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

## CONTENTS

## SECTION A. General description of project activity

### A.1 Title of the project activity:

>>
Title: Wind Power Project in Tinwari, Rajasthan
Version: 5.0
Date of completion of PDD: 23/07/2012

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

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Enercon (India) Limited (hereafter referred as "Enercon") is developing 20.0 MW wind farm in the state of Rajasthan in India. The project consists of 25WECs (Wind Energy Convertor) of Enercon make E-53 type WECs of 800KW capacity each. Annually, the project is expected to generate and supply 34.164 GWh of electricity to Rajasthan regional electricity grid which is part of the NEWNE (Northern, Eastern, Western and North-Eastern) grid in India. The clean and green electricity supplied by the project will aide in sustainable growth in the region. Enercon is the project owner and project participant for the project activity.

**Objective of the Project**

The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The project activity replaces anthropogenic emissions of greenhouse gases (GHG's) into the atmosphere, which is estimated to be approximately 32,415 $tCO_2e$ per year, by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansions connected to the grid.

Project activity is the installation of green field energy production using wind as a source of power generation. In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the NEWNE[1], which are/ will be predominantly based on fossil fuels. Whereas the operation of Wind Energy Convertors (WEC's) is emission free and no emissions occur during the lifetime of the project activity. As per the applicable methodology the baseline scenario for the project activity is the grid based electricity system, which is also the pre-project scenario.

**Nature of Project**

The Project harnesses renewable resources in the region, thereby displacing non-renewable natural resources and thus leading to sustainable economic and environmental benefits. Enercon (India) Limited is the equipment supplier and the operations and maintenance contractor for the Project. The Project is owned by Enercon. The generated electricity will be supplied to Electricity Distribution Company (DISCOM) under a long-term power purchase agreement (PPA) for a period of 20 years.

**Contribution to sustainable development**

[1] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf

The National CDM Authority (NCDMA) is the Designated National Authority (DNA) for the Government of India (GoI) in the Ministry of Environment and Forests (MoEF). It has stipulated four indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India[2]. The contributions of this project activity towards these indicators are provided below:

1. **Social well being:**

- The project activity will lead to the development of supporting infrastructure such as road network etc., in the wind park location, the access to which is also provided to the local population.
- The project activity will lead to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
- Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading to increased energy security.

2. **Environmental well being:**

- The project activity employs renewable energy source for electricity generation instead of fossil fuel based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus, the project causes no negative impact on the surrounding environment and contributes to environmental well-being.

3. **Economic well being:**

- The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this will create additional employment opportunities.
- The generated electricity will be fed into the NEWNE regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants). This will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

4. **Technological well being:**

- Increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

In addition to this, the project proponent (PP) will contribute 2% of the CDM revenue realized from the CDM project activity for sustainable development including society / community development. The PP is aware about the guideline of Indian DNA on commitment of 2% of the CDM revenues towards sustainable development and a formal undertaking will be submitted accordingly to the DNA.

[2] http://www.cdmindia.gov.in/approval_process.php

| A.3. Project participants: |
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| Name of Party involved ((host) indicates a host Party) | Private and/or public entity(ies) project participants (*) (as applicable) | Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No) |
|---|---|---|
| Government of India (Host) | Enercon (India) Limited (Private entity) | No |

The contact details of the entities are provided in Annex – 1.

| A.4. Technical description of the project activity: |
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| A.4.1. Location ofthe project activity: |
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| A.4.1.1. Host Party(ies): |
|---|

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India

| A.4.1.2. Region/State/Province etc.: |
|---|

>>

North-Western Region/Rajasthan State

| A.4.1.3. City/Town/Community etc: |
|---|

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The Project is spread across Salodi, Chensingh Nagar, Bari, Malunga, Bada Kotacha, Digadi Dhani, Balrva & Beru villages of Jodhpur district in the Rajasthan state of India.

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

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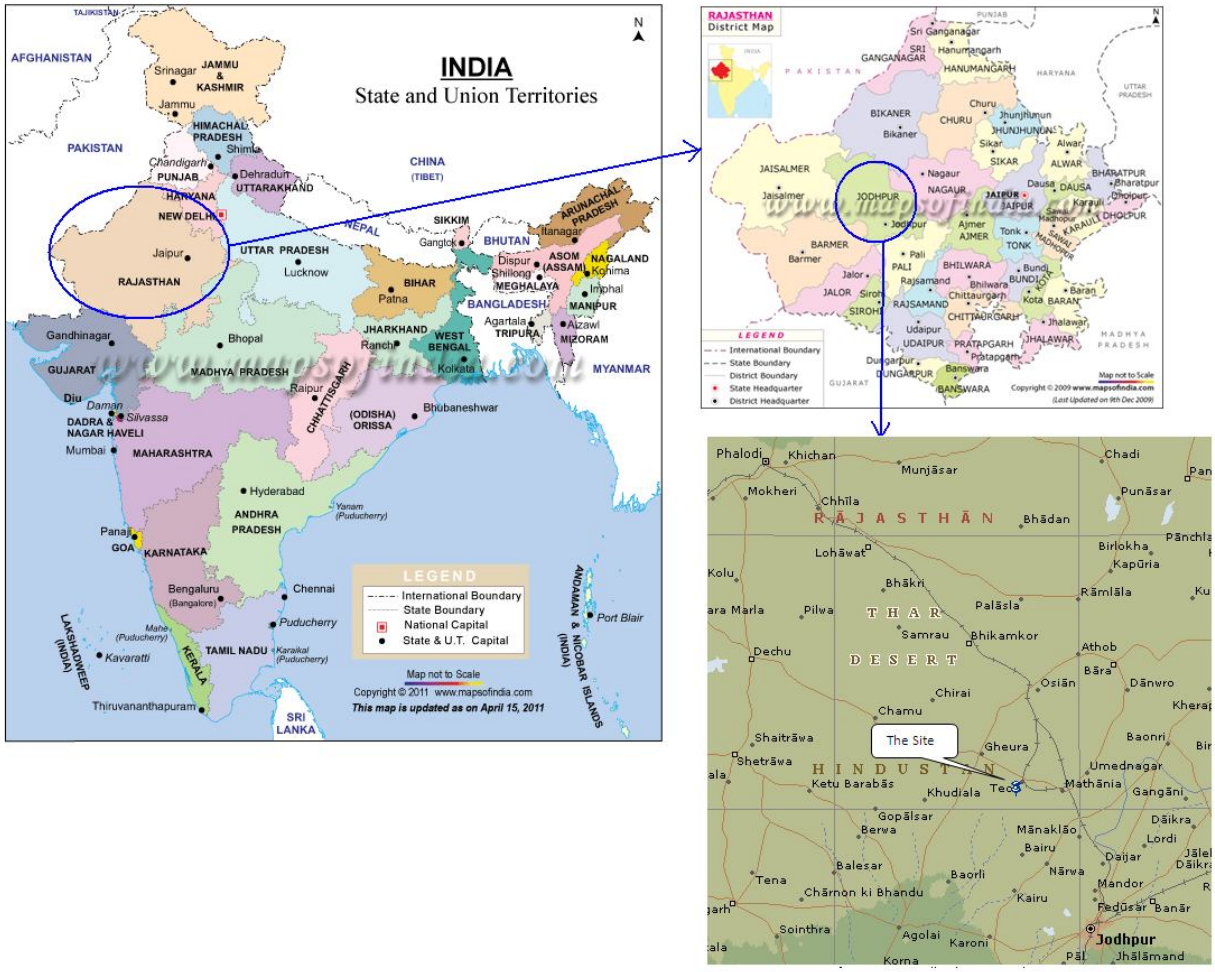
The Project is located in Jodhpur district in the Indian State of Rajasthan. The nearest railway station from the project site is Jodhpur, approximately at a distance of 50 Kms. The nearest airport is Jodhpur from site. The wind turbines extend between Latitude N 26.42481 to Latitude N 26.51170 and Longitude E 72.77188 to Longitude E 72.87424. The latitude and longitude of each WECs is provided in Appendix 1:

The location of the project site is shown in below picture:




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

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The project activity is considered under CDM category zero-emissions **'grid-connected electricity generation from renewable sources'** that generates electricity in excess of 15 MW (limit for small scale project). Therefore as per the scope of the project activity enlisted in the 'list of sectoral scopes and related approved baseline and monitoring methodologies', the project activity may principally be categorized in **Scope Number 1, Sectoral Scope - Energy industries (renewable/ non-renewable sources).**

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

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The project activity involves 25-wind energy converters (WECs) of Enercon make (800 KW E-53) with internal electrical lines connecting the project activity with local evacuation facility. The WECs generate 3-phase power at 400V, which is stepped up to 33 KV. The project activity can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The average life time of the WEC is around 20 years as per the industry standards. The other salient features of the state-of-art-technology are:

| | |
|---|---|
| Turbine model | Enercon E- 53 |
| Rated power | 800 KW |
| Rotor diameter | 53 m |
| Hub height | 75 m |
| Turbine Type | Gearless horizontal axis wind turbine with variable rotor speed |
| Power regulation | Independent electromechanical pitch system for each blade. |
| Cut in windspeed | 2.5 *m/s* |
| Rated wind speed | 12 *m/s* |
| Cut out Windspeed | 28-34 m/s |
| Extreme Wind Speed | 59.5 *m/s* |
| Rated rotational speed | 32 rpm |
| Operating range rot. speed | 12-29 rpm |
| Orientation | Upwind |
| No of Blades | 3 |
| Blade Material | Glass Fiber reinforced Epoxy |
| Gear box type | Gear less |
| Generator type | Synchronous generator |
| Braking | Aerodynamic |
| Output Voltage | 400 V |
| Yaw System | Active yawing with 4 electric yaw drives with brake motor and friction bearing |
| Tower | 74 m concrete |

Enercon (India) Limited has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

**Scenario existing prior to the start of the implementation of the project activity:**

Project activity installs the wind farm at a barren land. Project activity is the installations of green field energy production with the installation of 25 WECs of Enercon make E 53 of 800 KW each totalling 20.0 MW project capacity.

