be equal to that of the respective stations in the following cases:

- a) All units of a station fall into the build margin; or
- b) All units of a station have the same installed capacity; or
- c) The units in the station have different capacities but do not differ with respect the applicable standard auxiliary consumption.

2. In all other cases, standard values for auxiliary consumption adopted by CEA were applied.

3. Fuel consumption and GCV: Fuel consumption and GCV are generally not measured at unit level. Instead, the specific CO<sub>2</sub> emissions of the relevant units were directly calculated based on heat rates.

**Calculation Approach:**

The Simple OM has been calculated using the following formula:

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$  = Simple operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)

$EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit m in year y (tCO<sub>2</sub>/MWh)

m = All power units serving the grid in year y except low-cost / must-run power units

y = The relevant year as per the data vintage chosen in Step 3

**Determination of  $EF_{EL,m,y}$**

The emission factor of each power unit m should be determined as follows:

- Option A1. If for a power unit m data on fuel consumption and electricity generation is available, the emission factor ( $EF_{EL,m,y}$ ) should be determined as follows:



$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_{m,y}}$$

Where:

$EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit m in year y (tCO<sub>2</sub>/MWh)

$FC_{i,m,y}$  = Amount of fossil fuel type “i” consumed by power plant / unit m in year y (mass or volume unit)

$NCV_{i,y}$  = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO_2,i,y}$  = CO<sub>2</sub> emission factor of fossil fuel type i in year y (tCO<sub>2</sub>/GJ)

$EG_{m,y}$  = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)

m = All power plants / units serving the grid in year y except low-cost / must-run power plants / units

i = All fossil fuel types combusted in power plant / unit m in year y

y = The three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (for ex ante option)

The three most recent years for which data was available at the time of submission to the DOE included 2005-06, 2006-07, and 2007-08 and the same is presented in Annex 3 of the PDD. The generation weighted average value for these three years works out to 1.0086 for the NEWNE grid. Thus,

$$EF_{Grid,OM,y} = 1.0086 \text{ tCO}_2/\text{MWh}$$

#### Step 5: Identification of the group of power units to be included in the Build Margin

The sample group of power units “m” selected for calculation of the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. The data pertaining to the units thus identified are detailed in the Version 4 of the Baseline Carbon Dioxide Emissions database of the CEA<sup>16</sup>.

With regards to data vintage, the project participant wishes to use Option 1 viz., for the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group “m” at the time of CDM-PDD submission to the DOE for validation.

#### Step 6: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$  = Build margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)

$EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit m in year y (tCO<sub>2</sub>/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

<sup>16</sup> <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>



The Build Margin has been calculated ex ante during the crediting period. For ex ante calculation the most recent data available has been used and the build margin thus calculated is 0.5977 for the NEWNE grid. Therefore,

$$EF_{\text{Grid,BM},y} = 0.5977 \text{ tCO}_2/\text{MWh}$$

### Step 7: Calculation of the Combined Margin Emission Factor

The combined margin emission factor is calculated as follows:

$$EF_{\text{grid,CM},y} = EF_{\text{grid,OM},y} \times w_{\text{OM}} + EF_{\text{grid,BM},y} \times w_{\text{BM}}$$

Where,

$EF_{\text{grid,BM},y}$  = Build margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)

$EF_{\text{grid,OM},y}$  = Operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)

$w_{\text{OM}}$  = Weighting of operating margin emissions factor (%)

$w_{\text{BM}}$  = Weighting of build margin emissions factor (%)

The default values to be used for Wind Power projects are

$$w_{\text{OM}} = 0.75$$

$$w_{\text{BM}} = 0.25$$

Hence, the Baseline Emission Factor is calculated as below:

$$\begin{aligned} EF_{\text{Grid,CM},y} &= w_{\text{OM}} * EF_{\text{Grid,OM},y} + w_{\text{BM}} * EF_{\text{Grid,BM},y} \\ &= 0.75 * 1.0086 + 0.25 * 0.5977 \\ &= 0.9058 \text{ tCO}_2/\text{MWh} \end{aligned}$$

The Baseline emission Factor thus calculated is fixed during the entire crediting period.