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the NEWNE grid, which are/ will be predominantly based on fossil

fuels[3], hence baseline scenario of the project activity is the grid based electricity system, which is also the pre-project scenario. Since the project activity involves power generation from wind, it does not emit any emissions in the atmosphere.

Project activity will harness wind as a source of energy production which is environmentally safe and sound technology. There is no GHG emission through project activity. The WECs confirms to the relevant code of safety and standards mandatory for setting up wind projects. The standard includes Wind Turbine Safety and Design, Noise level and Mechanical Load. Therefore the technology implemented can be depicted as environmentally safe and sound one.

The power production through WEC's depends on several factors i.e. wind speed and grid availability. Grid availability as well as wind speed varies, based on different external factors. Enercon has conducted a third party study through "True Wind International Certification, India" for estimating the PLF of the site. As per the report of 'Energy Estimate' the PLF of the site is 19.50 %, which has been used in the financial analysis in additionality demonstration.

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

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The estimated emission reductions over the 10 years fixed crediting period would be 324,150 $tCO_2e$ as per the details on annual emission reductions provided below:

| Years | Annual estimation of emission reductions in tonnes of $CO_2e$ |
|---|---|
| Year 1 * | 32,415 |
| Year 2 | 32,415 |
| Year 3 | 32,415 |
| Year 4 | 32,415 |
| Year 5 | 32,415 |
| Year 6 | 32,415 |
| Year 7 | 32,415 |
| Year 8 | 32,415 |
| Year 9 | 32,415 |
| Year 10 | 32,415 |
| Total estimated reductions (tonnes of $CO_2e$) | 324,150 |
| Total number of crediting years | 10 |
| Annual average over the crediting period of estimated reductions (tonnes of $CO_2e$) | 32,415 |

* Year 1st begins from 01/08/2012 or date of registration of project with UNFCCC whichever is later, and each year extends for 12 months.

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

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[3] http://www.cea.nic.in/executive_summary.html

There is no public funding from Annex 1 countries and no diversion of Official Development Assistance (ODA) is involved in the project activity.

## 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:

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**Title:** Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"

**Reference:** Approved consolidated baseline methodology ACM0002 (Version 12.2.0, EB 58)

ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 02.2.1[4]
- Tool for the demonstration and assessment of additionality – Version 05.2[5]

Further information with regards to the methodology / tools can be obtained at:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved

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

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The project activity is wind based renewable energy source, zero emission power project connected to the Rajasthan state grid, which forms part of the NEWNE grid. The project activity will displace fossil fuel based electricity generation that would have otherwise been provided by the operation and expansion of the fossil fuel based power plants in NEWNE grid.

The approved consolidated baseline and monitoring methodology ACM0002 Version 12.2.0 is the choice of the baseline and monitoring methodology and it is applicable because:

| Para No. | Applicability Conditions as per ACM 0002 | Applicability to this Project Activity |
|---|---|---|
| 1. | The project activity is the installation capacity addition, retrofit or replacement of a power plant/unit of one of the following types:<br>• Hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir)<br>• Wind power plant/unit,<br>• Geothermal power plant/unit,<br>• Solar power plant/unit, | The project activity is the installation of new grid connected renewable power generation from wind. |

[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

| | | |
|---|---|---|
| | • Wave power plant/unit<br>• Tidal power plant/unit. | |
| 2. | 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; | This condition is not relevant, as the project activity does not involve capacity additions, retrofits or replacements. |
| 3. | In case of hydro power plants:<br>• The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs.<br>• The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 $W/m^2$.<br>• The project activity results in new single or multiple reservoirs and the power density of each reservoir the power plant, as per definitions given in the project emissions section, is greater than 4 $W/m^2$. | This condition is not relevant, as the project activity is not the installation of a hydro power plant. |
| 4. | The methodology is not applicable to the following:<br>• Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;<br>• Biomass fired power plants;<br>• Hydro power plant that result in new single reservoir or in the increase in existing single reservoir where the power density of the power plant is less than 4 $W/m^2$. | The project activity does not involve any of the given criteria hence methodology is applicable for the project activity. |
| 5. | In the case of retrofits, replacements, or capacity additions, this methodology is only | The project activity is a new wind power plant. No replacement, modification or |

| | | |
|---|---|---|
| | applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance". | retrofit measures are implemented here. Hence, this criterion is also not relevant to the project activity. |

The description provided in table above shows that the project activity satisfies the applicable conditions of the methodology, ACM0002.

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

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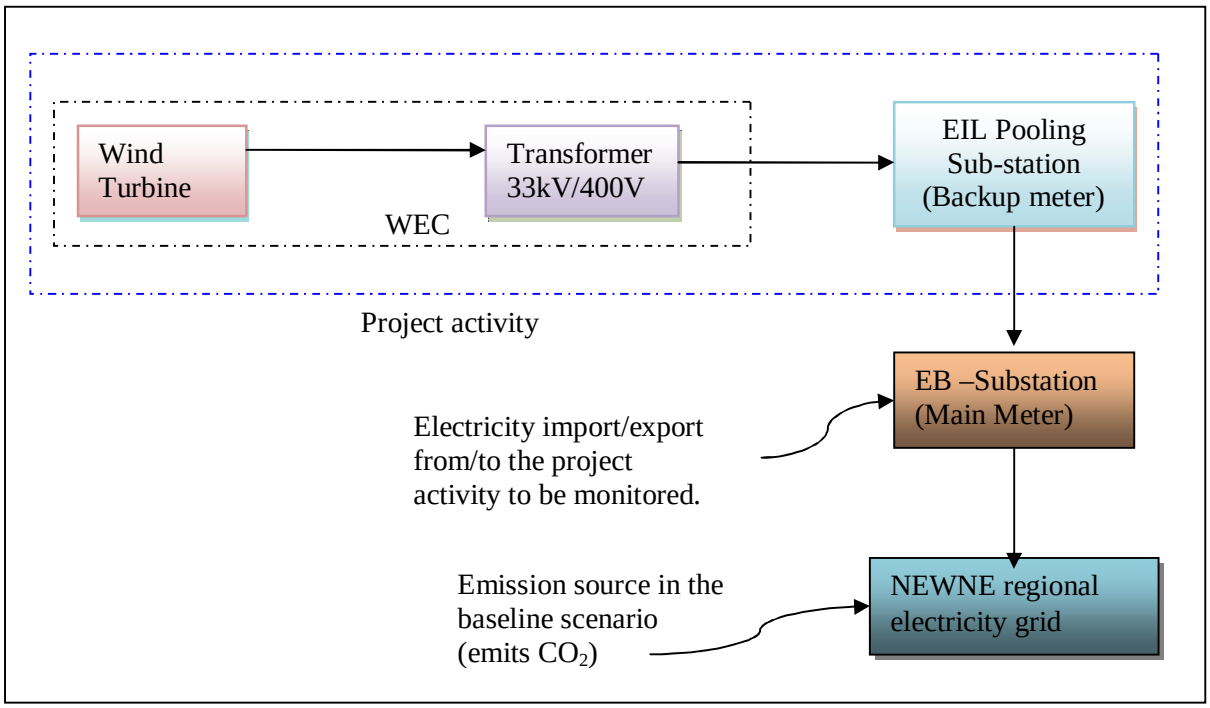
According to the applicable methodology, spatial extent of this project activity includes the project site and all the power plants connected physically to the electricity system that the CDM power project is connected to. The project activity is connected to the network of state transmission utility which falls in NEWNE grid. Thus the project boundary includes all the power plants physically connected to the NEWNE grid.

Project boundary includes all the 25 WEGs of Enercon along with the other customer WEGs connected to the sub-station. Project boundary includes main and backup meters for energy monitoring. Metering is done at 132 kV billing metering point (one main & one check meter) connected at 132kV EB sub-station (PS-8 Narwa). There is one backup metering point (one main & one check meter) connected at Salodi - 132kV Enercon pooling sub-station. Project activity is connected to Enercon pooling sub-station (132kV, Salodi) through 33 KV line. Further a 132kV transmission line (EHV line) connects the EIL pooling sub-station to state utility sub-station (132kV, PS-8) where energy monitoring is done.

From state utility substation (EB Sub-station) electricity is transmitted to NEWNE grid though transmission lines. A schematic of project boundary diagram is shown below.

**Flow diagram of the project boundary:**




Represents project activity

Represents 1 unit of WEC (there are 25 such units in the project activity)

Represents project boundary

The baseline study of NEWNE grid shows that the main sources of GHG emissions in the baseline are $CO_2$ emissions from the conventional power generating systems, the other emissions are that of $CH_4$ and $N_2O$ but both emissions were conservative and are excluded for simplification of the project. The project activity is the emission free electricity generation from renewable sources and hence emits no gases in the atmosphere.