#### B.6.2. Data and parameters that are available at validation:

| Data / Parameter:   | $EF_{\text{Grid,OM},y}$   |
|---|---|
| Data unit:  | tCO <sub>2</sub> /MWh   |
| Description:  | Weighted Average Simple Operating margin of the grid  |
| Source of data used:  | Central Electricity Authority database (Version 4.0)  |
| Value applied:  | 1.0086  |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The value has been used from the Central Electricity Authority (CEA) database (Version 4.0, dated 1 <sup>st</sup> September 2008 <sup>17</sup> ). |
| Any comment:  |   |

<sup>17</sup> [http://www.cea.nic.in/planning/c/%20and%20e/database\\_publishing\\_ver4.zip](http://www.cea.nic.in/planning/c/%20and%20e/database_publishing_ver4.zip)



|   |   |
|---|---|
| <b>Data / Parameter:</b>  | <b>EF<sub>Grid,BM,y</sub></b>   |
| Data unit:  | tCO <sub>2</sub> /MWh   |
| Description:  | Build Margin of the grid.   |
| Source of data used:  | Central Electricity Authority database (Version 4.0)  |
| Value applied:  | 0.5977  |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The value has been used from the Central Electricity Authority (CEA) database (Version 4.0, dated 1 <sup>st</sup> September 2008) <sup>18</sup> . |
| Any comment:  |   |

|   |   |
|---|---|
| <b>Data / Parameter:</b>  | <b>EF<sub>Grid,CM,y</sub></b>   |
| Data unit:  | tCO <sub>2</sub> /MWh   |
| Description:  | Combined Margin emission factor of the grid   |
| Source of data used:  | Central Electricity Authority database (Version 4.0)  |
| Value applied:  | 0.9058  |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The value will be calculated using the Operating Margin and Build Margin values, also taken from the CEA reports. |
| Any comment:  |   |

### **B.6.3. Ex-ante calculation of emission reductions:**

&gt;&gt;

#### Calculation of Baseline Emissions

The Baseline emission is calculated by the following formula:

$$BE_y = (EG_y - EC_y) * EF_{Grid,CM,y}$$

BE<sub>y</sub> = Baseline emissions in year y (tCO<sub>2</sub>/yr).

EG<sub>y</sub> = Electricity exported to the grid (MWh).

EC<sub>y</sub> = Electricity imported from the Grid (MWh)

EF<sub>grid,CM,y</sub> = Combined margin CO<sub>2</sub> emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system.”

Net annual Generation Capacity of Project Activity supplied to grid = 36199 MWh<sup>19</sup>

$$BE_y = 36199 * 0.9058$$

$$= 32788$$

The estimated annual baseline emissions are 32788 tCO<sub>2</sub>.

<sup>18</sup> [http://www.cea.nic.in/planning/c%20and%20e/database\\_publishing\\_ver4.zip](http://www.cea.nic.in/planning/c%20and%20e/database_publishing_ver4.zip)

<sup>19</sup> It may be noted here that as per “Guidelines for the reporting and validation of plant load factors” Version 01, a wind assessment study had been conducted by the project proponent, which states a generation value lower than that mentioned in the quote by WTG supplier. For conservativeness, the lower PLF figures, as provided in the wind assessment study, have been taken into consideration for estimating annual emission reductions.

Calculation of Project Emission:

As the project activity involves the generation of electricity from Wind power and supply of the electricity to the grid, the project emissions are considered to be zero. Hence

$$PE_y = 0$$

Calculation of Leakage emission:

According to the methodology, no leakage emission has taken into account by the project. Thus  $LE_y = 0$   
The emission reduction in the year y is calculated by the following formula:

$$ER_y = BE_y - PE_y - LE_y$$

Where

$ER_y$  = Emission reduction in the year y

$BE_y$  = Baseline emission in the year y

$PE_y$  = Project emission in the year y

$LE_y$  = Leakage emission in the year y

$$\begin{aligned} ER_y &= 32788 - 0 - 0 \\ &= 32788 \text{ tCO}_2 \end{aligned}$$

The emission reduction for the project has been estimated as 32788 tonnes of CO<sub>2</sub> per annum.

**B.6.4 Summary of the ex-ante estimation of emission reductions:**

>>

| Year                                     | Estimation of project activity emissions (tCO <sub>2</sub> e) | Estimation of Baseline emissions (tCO <sub>2</sub> e) | Estimation of leakage (tCO <sub>2</sub> e) | Estimation of overall emission reductions (tCO <sub>2</sub> e) |
|--|---|---|--|--|
| 2010 – 2011                              | 0   | 32,788  | 0  | 32,788   |
| 2011 – 2012                              | 0   | 32,788  | 0  | 32,788   |
| 2012 – 2013                              | 0   | 32,788  | 0  | 32,788   |
| 2013 – 2014                              | 0   | 32,788  | 0  | 32,788   |
| 2014 – 2015                              | 0   | 32,788  | 0  | 32,788   |
| 2015 – 2016                              | 0   | 32,788  | 0  | 32,788   |
| 2016 – 2017                              | 0   | 32,788  | 0  | 32,788   |
| 2017 – 2018                              | 0   | 32,788  | 0  | 32,788   |
| 2018 – 2019                              | 0   | 32,788  | 0  | 32,788   |
| 2019-2020                                | 0   | 32,788  | 0  | 32,788   |
| <b>Total (tonnes of CO<sub>2</sub>e)</b> |   | <b>327,880</b>  | <b>0</b>                                   | <b>327,880</b>   |

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

|   |   |
|---|---|
| <b>Data / Parameter:</b>  | <b>EG<sub>v</sub></b>   |
| Data unit:  | MWh   |
| Description:  | Total electricity exported to grid  |
| Source of data to be used:  | Credit notes from the state electricity utility   |
| Value of data applied for the purpose of calculating expected emission reductions | 36,199  |
| Description of measurement methods and procedures to be applied.                  | <u>Monitoring:</u> Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2 (Main & Check meters)<br><u>Data type:</u> Measured & Calculated<br><u>Archiving:</u> Paper & Electronic<br><u>Recording Frequency:</u> Daily<br><u>Responsibility:</u> The O&M site-in-charge shall be responsible for the regular recording of data.<br><u>Calibration Frequency:</u> The meters shall be calibrated annually. |
| QA/QC procedures to be applied:   | Meter calibration shall be conducted annually and internal audit system is in place as mentioned in Section B.7.2   |
| Any comment:  | The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.<br>In the case of the crediting period start & end dates of the project activity falls in – between the billing cycles, then for emission reduction calculations, the daily generation reports provided by the O&M service provider, shall be considered.                       |

|   |  |
|---|--|
| <b>Data / Parameter:</b>  | <b>EC<sub>v</sub></b>  |
| Data unit:  | MWh  |
| Description:  | Total electricity imported from grid   |
| Source of data to be used:  | Credit notes from the state electricity utility  |
| Value of data applied for the purpose of calculating expected emission reductions | 0  |
| Description of measurement methods and procedures to be applied.                  | <u>Monitoring:</u> Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.2 (Main & check meters)<br><u>Data type:</u> Measured & Calculated<br><u>Archiving:</u> Paper & Electronic<br><u>Recording Frequency:</u> Daily<br><u>Responsibility:</u> The O&M site-in-charge shall be responsible for the regular recording of data.<br><u>Calibration Frequency:</u> The meters shall be calibrated annually |
| QA/QC procedures to be applied:   | Meter calibration shall be conducted annually and internal audit system is in place as mentioned in Section B.7.2  |
| Any comment:  | The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.  |



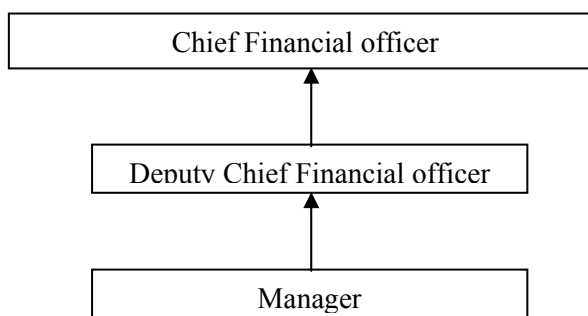


|  |  |
|--|--|
|  | In the case of the crediting period start & end dates of the project activity falls in – between the billing cycles, then for emission reduction calculations, the daily generation reports provided by the O&M service provider, shall be considered. |
|--|--|

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

&gt;&gt;

Project participants will be implemented 20 MW Wind energy power generation project. Power generation using renewable energy like wind power is eligible for CDM benefits under Kyoto protocol. Following is a monitoring plan for CDM activity

**Organizational Structure:****Responsibility:**

Analysis of power generation reports, performance report and monthly meter reading is handled by project proponents on regular basis. The data collection on daily basis is done by O&M team contracted by project proponent. An automated generation report is sent to the manager. The manager maintains the generation reports.