Following table indicates the sources and gases included in the project boundary:

| | Source | Gas | Included? | Justification/Explanation |
|---|---|---|---|---|
| **Baseline** | Grid-connected electricity generation | $CO_2$ | Yes | In the baseline scenario the electricity would have been sourced from the NEWNE grid which in turn would be connected to fossil fuel fired power plants which emit $CO_2$. |
| | | $CH_4$ | No | No methane generation is expected to be emitted. |
| | | $N_2O$ | No | No nitrous oxide generation is expected to be emitted. |
| **Project Activity** | Greenfield wind energy conversion | $CO_2$ | No | The project activity does not emit any emissions. |
| | | $CH_4$ | No | No methane generation is expected to be emitted. |

| | | | | |
|---|---|---|---|---|
| | system | $N_2O$ | No | No nitrous oxide generation is expected to be emitted. |

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

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According to the applied methodology ACM 0002, if the project activity is the installation of a new grid-connected renewable power plant/ unit, the baseline scenario is the following:

*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 of an electricity system".*

As the Project does not modify or retrofit an existing generation facility, the baseline scenario is the emissions generated by the operation of grid-connected power plants and by the addition of new generation sources. This is estimated by multiplying the Combined Margin with electricity delivered to the grid by the Project.

The details of India grid system is described in the table below:

| S.No. | Electricity Grid (Present) | Electricity Grid (Earlier) | Geographical Areas Covered |
|---|---|---|---|
| 1. | NEWNE Grid | Northern | Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand |
| | | Western | Chhattisgarh, Gujarat, Daman & Diu, Dadar & Nagar Haveli, Madhya Pradesh, Maharashtra, Goa |
| | | Eastern | Bihar, Jharkhand, Orissa, West Bengal, Sikkim, Andaman-Nicobar |
| | | North-Eastern | Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura |
| 2. | Southern Grid | Southern | Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Pondicherry, Lakshadweep |

Rajasthan state falls under NEWNE grid. The power sector in India including the Northern region largely comprises thermal power stations[6]; Sector- wise installed capacity (MW) as on 31.03.2010.can be seen from the table below[7]:

[6] http://www.cea.nic.in/

[7] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver6.pdf

| Sector | Hydro (MW) | Thermal (MW) | | | | Nuclear (MW) | Renewable (MW) | Total (MW) |
|---|---|---|---|---|---|---|---|---|
| | | Coal | Gas | Diesel | Total | | | |
| State | 27065 | 44977 | 4046.12 | 602.61 | 49625.73 | 0 | 2701 | 79391.85 |
| Central | 8565.40 | 31165 | 6702.23 | 0 | 37867.23 | 4560 | 0 | 50992.63 |
| Private | 1233.00 | 8056.38 | 6307.50 | 597.14 | 14961.02 | 0 | 12819.99 | 29014.01 |
| All India | 36863.40 | 84198.38 | 17055.85 | 1199.75 | 102453.98 | 4560 | 15521.11 | 159398.49 |

It is evident from the above table that the installed capacity in India is predominantly thermal power plants; thermal power generation is GHG intensive and is a major source of $CO_2$ emissions. In the absence of the project activity equivalent amount of electricity would have been generated from the existing grid connected power plants and planned capacity additions which are also largely fossil fuel based. Thus generation from the project displaces the electricity generated from existing and planned power plant capacities in the NEWNE grid whose emission intensities are represented by the Combined Margin Emission Factor of the NEWNE Grid. The Emission Reductions from the project activity is estimated to be 32,415 $tCO_2e$ annually.

The baseline emissions and emission reductions from the project activity are estimated by multiplying the amount of electricity exported by the project activity to the NEWNE grid with the emission factor of the NEWNE grid calculated as the combined margin (CM) of the operating margin (OM) and build margin (BM) emission factors.

| Variable | Data Source |
|---|---|
| $\mathbf{EG_{facitlity,y}}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr) | Records maintained by project proponents |
| **Parameter** | **Data Source** |
| $\boldsymbol{EF_{grid,OM,y}}$ = Operating Margin Emission Factor ($tCO_2$/MWh) | "$CO_2$ Baseline Database for Indian Power Sector" version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India |
| $EF_{grid,BM,\ y}$ = Build Margin Emission Factor ($tCO_2$/MWh) | "$CO_2$ Baseline Database for Indian Power Sector" version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India |
| EFy – Grid Emission Factor | Calculated as the weighted average of the operating margin and build margin |

**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):**

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The project activity has been conceived as a CDM project since its inception. The decision to initiate the project activity and to pursue the same under CDM was taken in the Board meeting dated 5 May 2011. . Based on the board decision, Enercon (India) Limited issued an official circular dated 07 May 2011, which mandated concerned departments to take necessary steps for the installation of project activity.

Date of issuance of official circular towards the implementation of the project activity has been considered as the project start date. The PP has intimated UNFCCC about the project activity initiative within six months of the start date on 5th July 2011 and received the acknowledgement from UNFCCC on the same day. The acknowledgement from UNFCCC and intimation by Project participant shall be provided to the DOE for verification. The PP published invitation of local stakeholder meeting on dated 05th July 2011 and stakeholder meeting was conducted on 23rd July 2011 at Jodhpur project site.

Furthermore, the following chronology of events demonstrates real action taken towards availing the CDM benefits and shows serious CDM consideration during the investment period of the project activity:

| S.No. | Event | Date |
|---|---|---|
| 1 | Detailed Project report | 28/04/2011 |
| 2 | Board Resolution | 05/05/2011 |
| 3 | Inter office communication about the implementation of project activity | 07/05/2011 |
| 4 | Starting of material transfer to site as per SAP details | 16/05/2011 |
| 5 | Loan application | 23/05/2011 |
| 6 | Prior Intimation of CDM project to UNFCCC & NCDMA (DNA) | 05/07/2011 |
| 7 | DOE agreement | 12/07/2011 |
| 8 | Loan Sanction letter | 14/07/2011 |
| 9 | Local Stakeholders' consultation | 23/07/2011 |
| 10 | PDD web-hosted with UNFCCC | 09/08/2011 |

**Demonstration of Additionality for the project activity:**

The Additionality tool i.e. Tool for the demonstration and assessment of Additionality version 5.2, EB 39 approved by CDM Executive Board is used to demonstrate project Additionality.

**Step 1: Identification of alternatives to the project activity consistent with current laws and regulations**

As per ACM0002, the baseline alternative for the project activity is generation of equivalent amount of electricity by operation of grid-connected power plants and by addition of new generation sources. Accordingly, the realistic and credible alternatives to the project activity are:

(a) The Project is undertaken without registering it as a CDM activity.

(b) Equivalent amount of electricity being generated through operation of grid-connected power plants and addition of new generation sources

**Outcome of Step 1a:** Alternatives (a) and (b) above have been identified as realistic and credible alternative scenario(s) to the project activity

**Sub-step 1b: Consistency with mandatory laws and regulations:**

There are no legal and regulatory requirements that prevent Alternatives (a) and (b) from occurring.

**Outcome of Step 1b:** Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

**Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both steps 2 and 3.)**

**Step 2: Investment Analysis**

**Sub step 2(a): Determine Appropriate Analysis Method**

The project activity generates revenue by selling electricity to State electricity Board/ DISCOM, thus simple cost analysis (option I) cannot be applied to the proposed CDM project activity.

The alternative to the project activity is continuation of current situation, i.e. no project activity and equivalent amount of energy would have been produced by the grid electricity system. This alternative will not require capital investment; hence investment comparison analysis (option II) cannot be applied.

In this case the benchmark analysis (option III) is most appropriate.

**Sub step 2(b): Option III- Apply benchmark analysis**

The Project Proponent proposes to use **Option III – Benchmark Analysis** and the financial indicator is identified as *post-tax* equity IRR.

The guidance to investment analysis version 05 issued in EB 62, Annex 5 (paragraph 12) states that in cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Required/expected returns on equity (Cost of Equity) are appropriate benchmarks for equity IRR.

As per ACM 0002 version 12.2.0, the additionality of the project shall be conducted using "tool for demonstration and assessment of additionality". The tool for demonstration and assessment of additionality, version 5.2 [para-5, [8]sub step 2(b)] states that, the financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type but not linked to the subjective profitability expectation or risk profile of a particular project developer. Accordingly, the cost of Equity applicable to the project type has been considered as the benchmark to be compared against equity IRR.

Further as per para 15 of "Guidelines on the assessment of investment analysis" annex 5 of EB 62, version 5.0;
*If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors*". The project participant has chosen option a (values as provided in Appendix ('*Default values for the expected return on equity'*) of the guidance on assessment of investment analysis version 5.0) for calculating cost of equity benchmark. As per the Appendix,- *default values for the expected return on equity is 11.7% for the project activity.*

[8] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

As per para 7 of the appendix of "Guidelines on the assessment of investment analysis" annex 5 of EB 62, version 5.0, "*in situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period*".

As the analysis has been carried out in nominal terms, the default value of expected return on equity has been adjusted with the inflation. The inflation value has been taken as per the forecast by the Reserve Bank of India (RBI). The crediting period for the project activity is 10 years and the mean WPI and CPI inflation rate are 5.40% and 6.4%. Conservatively, PP has selected 5.40% inflation rate based on data published by RBI.

The benchmark has been calculated as:

Nominal Benchmark [9] = {(1+ Real Benchmark[10])*(1+Expected Inflation Rate[11]) – 1}
= {(1+11.75%)*(1+5.4%) – 1}
= 17.78%

Hence, the benchmark Cost of equity for the project is calculated as 17.78%.

**Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):**

Key assumptions used for calculating post-tax Equity IRR are set out below:

| **Assumptions for Financial Model** | | | |
|---|---|---|---|
| Capacity of Machines in kW | 800 | | *Detailed Project Report* |
| Number of Machines | 25 | | *Detailed Project Report* |
| Project Capacity in MW | 20.00 | | *Detailed Project Report* |
| Expected project commissioning date | 31-Dec-11 | | *Expected Date of Commissioning* |
| Project Cost per MW (INR. In Millions) | 51.64 | | *Calculated* |
| | | | |
| **Operations** | | | |
| Plant Load Factor (base case at P-50) | 19.50% | | *Third Party PLF report dated 25 Apr 2011* |
| Insurance Charges @ % of | 0.12% | | *Normative* |

[9] http://simonbenninga.com/benninga_sarig/chap09.pdf

[10] Default value for expected return on equity of 11.75% published by UNFCCC under investment guidance version 5.0 has been used by PP.

[11] Expected Inflation rate for over 10 years period has been published by RBI (http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/PREERE14020210.pdf ). As per investment guidance, inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. The crediting period for the project activity is 10 years and the mean WPI and CPI inflation rate are 5.40% and 6.4%. Conservatively, PP has selected 5.40% inflation rate based on data published by RBI.

| | | | |
|---|---|---|---|
| capital cost | | | |
| Operation & Maintanance Cost base year @ % of capital cost | 1.30% | | *Detailed Project Report* |
| % of escalation per annum on O & M Charges | 6.0% | | *Detailed Project Report* |
| Service Tax on O&M expenses | 10.3% | | *Income Tax Act (Financial Year 2011-12) (Source: http://www.mukeshraj.com/service-tax.html )* |
| | | | |
| **Tariff** | | | |
| Base year Tariff for 20 years – INR./Kwh | 4.22 | | *RERC order 3.June.2011* |
| | | | |
| **Project Cost** | **INR Million** | | |
| WEGs, Concrete Tower, Transformer and DP structure, Civil & Industrial Construction, Erection & Commessioning, Trasportation charges, etc. | | | |
| **Total Project Cost** | **1,032.80** | | *Detailed Project Report* |
| | | | |
| **Means of Finance** | | **INR Million** | |
| Own Source | 30% | 309.84 | *Detailed Project Report* |
| Term Loan | 70% | 722.96 | *Detailed Project Report* |
| Total Source | | 1,032.80 | |
| | | | |
| **Terms of Loan** | | | |
| Interest Rate | 12.50% | | *http://www.pfc.gov.in/writereaddata/userfiles/file/LendingRates/interest_circular_25052011.pdf* |
| Tenure | 10 | Years | |
| | | | |
| **Income Tax Depreciation Rate (Written Down Value basis)** | | | |
| Depreciation as per IT Act | 80% | | *http://paryca.org/images/Tax_%20matters/DepreciationRates%20as%20per%20IT%20act.pdf* |
| Additional depreciation | 20% | | *http://www.knowledgebible.com/forum/showthread.php/1318-Additional-* |

| | | | |
|---|---|---|---|
| | | | *Depreciation* |
| **Total depreciation on Wind Energy Generators** | **100%** | | *http://taxguru.in/income-tax/understanding-deprecation-section-32-income-tax-act-1961-latest-case-laws.html* |
| | | | |
| **Income Tax act 80 IA** | | | |
| As per section 80IA of income Tax act there is Tax Exemption in 10 consecutive years out first 15 years of operations of infrastructure projects. | | | *http://law.incometaxindia.gov.in/DIT/File_opener.aspx?page=ITAC&schT=&csId=26afdd46-ae8d-495e-9d0d-23f057d4ab11&rdb=sec&yr=e5be6bdb-1fc4-42d6-ac7b-34a44fd65485&sec=80&sch=&title=Taxmann - Direct Tax Laws* |
| | | | |
| **Book Depreciation Rate (Straight Line Method basis)** | | | |
| On all assets | 4.50% | | *Straight line Method Adopted* |
| Book Depreciation up to (% of asset value) | 90% | | *10% salvage has been applied and balance 90% is depreciated* |
| | | | |
| **Income Tax** | | | |
| Income Tax rate | 33.22% | | *http://www.canaresh.com/some-useful-content/income-tax-india/income-tax-rates-india/corporate-tax-rate-2011-2012* |
| MAT Rate | 20.48% | | *http://www.canaresh.com/some-useful-content/income-tax-india/income-tax-rates-india/corporate-tax-rate-2011-2012* |
| | | | |
| **Working capital** | | | |
| Receivables (no of days) | 30 | | *Billing Cycle of State Utility* |
| O & m expenses (no of days) | 90 | | *Detailed Project Report* |

The post tax equity IRR for the Project without CDM revenues is 9.40% i.e. less than the benchmark.

**Sub-step 2d: Sensitivity analysis (only applicable to Options II and III):**

**Sensitivity Analysis**

The investment in wind power project shall be tested based on the following parameters:

- Capital Cost
- Tariff
- Plant Load Factor

- O&M cost
- Debt Equity Ratio

**Capital Cost**

In accordance with the investment guidance, the additionality for the project activity is demonstrated at the time of decision making. The project proponent has considered it appropriate to conduct the sensitivity at the variation of +/- 10% of the project cost.

| | 10% decrease in Capital Cost | Base Capital Cost | 10% Increase In Capital Cost |
|---|---|---|---|
| Post tax Equity IRR | 14.33% | 9.40% | 5.87% |

The equity IRR crosses the benchmark at capital cost variation of 14.81% which is not realistic for the project activity.

**Tariff**

Rajasthan state electricity commission has fixed the tariff for the period of 20 years (Lifetime) for the wind power projects. The tariff for the entire life of the project activity is fixed a INR. 4.22 per Unit. Therefore it is not appropriate to conduct sensitivity on tariff. Though being conservative PP has done 10% sensitivity on tariff and an increase of 10% in tariff, the IRR for project activity is 12.40% which is below than the benchmark.

**Plant Load Factor**

Plant Load Factor is the key variable encompassing variation in wind profile, variation in off-take (including grid availability) including machine downtime.

As per EB 48, annex 11, Plant load factor validated by independent third party source can be used for investment analysis. PP has appointed third party for the assessment of PLF for the project site.
The third party report for PLF mentioned the PLF at different probability levels ranging from P-10 to P-90. In DPR PP has considered the PLF of 19.50% at P-50 level which is the base case for the analysis which is subject to sensitivity from P-90 to P-10 levels. As per the PLF report the PLF of project site will vary between 17.97% (at P-90) to 20.74% (at P-10) which is the sensitivity range for PLF, which concludes that the maximum estimated PLF of site is 20.74% at P-90 level. Though being conservative PP has done sensitivity of ±10% on base value of PLF of 19.50% (at P-50) in the revised PDD.
Sensitivity is summarized in below table:

| | PLF @ 17.55% (10% Decrease over PLF estimated by Third Party) | PLF 19.50% (PLF estimated by Third Party) | PLF @ 21.45% (10% Increase over PLF estimated by Third Party) |
|---|---|---|---|
| Post tax Equity IRR | 6.20% | 9.40% | 12.40% |

The sensitivity analysis clearly shows even with a higher PLF, the project is not able to generate sufficient returns. It can therefore be concluded that the project is financially not viable without CDM benefits.

The equity IRR crosses the benchmark at PLF of 24.61% which is not a reasonable assumption for the project site.

**O&M Cost**

From the available documents in public domain the average cost of Operation & Maintanance for the Enercon make E-53 WEGs in the state of Rajasthan is 1.4% of capital cost with average escalation of 6% per annum on O&M charges. In the financial analysis of the project activity PP has taken the O&M cost of 1.3% of capital cost which is conservative with respect to the same type of WEGs.

Hence being conservative, PP has done sensitivity on ±10% in O&M and 5% escalation in O&M yearly.

By varying the O&M cost by ±10% the equity IRR has following value:

| | **(-10% decrease in base value & at 5% escalation) 1.17%** | **(Base Value) 1.30%** | **(+10% increase in base value & at 5% escalation) 1.43%** |
|---|---|---|---|
| Post tax Equity IRR | 10.11% | 9.40% | 9.29% |

From the above sensitivity analysis it is clear that a decrease of 10% in O&M, IRR for the project activity is 10.11% which is below than the benchmark.

The project does not cross the benchmark even at 100% variation in O&M cost and project is still additional.

**Debt Equity Ratio**

This is the first investment of the project particiapnt in wind power projects. A debt equity ratio of 70:30 has been considered for project investment analysis. The PP has conducted sensitivity at the variation of 10% over the base debt equity ratio.

| | **10% decrease over base case (68:32)** | **Base Debt Equity ratio (70:30)** | **10% Increase over base case (72:28)** |
|---|---|---|---|
| Post tax Equity IRR | 9.37% | 9.40% | 9.37% |

It may also be noted that at 100% equity, the Equity IRR is 9.43% which is below the benchmark.

**Outcome of Step 2:** As can be seen, the equity IRR of the project activity remains well below the benchmark even under the sensitivity analysis. Therefore it can be concluded that the proposed CDM project activity is unlikely to be the most financially/economically attractive.

**Step 3: Barrier analysis**

Not Opted for.

**Step 4: Common practice analysis**

**Sub-step 4a: Analyze other activities similar to the proposed project activity:**

The description of common practice test (sub step 4a of "Tool for the demonstration and assessment of additionality", Version 5.2, EB 39, annex 10) requires analysis of any other activities that are operational and that are similar to the proposed project activity. 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.

The project activity is a 20.0 MW wind power project set up by Enercon industry in Rajasthan to generate and supply electricity to the Rajasthan state grid. The project is a large scale CDM activity. The applicable tariff for the project has been determined by the Rajasthan Electricity Regulatory Commission.

For common practice analysis only the state of Rajasthan is being considered as a reason of common practice analysis since in India the regulatory framework is different for different states and tariff policy and other regulations are state specific and are governed by state electricity regulatory commission.

It may be noted that common practice analysis is required to be carried out only in case of large scale CDM projects i.e. projects of more than 15 MW capacity. Further, the common practice guidance also states that projects of similar scale only need to be considered. Accordingly, for carrying out the common practice analysis the PP have considered following three criteria to define similar scale projects viz:-

1. Wind power projects that fall under the large scale definition of CDM i.e. that are of 15 MW of higher capacity.

2. The project activity has been set up by a private investor, in such cases; the additionality tool clearly states that the benchmark (Sub step 2b Paragraph 29, EB 65, annex 21), "*The financial/economic analysis shall be based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer"*. The project activity is developed by the private investor hence investment analysis should be increased to account for higher risks in private investments. Thus it is clear that government sector investments cannot be compared with private investments.

3. Further the small scale wind power projects by different investors combined to form a large scale bundled wind power project are not considered for common practice analysis since the investment risk profile of single private investor setting up a large scale project is different from the large scale bundled wind power projects.

Accordingly, all wind power projects of greater than 15 MW capacity set by single private project proponent in the state of Rajasthan, have been analyzed till the date of investment decision. Data for the common practice analysis have been sourced from the Indian Wind Power Directory 10th edition published in August 2010, which was available at the time of investment decision.

Wind projects by individual investors in Rajasthan where the installed capacity is more than 15MW are presented in the table below:

| S.No. | Name of Investor | Total Capacity in Rajasthan (MW) | CDM | CDM Project Title | Sub project Capacity (MW) | UNFCCC Reference number | Web links |
|---|---|---|---|---|---|---|---|
| 1 | Enercon Windfarms Hindustan P. Ltd. | 60 | Yes | Enercon Wind Farm (Hindustan) Ltd in Rajasthan | 60 | 1168 | http://cdm.unfccc.int/Projects/DB/SGS-UKL1181742063.57/view |
| 2 | DLF Home Developers | 33 | Yes | Wind Power based electricity generation project in India by DLF Home Developers Limited | 33 | At validation stage | http://cdm.unfccc.int/Projects/Validation/DB/34CAG54CUL49MILW9S0SKWCWU38SSX/view.html |
| 3 | Enercon Wind Farms (Rajasthan) Pvt. Ltd. | 24 | Yes | Bundled wind energy power projects (2003 policy) in Rajasthan | 24 | At validation stage | http://cdm.unfccc.int/Projects/DB/SGS-UKL1181738388.43/view |
| 4 | Enercon Wind Farm (Jaisalmer) Ltd. | 24.6 | Yes | "Bundled Wind power project in Jaisalmer (Rajasthan in India) managed by Enercon (India) Ltd. " * | 24.6 | 310 | http://cdm.unfccc.int/UserManagement/FileStorage/QHZU5CN321RNIWYQQ8DGK5HHYO9BBC |
| 5 | Modern Road Makers Pvt. Ltd. | 20 | Yes | MRMPL Wind Power Project | 20 | At validation stage | http://cdm.unfccc.int/Projects/Validation/DB/AERX8YCUI2RBEAK41JC7IF8SN67G1P/view.html |
| 6 | K S Oils Ltd. | 21.5 | Yes | 1) 7.5 MW Wind Power project in Jodhpur, Rajasthan | 7.5 | 13321 | http://cdm.unfccc.int/UserManagement/FileStorage/5SD1YC0F6ZHAXGUEB9KOMQ3TL2PN8W |
| | | | | 2) 8 MW Wind power project by K.S Oils | 8 | 2958 | http://cdm.unfccc.int/UserManag |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | Limited | | | ement/FileStorage/UVXD2R4EA1L3ZJSQOCGB6WI8TY5PMK |
| | | | | 3) Grid connected wind Power Project in Jodhpur, Rajasthan | 6 | At validation stage | http://cdm.unfccc.int/UserManagement/FileStorage/G048LRZYM2KNE9TD1HS5JBIPAFWUQV |
| 7 | CEPCO Industries Pvt. Ltd. | 37.2 | Yes | Bundled wind energy power projects (2004 policy) in Rajasthan | 12 | 1166 | http://cdm.unfccc.int/UserManagement/FileStorage/ZN5YCPMU6BXIDHJ4GO7LF28RET1W0V |
| | | | | Cepco Wind Power Project in Rajasthan | 23.2 | 4942 | http://cdm.unfccc.int/UserManagement/FileStorage/L054TBIUYEQWD9XRZ6KP82SJGONHM3 |
| 8 | Kohinoor Planet constructio n Pvt Ltd. | 24 | Yes | Kohinoor Wind Power Project in Rajasthan | 24 | 4679 | http://cdm.unfccc.int/UserManagement/FileStorage/VSH1BAM05YKP6RLX4F3D7UEWTNIOJ2 |
| 9 | Ruchi Soya Industries Ltd. | 15 | Yes | 35.10 MW Wind Energy Project by Ruchi Soya Industries Limited, India | 15 | At validation stage | http://cdm.unfccc.int/UserManagement/FileStorage/REB0AY72GUDJ3WC4P69MF8TO1SQVHN |
| 10 | Gujarat Fluoroche micals Ltd. | 35.1 | Yes | 1) 10.5 MW wind power project in Ossiya, Rajasthan by Gujarat Fluorochemicals Limited (GFL) | 10.5 | At validation stage | http://cdm.unfccc.int/UserManagement/FileStorage/HYQRFVZ27EP8BW1D6LSCTAU3MIK450 |
| | | | | 2) 19.5 MW wind power project in Ossiya, Rajasthan by Gujarat Fluorochemicals Limited (GFL) | 19.5 | At validation stage | http://cdm.unfccc.int/UserManagement/FileStorage/FU0ZIVP64LBQ2EDJ15RNHM7O3G8YAX |
| | | | | 3) 12 MW wind power project in Sadiya, Rajasthan by Gujarat Fluorochemicals Limited (GFL) | 12 | At validation stage | http://cdm.unfccc.int/UserManagement/FileStorage/NCMSUBPHRGWK2YQDLZX4VF60IAET85 |

It can be seen that, without exception, all private investors in the state of Rajasthan with installations greater than 15 MW have developed these projects as CDM projects. In addition, all similar activities over 15 MW in size in the state of Rajasthan are CDM projects.

**Sub-steps 4a is satisfied.**

**Sub-step 4b Discuss any similar options that are occurring:**

From sub-step 4a it is clear that all similar projects have been undertaken only as CDM projects. Hence it can be concluded that similar activities are not widely observed or commonly carried out. Thus Sub-step 4b is not applicable.

Therefore, the project activity is considered to be additional.

## B.6. Emission reductions:

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

>>

According to the approved methodology ACM0002 (Version 12.2.0) Emission Reductions are calculated as:-

$$ER_y = BE_y - PE_y - L_y$$

Where:

| | |
|---|---|
| $BE_y$ | Baseline Emissions in year *y* (t $CO_2$e/yr) |
| $PE_y$ | Project Emissions in year *y* (t $CO_2$e/yr) |
| $L_y$ | Leakage Emissions in year *y* (t $CO_2$e/yr) |

**Estimation of Baseline Emissions:**

Baseline emissions include only $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that in the absence of the project activity, equivalent amount of electricity would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_{y} = EG_{PJ, y} * EF_{grid, CM, y}$$

Where:

$BE_y$ = Baseline emissions in year *y* ($tCO_2$/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin $CO_2$ 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" ($tCO_2$/MWh)

Since the project activity is the installation of a new grid connected renewable power plant the $EG_{PJ,y}$ is calculated as :
$EG_{PJ,y} = EG_{facility,y}$

Where:
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

The proposed project activity is in the state of Rajasthan which falls under NEWNE grid which is not part of Annex –I. Therefore as per the paragraph 12 of the applied methodology baseline emission factor is calculated as combined margin, consisting of a combination of operating margin and build margin factors according to the procedures prescribed in the latest tool "Tool to calculate the emission factor for an electricity system – Version 02.2.1 (EB-63, Annex19)"for calculating the emission factor for an electricity system. The steps of calculation are as follows:

**STEP 1: Identifying the relevant electricity systems:**

The Indian electricity system is divided into two regional grids, viz. (1) Northern, Eastern, Western, North-Eastern and (2) Southern grid. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with neighboring countries like Bhutan and Nepal.

According to "Tool to calculate the emission factor for an electricity system" version 02.2.1, If a connected electricity system is located partially or totally in Annex-I countries, then the emission factor of that connected electricity system should be considered zero.

The above applicability criteria is not applicable for the project activity since the project activity will supply the electricity to the NEWNE grid of host country India, which is a not a part of Annex- I country hence the "Tool to calculate the emission factor for an electricity system" is applicable for the project activity. Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state in a regional grid meets its demand with its own generation facilities and also with allocation from power plants owned by the Central Sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the Central Sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The regional grid thus represents the largest electricity grid where power can be dispatched without significant constraints and thus, represents the "project electricity system" for the project activity. As the project activity is connected to the NEWNE regional electricity grid, the NEWNE grid is the "project electricity system".

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

Option I is opted for the project activity i.e. only grid power plants are included in the calculation.