The Deputy chief Financial officer is assisted by the manager on the project. 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 etc. The deputy CFO reports to the chief financial officer who is responsible for the overall project management.

O&M team is responsible for preventive maintenance, handling emergency situations and improvement measures. O&M team ensures that joint monthly reading, issuance of credit notes and meter testing on regular basis.

**Data Monitoring:**

The delivered energy will be metered by the authorities of JVVNL in the presence of representatives of the technology supplier at the substation at Soda Mada. Metering equipment used shall be electronic tri-vector meters. The metering equipment shall be maintained in accordance with electricity standards. The monthly meter readings at the project sites (controller reading) and the receiving station shall be taken simultaneously and jointly by the parties. The controller readings of the Wind mills will also be recorded by the technology supplier by a Central Monitoring system installed at the wind site. Daily and monthly generation reports will be sent to MRMPL.

All the Main and Check meters shall be tested for accuracy annually with reference to a portable standard meter. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. To ensure accurate and continuous monitoring, MRMPL has a standby meter, calibrated by an authorised agency.



The allocation of electricity is executed as per the following procedure:

1. Enter the value of electricity received from meter at the controller (kWh).
2. Enter the value of electricity supplied to meter at the controller (kWh).
3. Take the difference of electricity received and supplied to meter at the controller (kWh)
4. Take the difference of electricity as per the above steps 1 to 3 for each of the WTGs (of owner i) connected to the feeder of the MRMPL WTG.  $[EG_{\text{meter},i}]$
5. Take the sum of all the controller readings as calculated in Step 4.  $[\Sigma EG_{\text{meter},i}]$
6. Divide individual difference by total calculated as per step 5 and multiply by 100 to find % allocation for each of the WTG of MRMPL.  
 $[EG_{\text{meter MRMPL}} / \Sigma EG_{\text{meter},i}) \times 100]$
7. Enter the value of electricity received from the feeder at the substation (kWh).
8. Enter the value of electricity supplied to the feeder at the substation (kWh).
9. Take the difference of electricity received and supply to meter at the substation. (kWh)  $[EG_{\text{meter},T}]$
10. Multiply the value calculated as per step 9 by % allocation calculated as per step 6 to calculate the net electricity export allocated to the WTGs of MRMPL connected to the feeder.  $[EG_{\text{net,MRMPL}}$ , i.e.,  $EG_y$  and  $EC_y]$
11. The steps 1-10 will be repeated for the other feeders connecting the WTGs of MRMPL to the substation to calculate the allocation of net electricity.

The sum of net electricity allocated in all the relevant feeder units will give the total net electricity exported by the WTGs of Modern Road Makers Private Limited.

#### Application:

The project owner uses the credit notes sent by state electricity board for respective the WTGs at different locations. The cumulative power supplied to grids shall be tabulated and multiplied by respective Grid Emission Factor to calculate number of CERs.

#### *Internal audits & Performance review*

The records are regularly audited and checked by the senior officials from project proponent on an annual basis. The officials will monitor the actual emission reduction. The personnel responsible for taking readings at site are adequately trained.

|   |
|---|
| <b>B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):</b> |
|---|

>>

Date of completion of baseline study and monitoring methodology----25/02/2009

Person Responsible: Mr Anil D. Yadav  
Modern Road Makers Pvt. Ltd.  
91-22-6640-4220  
ady@irb.co.in

**SECTION C. Duration of the project activity / crediting period****C.1. Duration of the project activity:****C.1.1. Starting date of the project activity:**

&gt;&gt;

19/08/2008 (Date of the Purchase Order)

**C.1.2. Expected operational lifetime of the project activity:**

&gt;&gt;

20 years 00 months

**C.2. Choice of the crediting period and related information:****C.2.1. Renewable crediting period:****C.2.1.1. Starting date of the first crediting period:**

&gt;&gt;