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

According to the tool, the calculation of the operating margin emission factor is based on one of the following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

Any of the four methods can be used for calculating OM, The simple adjusted OM and dispatch data analysis OM cannot be currently applied in India due to lack of necessary data however, the simple OM method (option a) can only be used if low cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The Share of Low Cost / Must-Run (% of Net Generation) in the generation profile of the different grids in India in the last five years is as follows:

| | **2005-06** | **2006-07** | **2007-08** | **2008-09** | **2009-10** |
|---|---|---|---|---|---|
| NEWNE | 18.0% | 18.5% | 19.0% | 17.3% | 15.9% |
| Southern | 27.0% | 28.3% | 27.1% | 22.8% | 20.6% |
| India | 20.1% | 20.9% | 21.0% | 18.6% | 17.1% |

*Source[12]: CO2 Baseline Database for the Indian Power Sector – Central Electricity Authority*

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the NEWNE regional grid is less than 50 % of the total generation. Hence the Simple OM method can be used to calculate the Operating Margin Emission factor. The average operating margin method cannot be applied, as low cost/ must run resources in NEWNE grid constitute less than 50% of total grid generation.

The project proponents choose an ex ante option for calculation of the OM with a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

**STEP 4: Calculate the operating margin emission factor according to the selected method:**

The simple OM emission factor is calculated as the generation-weighted average $CO_2$ emissions per unit net electricity generation ($tCO_2/MWh$) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Based on the net electricity generation, and a $CO_2$ emission factor of each power unit. (Option A), or
- 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 (option B)

[12] http://www.cea.nic.in/reports/planning/cdm_co2/Database_publishing_ver6.zip

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The $CO_2$ Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

The CEA database uses the option A i.e. data on net electricity generation and $CO_2$ emission factor for each power unit, the average efficiency of each power unit and the fuel type(s) used in each power unit, to calculate the OM of the different regional grids.
The simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$\mathbf{EF_{grid,OMsimple,y} = \Sigma\ (EG_{m,y}\ x\ EF_{EL,m,y})\ /\ \Sigma EG_{m,y}}$$

Where:

| | |
|---|---|
| $EF_{grid,OMsimple,y}$ | Simple operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$) |
| $EG_{m,y}$ | Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) |
| $EF_{EL,m,y}$ | $CO_2$ emission factor of power unit m in year y ($tCO_2/MWh$) |
| 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 |

The emission factor of each power unit m has been determined as follows:

$$\mathbf{EF_{EL,m,y} = (\Sigma\ FC_{i,m,y}\ x\ NCV_{i,y}\ x\ EF_{CO2,I,y})\ /\ EG_{m,y}}$$

Where:

| | |
|---|---|
| $EF_{EL,m,y}$ | $CO_2$ emission factor of power unit m in year y ($tCO_2/MWh$) |
| $FC_{i,m,y}$ | Amount of fossil fuel type i consumed by power 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) |
| $EF_{CO2,I,y}$ | $CO_2$ emission factor of fossil fuel type i in year y ($tCO_2/GJ$) |
| $EG_{m,y}$ | Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) |
| m | All power units serving the grid in year y except low-cost / must-run power units |
| i | All fossil fuel types combusted in power unit m in year y |
| y | The relevant year as per the data vintage chosen in step 3 |

Therefore, in line with this, the simple OM emission factor values have been directly sourced from "$CO_2$ Baseline Database for the Indian Power Sector", Version 6.0, 1st March, 2011 published by Central Electricity Authority (CEA) of India. As per the "Tool to calculate the emission factor for an electricity system" (Version 2.2.1), the calculation of Operating Margin (OM) has been done following ex – ante approach based on the average of the most recent 3 years' (2007-08; 2008-09; 2009-10) Operating Margin (OM) emission factor values, which is available at the time of PDD submission for validation.

Therefore, there is no requirement to monitor and recalculate this emission factor during the crediting period.

As per the version 6.0 [13]of CEA data base the Simple Operating Margin (tCO2/MWh) (including Imports) along with net Generation for NEWNE grid is as follows:-

| Year | 2007-08 | 2008-09 | 2009-10 |
|---|---|---|---|
| Simple OM (including imports) ($tCO_2$ / MWh) | 0.99990 | 1.00655 | 0.97774 |
| Net Generation Total (MWh) | 496.11903 | 510.69273 | 544.91516 |

| | |
|---|---|
| Weighted Average Operating Margin * | 0.99431 |

** Calculated as per Option A, i.e. generation weighted average CO2 emissions per unit electricity generation has been used*

**STEP 5. Calculate the build margin (BM) emission factor:**

The build margin emission factor has been calculated 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. This option does not require monitoring the emission factor during the crediting period.

The build margin emissions factor is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$\mathbf{EF_{grid,BM,y} = (\Sigma\ EG_{m,y}\ x\ EF_{EL,m,}) / \Sigma\ EG_{m,y}}$$

Where:

| | |
|---|---|
| $EF_{grid,BM,y}$ | Build margin $CO_2$ emission factor in year y ($tCO_2$/MWh) |
| $EG_{m,y}$ | Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh) |
| $EF_{EL,m,y}$ | $CO_2$ emission factor of power unit m in year y ($tCO_2$/MWh) |
| m | Power units included in the build margin |
| y | Most recent historical year for which power generation data is available |

The $CO_2$ emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 4 (a) for the simple OM, using option A1 for *y* most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

[13] Central Electricity Authority: $CO_2$ Baseline Database, Version 6.0,1st March, 2011; http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

The value of BM (not adjusted for imports) has been taken from "$CO_2$ Baseline Database for the Indian Power Sector", Version 6.0, 1st March, 2010 published by Central Electricity Authority (CEA), Government of India.

| Year | 2009-10 |
|---|---|
| Build Margin $CO_2$Emission Factor ($tCO_2e$ / MWh) | 0.81231 |

**STEP 6. Calculate the combined margin emissions factor:**
The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

Since project activity is located in the state of Andhra Pradesh state of India, which is not a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; that's why the weighted average CM method (option A) is preferred option.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$$

Where:

| | |
|---|---|
| $EF_{grid,BM,y}$ | Build margin $CO_2$ emission factor in year y ($tCO_2$/MWh) |
| $EF_{grid,OM,y}$ | Operating margin $CO_2$ emission factor in year y ($tCO_2$/MWh) |
| $w_{OM}$ | Weighting of operating margin emissions factor (%) |
| $w_{BM}$ | Weighting of build margin emissions factor (%) |

(where $w_{OM} + w_{BM} = 1$).

According to ACM0002 the weights for OM and BM are 0.75 and 0.25 respectively.

Using the values for operating and build margin emission factor provided in the CEA database and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) is 0.94881$tCO_2e$/MWh.

| | |
|---|---|
| Combined Margin$CO_2$Emission Factor($tCO_2$ / MWh) | 0.94881 |

**Details of Baseline data:**
Data of operating for the three financial years from 2007-08, 2008-09 and 2009-10 and Build Margin for 2009-10 has been obtained from:-

**The $CO_2$ Baseline Database for the Indian Power Sector**
Ministry of Power: Central Electricity Authority (CEA)
Version 6.0
Key baseline information is reproduced in Annex 3.The detailed excel sheet is available at:

http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

**Estimation of Project Emissions**
The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002 Version 12.2.0, there will be no project emissions in the project activity ($PE_y = 0$).

**Estimation of Leakage Emissions**
As per ACM0002 Version 12.2.0, no leakage has been considered for the calculation of emission factor ($LE_y = 0$).

The details on OM, BM and CM estimates as provided by the CEA are shown in Annex-3.

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

>>

| **Data / Parameter:** | $EF_{grid,OM,y}$ |
|---|---|
| Data unit: | $tCO_2e/MWh$ |
| Description: | Operating Margin Emission Factor of NEWNE Electricity Grid |
| Source of data used: | "$CO_2$ Baseline Database for Indian Power Sector", version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India.<br><br>The "$CO_2$ Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm |
| Value applied: | 0.99431 |
| Justification of the choice of data or description of measurement methods and procedures actually applied: | Operating Margin (OM) emission factor has been calculated as per Option A, i.e. generation weighted average CO2 emissions per unit electricity generation using the most recent 3 years' (2007-08; 2008-09; 2009-10) Operating Margin (OM) emission factor values from the "$CO_2$ Baseline Database for Indian Power Sector", Version 6.0, 1st March, 2011 published by the Central Electricity Authority (CEA), Government of India. The database is the publicly available official database on emission factors for all regional grids in India. The detailed calculation and value of OM have been explained in the section B.6.1 and Annex 3 of the PDD respectively. |
| Any comment: | This value is calculated on ex-ante basis and will remain fixed for the entire crediting period. |

| **Data / Parameter:** | $EF_{grid,BM,y}$ |
|---|---|
| Data unit: | $tCO_2e/MWh$ |
| Description: | Build Margin Emission Factor of NEWNE Electricity Grid |
| Source of data used: | "$CO_2$ Baseline Database for Indian Power Sector", version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India.<br><br>The "$CO_2$ Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm |
| Value applied: | 0.81231 |
| Justification of the choice of data or description of measurement methods | Most recent value of Build Margin (BM) Emission Factor (for the year 2009-10) from the "$CO_2$ Baseline Database for Indian Power Sector ", Version 6.0, 1st March, 2011, Central Electricity Authority, Government of India, has been used. This database is the publicly available official database on emission |

| | |
|---|---|
| and procedures actually applied: | factors for all regional grids in India.The detailed calculation and value of BM have been explained in the section B.6.1 and Annex 3 of the PDD respectively. |
| Any comment: | This value is calculated on ex-ante basis and will remain fixed for the entire crediting period. |

| **Data / Parameter:** | $EF_{grid,CM,y}$ |
|---|---|
| Data unit: | $tCO_2e/MWh$ |
| Description: | Combined Margin Emission Factor of NEWNE Electricity Grid |
| Source of data used: | Combined Margin Emission Factor ($EF_{grid,CM,y}$) is calculated as the weighted average of Operating Margin Emission Factor ($EF_{grid,OM,y}$) and Build Margin Emission Factor ($EF_{grid,BM,y}$).<br><br>The "$CO_2$ Baseline Database for Indian Power Sector", version 6.0, published by the Central Electricity Authority, Ministry of Power, Government of India.<br><br>The "$CO_2$ Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm |
| Value applied: | "$CO_2$ Baseline Database for Indian Power Sector", version 6.0 published by the Central Electricity Authority, Ministry of Power, Government of India.<br><br>Combined Margin Emission Factor ($EF_{grid,CM,y}$) = 0.94881<br><br>Refer Annex – 3 for comprehensive calculation of Combined Margin Emission Factor. |
| Justification of the choice of data or description of measurement methods and procedures actually applied: | The Combined Margin (CM) Emission Factor has been calculated (for the year 2009-10) as a weighted sum of Operating Margin emission factor and Build Margin emission factor taking the weight age value as 0.75 and 0.25 respectively as per the "Tool to calculate the emission factor for an electricity system" and on the basis of the data available at the time of PDD submission from the publicly available official database on emission factors for all regional grids in India. The detailed calculation and value of CM have been explained in the section B.6.1 and Annex 3 of the PDD respectively. |
| Any comment: | This value is calculated on ex-ante basis and will remain fixed for the entire crediting period. |

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

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Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.

Baseline emissions for project activity is calculated as explained below:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$

Where:

$BE_y$ = Baseline emissions in year *y* ($tCO_2$/yr)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$ = Combined margin $CO_2$ 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" ($tCO_2$/MWh)

Baseline emission factor (Combined Margin) ($EF_{grid, CM, y}$) = 0.94881 $tCO_2e$/MWh

Since the project activity is the installation of a new grid connected renewable power plant the $EG_{PJ,y}$ is calculated as :

$EG_{PJ,y} = EG_{facility,y}$

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Annual electricity supplied to the grid by the Project ($EG_{facility,y}$ ) is calculated as follows:-

$EG_{facility,y}$ = 20 MW (Capacity) x 19.50% (PLF) x 8,760 (hours) MWh/yr
= 34164.00MWh/yr

Hence,

$EG_{PJ,y}$ = $EG_{facility,y}$
= 34164.00 MWh/yr

Annual Baseline Emissions Reduction: $BE_y$ = $EG_{PJ, y}$ * $EF_{grid, CM, y}$
= $EG_{facility,y}$ * $EF_{grid, CM, y}$
= 0.94881 $tCO_2e$/MWh x 34164.00MWh
= 32415 $tCO_2e$/yr

Emission reductions for project activity are calculated according to following equation:
$ER_y = BE_y – PE_y$

Where,
$ER_y$ = Emission reductions in year, y (tCO2e/y)
$BE_y$ = Baseline Emissions in year, y (tCO2e/y)
$PE_y$ = Project Emissions in year, y (tCO2e/y)

Since, Project emissions $PE_y = 0$

Hence $ER_y = BE_y$

Hence emission reduction ( $ER_y$) = $BE_y$
= 32415 $tCO_2e$/yr

The emission reductions per year are estimated to be 32,415 $tCO_2e$/yr.

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

>>

| Year | Estimation of project activity emissions (tonnes of $CO_2e$) | Estimation of baseline emissions (tonnes of $CO_2e$) | Estimation of leakage (tonnes of $CO_2e$) | Estimation of overall emission reductions (tonnes of $CO_2e$) |
|---|---|---|---|---|
| Year 1* | 0 | 32,415 | 0 | 32,415 |
| Year 2 | 0 | 32,415 | 0 | 32,415 |
| Year 3 | 0 | 32,415 | 0 | 32,415 |
| Year 4 | 0 | 32,415 | 0 | 32,415 |
| Year 5 | 0 | 32,415 | 0 | 32,415 |
| Year 6 | 0 | 32,415 | 0 | 32,415 |
| Year 7 | 0 | 32,415 | 0 | 32,415 |
| Year 8 | 0 | 32,415 | 0 | 32,415 |
| Year 9 | 0 | 32,415 | 0 | 32,415 |
| Year 10 | 0 | 32,415 | 0 | 32,415 |
| **Total (tonnes of $CO_2e$)** | 0 | 324,150 | 0 | 324,150 |

* Year 1st begins from 01/08/2012 or date of registration of project with UNFCCC whichever is later, and each year extends for 12 months.

## B.7 Application of the monitoring methodology and description of the monitoring plan:

### B.7.1 Data and parameters monitored:

>>

| Data / Parameter: | $EG_{facitlity,y}$ |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | Net electricity generation supplied to the grid by the Project activity. |
| Source of data to be used : | Generation break-up sheets prepared by the developer[14] (Enercon), which is based on monthly JMR reading recorded at main meter installed at DISCOM sub-station and the LCS controller meter (panel meter) reading. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | =34,164.00 |
| Description of measurement methods and procedures to be applied: | • There is a billing metering point (one main & one check meters) located at 132kV Discom's sub-station at PS-8 Narwa.<br>• There is also a back up metering (one main & one check meter) located at |

[14] As per PPA (refer page 3) developer shall be responsible to set up requisite power injection system in to RVPN/ Discom(s) grid, to take joint meter reading at Common Delivery Point and to furnish breakup of energy supplied by individual Power Producer(s) commensurate with the total energy supplied at Common Delivery Point.

| | |
|---|---|
| | 132kV Enercon's sub-station at Salodi.<br>• All the above meters are 0.2% accuracy class. There are other WEGs apart from the project activity WEGs, that are connected to these meters at respective sub-station.<br>• Monthly Joint Meter Recording recorded is done at billing metering point at PS-8 Narwa sub-station by Discom utility in the presence of PP's representative (Enercon).<br>• Joint meter reading records the values of export, import based on which the net export by all the WEGs (Project as well as non-project) connected to billing metering point at the DISCOM sub-station (PS-8 Narwa) is calculated.<br>• Based on the monthly JMR reading and the LCS controller reading of Project as well as non-project WEGs, Enercon prepares the breakup sheet which indicates the energy Exported, Imported & net electricity supplied by the individual WEGs. This breakup sheet is then submitted to Discom authority as well as the individual investors.<br>• Based on this breakup sheet the PP raises an invoice and submits to the Discom.<br>• The Discom authority conducts a thorough review based on the JMR readings, breakup sheets and the invoice raised by individual investors. The audits are conducted by senior official based at the circle office of individual Discom and only after the authorisation of submitted documents/ records by the superintending engineer of the respective Discom, are the payments released to the individual investor.<br>• Net electricity supplied to the grid is a calculated value and is used in calculation of emission reduction of the project activity.<br><br>Measurement & Recording of electricity:<br><br>-Main and Back up meters measures the electricity (export & Import) on continuous basis and recorded by state utility on monthly basis.<br>-Panel meter (LCS controller) measures the net electricity generation (Gross Export – Gross Import) on continuous basis and daily/monthly data can be sourced/recorded from online SCADA system.<br><br>Detailed procedure calculating net electricity supplied to the grid is given in section B.7.2. |
| QA/QC procedures to be applied: | Value of $EG_{facitlity,y}$ can be cross checked with the tariff invoices raised on the DISCOM and/or RTGS transaction or cheque copy.<br>All the billing main & back up meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon) |
| Any comment: | The data will be archived both in electronic and hard paper format for crediting period + 2 years. |

| **Data / Parameter:** | **$EG_{Export,y}$** |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | Electricity export to the grid by the Project activity. |

| | |
|---|---|
| Source of data to be used: | Generation break-up sheets prepared by the developer (Enercon), which is based on monthly joint meter reading recorded at main meter installed at DISCOM sub-station and the LCS controller meter (panel meter) reading. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | - |
| Description of measurement methods and procedures to be applied: | • Monthly Joint Meter Recording recorded is done at billing metering point at both PS-8 Narwa sub-station by Discom utility in the presence of PP's representative (Enercon).<br>• Joint meter reading records the values of export, import based on which the net export by all the WEGs (Project as well as non-project) connected to billing metering point at the DISCOM sub-station (PS-8 Narwa) is calculated.<br>• Based on the monthly JMR reading and the LCS controller reading of Project as well as non-project WEGs, Enercon prepares the breakup sheet which indicates the energy Exported, Imported & net electricity supplied by the individual WEGs. This breakup sheet is then submitted to Discom authority as well as the individual investors.<br>• Based on this breakup sheet the PP raises an invoice and submits to the Discom.<br>• The Discom authority conducts a thorough review based on the JMR readings, breakup sheets and the invoice raised by individual investors. The audits are conducted by senior official based at the circle office of individual Discom and only after the authorisation of submitted documents/ records by the superintending engineer of the respective Discom, are the payments released to the individual investor.<br><br>**Measurement & Recording of electricity:**<br><br>-Main and Back up meters measures the electricity (export & Import) on continuous basis and recorded by state utility on monthly basis.<br>-Panel meter (LCS controller) measures the net electricity generation (Gross Export – Gross Import) on continuous basis and daily/monthly data can be sourced/recorded from online SCADA system.<br><br>Detailed procedure calculation is given in section B.7.2. |
| QA/QC procedures to be applied: | Value of $EG_{Export,y}$ can be cross checked with the tariff invoices raised on the DISCOM and/or RTGS transaction or cheque copy.<br>All the billing & Back meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon) |
| Any comment: | The data will be archived both in electronic and hard paper format for crediting period + 2 years. |