**C.2.1.2. Length of the first crediting period:**

&gt;&gt;

**C.2.2. Fixed crediting period:****C.2.2.1. Starting date:**

&gt;&gt;

01/11/2010 or the date of registration at UNFCCC, whichever is later

**C.2.2.2. Length:**

&gt;&gt;

10 years 00 months

**SECTION D. Environmental impacts**

&gt;&gt;

**D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:**

&gt;&gt;

Also, in the redefined EIA notification i.e. S.O. 1533 (<http://envfor.nic.in/legis/eia/so1533.pdf>), dated 14<sup>th</sup> September 2006, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted. But some of the impacts of the project have been analyzed as mentioned below.

**Impact on air**

Some of the pollution is caused because of the transportation of the construction material but as the transportation is a onetime affair and not continuous, the effects are considered negligible.

**Impact on water**

No significant impact on the water takes place because of the project activity.

**Impact on ecology**

The wind mills are erected in the barren lands near the desert of Rajasthan. The vegetation of the area is scanty and hence the erection of the windmill does not have a significant impact on the ecology of the area.

**Impact of the Noise**

The noise from the rotors is not significant enough and is well below the regulatory norms. The population of the adjoining areas near the windmill is quite less and hence no major impact of the noise will be seen.

**D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:**

&gt;&gt;

As has been explained in the previous section no significant environmental impacts have been considered for the project activity

**SECTION E. Stakeholders' comments**

&gt;&gt;

**E.1. Brief description how comments by local stakeholders have been invited and compiled:**

&gt;&gt;

The project proponents have taken the local concerns into consideration while implementing the wind power project. A local stakeholders meeting was conducted on 24/12/2008 to discuss the various issues related to the project with the stakeholders of the project. The agenda of the meeting was:

- Introduction of Members present in the stakeholders meeting.
- Introduction and presentation of the details of the project activities
- Brief introduction to the concept of CDM
- Expression of opinions and comments by the members.
- Vote of thanks.

Handouts of a detailed presentation on the CDM mechanism and the project were given to the stakeholders in the meeting.

The stakeholders identified for the project were:

- Village Panchayat
- Local people
- District Authorities
- Suzlon

The local stakeholders were invited in the following way:

- A newspaper advertisement was done about the project in the local newspaper. This advertisement notified the readers about the Wind Power project of MRMPL and invited them to participate in the stakeholders meeting. It was also mentioned that the project has been under the clean development mechanism of the Kyoto Protocol. The comments by the local people were compiled during the meeting and will be provided at the time of validation.
- A letter was sent to village Sarpanch by the project participants, informing about the nature of project, various benefits of wind project and request to call meeting of local people. The purpose of meeting was to take consent and know the views of local people. The meeting was attended by members of village panchayat; the compiled minutes of meeting shall be made available to DOE at the time of validation. No negative comments were received from villagers and other parties

**E.2. Summary of the comments received:**

&gt;&gt;

The stakeholders were overall satisfied with the feedback given to them about the impact of the project activity on the environment. Some of the important points discussed in the meeting were.

- The stakeholders appreciated the fact that the project produces electricity from a clean source as opposed to the electricity generation from the fossil fuels.
- The villagers were inquisitive to know whether the wind project will have any effect on the soil and water of their region.
- The local people expressed their happiness about the project in their area which has provided employment opportunity to the local people.



- The person from the board expressed his appreciation for the fact that the project adds to the overall capacity of the state of Rajasthan and that it was a clean source of energy.

The list of questions asked by the Stakeholders and the replies by the project proponent has been shown in the Table below:

Table 12

| Sr. No. | Name  | Question/Comments  | Project Proponent Response   |
|---------|---|--|--|
| 1.      | Mr. Mir Hasan Khan<br>(villager)  | What are the benefits of wind power project?   | Mr. Anil Yadav explained Clean & green way of power generation and utilizing the renewable resources effectively rather consuming the fossil fuel. He further explained the concept of Sustainability.   |
| 2.      | Mr. P J S Kundal<br>(Rajasthan state Mines and Minerals Power Limited ) | What is CDM?   | Mr. Anil Yadav explained that CDM stands for Clean Development Mechanism. It is a mechanism by which the developed countries (Annex 1 countries) can buy carbon credits for the green house gas emission reductions in Developed countries. He explained to them the steps of the CDM process in brief and how the issuances of carbon credits can help make the wind power project more feasible for Modern Road Makers Pvt. Ltd. |
| 3.      | Mr. Kuldip Singh.<br>(Villager)   | How does the project fall under CDM?   | Mr. Anil Yadav explained that the project is the installation of 16 wind turbines of 1.25 MW capacity. Generation of power from wind is a clean source of energy and displaces power generation from burning of fossil fuels. He also explained the burning of fossil fuel causes large green house gas emissions. Hence by displacing such fuels, the project reduces GHG emissions and is eligible under CDM.                    |
| 4.      | Amin Khan<br>(Villager)   | Gave Mr. Khan word of appreciation for the project and concluded that the project will contribute to the improvement of the local environment. |  |
| 5.      | Sanjay Kumar Purohit<br>(Sarpanch, Mundari)                             | How does this Project benefit Local People?  | The project has employed several local people both Contractual & permanent.  |
| 6.      | Mr. Allah Bakhat<br>(Villager)  | Gave his word of appreciation for the project  |  |
| 7.      | Mr. Karim<br>(Villager)   | Quantum of GHG emission reductions that will be taking place?  | Mr. Anil Yadav briefed about GHG emissions and its accounting. He told them that under the estimated PLF of 24% the estimated carbon credits are around 35,000 annually.   |
| 8.      | Dr Rajendra Shitole<br>(Technology supplier)                            | Good initiative by Modern Road Makers Pvt Ltd., it has created awareness among   |  |



| Sr. No. | Name                                  | Question/Comments   | Project Proponent Response   |
|---------|---------------------------------------|---|--|
|         |                                       | neighbouring industrial units and business house.                                   |  |
| 9.      | Mr. Chandrasekhar (Villager)          | It is a role model for other industries in around Jaisalmer as well as in Rajasthan |  |
| 14.     | Mr. Gaurav Jain (Technology Supplier) | What will be benefit to the company by going for this project?                      | Being an environment friendly project, it will create a brand image globally for the organization.   |
| 15.     | Shaitan Singh (Technology Supplier)   | What are the prospects of employment opportunity because of project?                | The company will directly employ local people and the project will also lead to employment through indirect way like suppliers, service engineers etc. |

**E.3. Report on how due account was taken of any comments received:**

&gt;&gt;

The project proponent explained to the villagers that the project will have no drastic effect on the soil and water of the region. They said that wind power does not need any water or raw materials from the soil for its operation. They also said that it produces no waste material from its operation. The wind mills have been installed in the unused lands of the area and hence they also do not effect vegetation by any means. The villagers were satisfied with the reasoning and there were no further questions raised on this issue.

As evident from the stakeholders' comments the stakeholders were satisfied with the positive sustainable impacts of the wind project.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

|                  |  |
|------------------|--|
| Organization:    | Modern Road Makers Pvt. Ltd.                           |
| Street/P.O.Box:  | Kamani Oil Mill Road, Chandivli Estate, Andheri (East) |
| Building:        | A- 201, Universal Business Park, 2nd floor             |
| City:            | Mumbai   |
| State/Region:    | Maharashtra  |
| Postcode/ZIP:    | 400072   |
| Country:         | India  |
| Telephone:       | +91 22 6733 5959                                       |
| FAX:             | +91 22 6675 1024                                       |
| E-Mail:          | <a href="mailto:ady@irb.co.in">ady@irb.co.in</a>       |
| URL:             | <a href="http://www.irb.co.in">www.irb.co.in</a>       |
| Represented by:  |  |
| Title:           | Chief Financial Officer                                |
| Salutation:      | Mr.  |
| Last name:       | Yadav  |
| Middle name:     | D.   |
| First name:      | Anil   |
| Department:      |  |
| Mobile:          |  |
| Direct FAX:      | +91 22 6675 1024                                       |
| Direct tel:      | +91 22 6733 5959                                       |
| Personal e-mail: | <a href="mailto:ady@irb.co.in">ady@irb.co.in</a>       |





**Annex 2**

**INFORMATION REGARDING PUBLIC FUNDING**

NO PUBLIC FUNDING IS INVOLVED IN THE PROJECT ACTIVITY

**Annex 3****BASELINE INFORMATION**

The latest data available has been used for the estimation of the baseline emissions. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Build Margin and the Simple Operating Margin for the NEWNE grid, the details of which is available on the following website and is detailed below as well:

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

Version 4.0 of the database has been used.

**Gross Generation Total (GWh)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 470,037 | 499,380 | 531,539 |

**Net Generation Total (GWh)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 437,877 | 465,361 | 496,119 |

**20% of Net Generation (GWh)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 87,575  | 93,072  | 99,224  |

**Net Generation in Operating Margin (GWh)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 359,271 | 379,471 | 401,642 |

**Net Generation in Build Margin (GWh)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 87,764  | 93,524  | 100,707 |

**Share of Must-Run (Hydro/Nuclear) (% of Net Generation)**

|       | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|---------|---------|
| NEWNE | 17.37%  | 16.84%  | 18.0%   | 18.5%   | 19.0%   |

**Emission Data****Absolute Emissions Total (tCO<sub>2</sub>)**

|       | 2005-06     | 2006-07     | 2007-08     |
|-------|-------------|-------------|-------------|
| NEWNE | 368,114,047 | 385,643,080 | 406,563,416 |

**Absolute Emissions OM (tCO<sub>2</sub>)**

|       | 2005-06     | 2006-07     | 2007-08     |
|-------|-------------|-------------|-------------|
| NEWNE | 368,114,047 | 385,643,080 | 406,563,416 |

**Absolute Emissions BM (tCO<sub>2</sub>)**

|       | 2005-06    | 2006-07    | 2007-08    |
|-------|------------|------------|------------|
| NEWNE | 59,023,383 | 59,042,467 | 60,193,616 |

**Emission Factor****Simple Operating Margin (tCO<sub>2</sub>/MWh) (incl. Imports)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 1.0195  | 1.0083  | 0.9992  |

**Build Margin (tCO<sub>2</sub>/MWh) (not adjusted for imports)**

|       | 2005-06 | 2006-07 | 2007-08 |
|-------|---------|---------|---------|
| NEWNE | 0.6725  | 0.6313  | 0.5977  |



#### **ANNEX 4**

##### **MONITORING INFORMATION**

Refer Sections B.7.1 and B.7.2 of this document.

**APPENDIX 1****CONTRIBUTION OF CER REVENUES TO SUSTAINABLE DEVELOPEMENT**

MRMPL will contribute 2% of its CER revenues in sustainable development of the area. The following table lists the sustainable development scope and the monitoring action plan of the scope.

| <b>Sustainable Development</b>   | <b>Monitoring Action Plan</b>   |
|--|---|
| <p><u><i>Educational empowerment:</i></u></p> <p>MRMPL is dedicated towards empowering the unprivileged in the local community with education. A number of initiatives will be taken to provide non- formal education in the community. The initiatives such as developing a strong educational foundation, deep sense of self-esteem and fun activities for underprivileged children has been identified to facilitate education and awareness. For example nearby schools will be given computers to promote IT education in the neighbouring areas.</p> | <p>Receipts from the dealers will be documented. The acknowledgements from the concerned authorities like the school will also be provided. Regular visits will be made to monitor the smooth running of the initiatives.</p> |
| <p><u><i>Road development:</i></u></p> <p>MRMPL being in the road development sector has been involved in development of good quality pucca roads in the local community as a part of its Social Corporate responsibility. The revenue from the Carbon credits will be used in doing further work in this sector. Such initiatives facilitate transportation facilities in the local community as well as help in the overall development of the area.</p>   | <p>All the necessary clearances and purchase orders will be provided. The company will oversee the work of construction. In addition a letter of appreciation from the local community will be provided.</p>                  |
| <p><u><i>Health facilities for the slum dwellers:</i></u></p> <p>Health has been identified as one of the primary objective in the community development process. As a part of the healthcare initiatives weekly clinics, counselling sessions, health camps will be held to promote general health and well-being in the community. MRMPL is in touch with some NGO's and doctors who provide these services in the local community. Funding will be provided to these initiatives in partnership with these authorities.</p>                             | <p>The company will ensure that health initiatives will be taken regularly. All the necessary papers and receipts will be documented.</p>   |