| **Data / Parameter:** | **$EG_{Import,y}$** |
|---|---|
| Data unit: | MWh (Mega-watt hour) |

| | |
|---|---|
| Description: | Electricity Import from grid by the Project activity. |
| Source of data to be used : | Generation break-up sheets prepared by the developer (Enercon), which is based on monthly meter reading recorded at main meter installed at DISCOM sub-station and the LCS controller meter (panel meter) reading. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | - |
| Description of measurement methods and procedures to be applied: | • Monthly Joint Meter Recording recorded is done at billing metering point at both PS-8 Narwa sub-station by Discom utility in the presence of PP's representative (Enercon).<br>• Joint meter reading records the values of export, import based on which the net export by all the WEGs (Project as well as non-project) connected to billing metering point at the DISCOM sub-station (PS-8 Narwa) is calculated.<br>• Based on the monthly JMR reading and the LCS controller reading of Project as well as non-project WEGs, Enercon prepares the breakup sheet which indicates the energy Exported, Imported & net electricity supplied by the individual WEGs. This breakup sheet is then submitted to Discom authority as well as the individual investors.<br>• Based on this breakup sheet the PP raises an invoice and submits to the Discom.<br>• The Discom authority conducts a thorough review based on the JMR readings, breakup sheets and the invoice raised by individual investors. The audits are conducted by senior official based at the circle office of individual Discom and only after the authorisation of submitted documents/ records by the superintending engineer of the respective Discom, are the payments released to the individual investor.<br><br>Measurement & Recording of electricity:<br><br>-Main and Back up meters measures the electricity (export & Import) on continuous basis and recorded by state utility on monthly basis.<br>-Panel meter (LCS controller) measures the net electricity generation (Gross Export – Gross Import) on continuous basis and daily/monthly data can be sourced/recorded from online SCADA system.<br><br>Detailed procedure calculation is given in section B.7.2. |
| QA/QC procedures to be applied: | Value of $EG_{Import,y}$ can be cross checked with the tariff invoices raised on the DISCOM and/or RTGS transaction or cheque copy.<br>All the billing & Back meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon) |
| Any comment: | The data will be archived both in electronic and hard paper format for crediting period + 2 years. |

| | |
|---|---|
| **Data / Parameter:** | **$EG_{JMR, Export}$** |

| | |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | Electricity export by project activity & non project activity recorded by main meter installed at DISCOM sub-station. |
| Source of data to be used: | Monthly JMR sheets recorded by representative of both DISCOM & Enercon. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | - |
| Description of measurement methods and procedures to be applied: | • Monthly Joint Meter Recording recorded is done at billing metering point at both PS-8 Narwa sub-station by Discom utility in the presence of PP's representative (Enercon).<br>• Joint meter reading records the values of export, import based on which the net export by all the WEGs (Project as well as non-project) connected to billing metering point at the DISCOM sub-station (PS-8 Narwa) is calculated.<br>• Based on the monthly JMR reading and the LCS controller reading of Project as well as non-project WEGs, Enercon prepares the breakup sheet which indicates the energy Exported, Imported & net electricity supplied by the individual WEGs. This breakup sheet is then submitted to Discom authority as well as the individual investors.<br>• Based on this breakup sheet the PP raises an invoice and submits to the Discom.<br>• The Discom authority conducts a thorough review based on the JMR readings, breakup sheets and the invoice raised by individual investors. The audits are conducted by senior official based at the circle office of individual Discom and only after the authorisation of submitted documents/ records by the superintending engineer of the respective Discom, are the payments released to the individual investor.<br><br>**Measurement & Recording of electricity:**<br><br>-Main and Back up meters measures the electricity (export & Import) on continuous basis and recorded by state utility on monthly basis.<br>-Panel meter (LCS controller) measures the net electricity generation (Gross Export – Gross Import) on continuous basis and daily/monthly data can be sourced/recorded from online SCADA system.<br><br>Refer section B.7.2 for detailed measurement procedure. |
| QA/QC procedures to be applied: | All the billing & Backup meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon) |
| Any comment: | The data will be archived both in electronic and hard paper format for crediting period + 2 years. |

| **Data / Parameter:** | **$EG_{JMR, Import}$** |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | Electricity import by project activity & non project activity recorded by main |

| | |
|---|---|
| | meter installed at DISCOM sub-station |
| Source of data to be used : | Monthly JMR sheets recorded by representative of both DISCOM & Enercon. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | - |
| Description of measurement methods and procedures to be applied: | • Monthly Joint Meter Recording recorded is done at billing metering point at both PS-8 Narwa sub-station by Discom utility in the presence of PP's representative (Enercon).<br>• Joint meter reading records the values of export, import based on which the net export by all the WEGs (Project as well as non-project) connected to billing metering point at the DISCOM sub-station (PS-8 Narwa) is calculated.<br>• Based on the monthly JMR reading and the LCS controller reading of Project as well as non-project WEGs, Enercon prepares the breakup sheet which indicates the energy Exported, Imported & net electricity supplied by the individual WEGs. This breakup sheet is then submitted to Discom authority as well as the individual investors.<br>• Based on this breakup sheet the PP raises an invoice and submits to the Discom.<br>• The Discom authority conducts a thorough review based on the JMR readings, breakup sheets and the invoice raised by individual investors. The audits are conducted by senior official based at the circle office of individual Discom and only after the authorisation of submitted documents/ records by the superintending engineer of the respective Discom, are the payments released to the individual investor.<br><br>**Measurement & Recording of electricity:**<br><br>-Main and Back up meters measures the electricity (export & Import) on continuous basis and recorded by state utility on monthly basis.<br>-Panel meter (LCS controller) measures the net electricity generation (Gross Export – Gross Import) on continuous basis and daily/monthly data can be sourced/recorded from online SCADA system.<br><br>Refer section B.7.2 for detailed measurement procedure. |
| QA/QC procedures to be applied: | All the billing & Back up meters are calibrated by DISCOM annually and the records are available with the representative of PP (Enercon). |
| Any comment: | The data will be archived both in electronic and hard paper format for crediting period + 2 years. |

| **Data / Parameter:** | $EG_{Controller,i}$ |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | net electricity generation (Gross Export – Gross Import) by a WEG of project activity or non project activity, as measured at the controller (LCS meter) at project site. Each WEG has exclusive LCS meter that records net electricity |

| | |
|---|---|
| | generation (Gross Export – Gross Import) from the WEG (project or non project).<br><br>Where,<br><br>i is any WEG between 1 to j+ k.<br><br>j is number of WEG of project activity connected to main meter at DISCOM substation and backup meter at Enercon substation.<br><br>k is number of WEG of non project activity connected to main meter at DISCOM substation and backup meter at Enercon substation. |
| Source of data to be used: | Monthly controller generation report (LCS) sourced from SCADA system installed at project site. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | - |
| Description of measurement methods and procedures to be applied: | LCS meter measures the net electricity generation (Gross Export – Gross Import) by WEG and doesn't provide individual reading of Export & Import . The value is monitored continuously and recorded daily by the online monitoring station at the site. In addition to the daily generation report and monthly generation report are also available at monitoring station. |
| QA/QC procedures to be applied: | All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately. |
| Any comment: | The data will be archived in electronic form for crediting period + 2 years. |

| **Data / Parameter:** | $\sum EG_{Controller,i}$ |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | Summation of net electricity generation (Gross Export – Gross Import) by all WEG (i number of WEGs) of project activity or non project activity, as measured at the controller (LCS meter) at project site, Each WEC has exclusive LCS meter that records net electricity generation (Gross Export – Gross Import) from the WEG (project or non project).<br><br>Where,<br>i is any WEG between 1 to j+ k,<br><br>j is number of WEG of project activity connected to main meter at DISCOM substation and backup meter at Enercon substation.<br><br>k is number of WEG of non project activity connected to main meter at DISCOM substation and backup meter at Enercon substation. |
| Source of data to be used: | Monthly controller generation report (LCS) sourced from SCADA system |
| Value of data applied | - |

| | |
|---|---|
| for the purpose of calculating expected emission reductions in section B.5 | |
| Description of measurement methods and procedures to be applied: | The value is monitored continuously and recorded daily by the online monitoring station at the site. In addition to the daily generation report and monthly generation report are also available at monitoring station. |
| QA/QC procedures to be applied: | All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately. |
| Any comment: | The data will be archived in electronic form for crediting period + 2 years. |

| **Data / Parameter:** | $\sum EG_{Controller, j}$ |
|---|---|
| Data unit: | MWh (Mega-watt hour) |
| Description: | Summation of net electricity generation (Gross Export – Gross Import) by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site. Each WEC has exclusive LCS meter that records net electricity generation (Gross Export – Gross Import) from the WEG (project or non project).<br><br>j is number of WEG of project activity connected to main meter at DISCOM substation and backup meter at Enercon substation. |
| Source of data to be used: | Monthly controller generation report (LCS) sourced from SCADA system installed at project site. |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | - |
| Description of measurement methods and procedures to be applied: | The value is monitored continuously and recorded daily by the online monitoring station at the site. In addition to the daily generation report and monthly generation report are also available at monitoring station. |
| QA/QC procedures to be applied: | All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately. |
| Any comment: | The data will be archived in electronic form for crediting period + 2 years. |

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

>>

Enercon (India) Limited is O&M contractor for the project activity and will be responsible for the maintaining all the monitoring data on behalf of Enercon in respect of the project activity. Enercon (India) Limited has implemented the management structure for managing the monitored data.

This approved monitoring methodology requires monitoring of the following:

- Net electricity supplied from the project activity; and

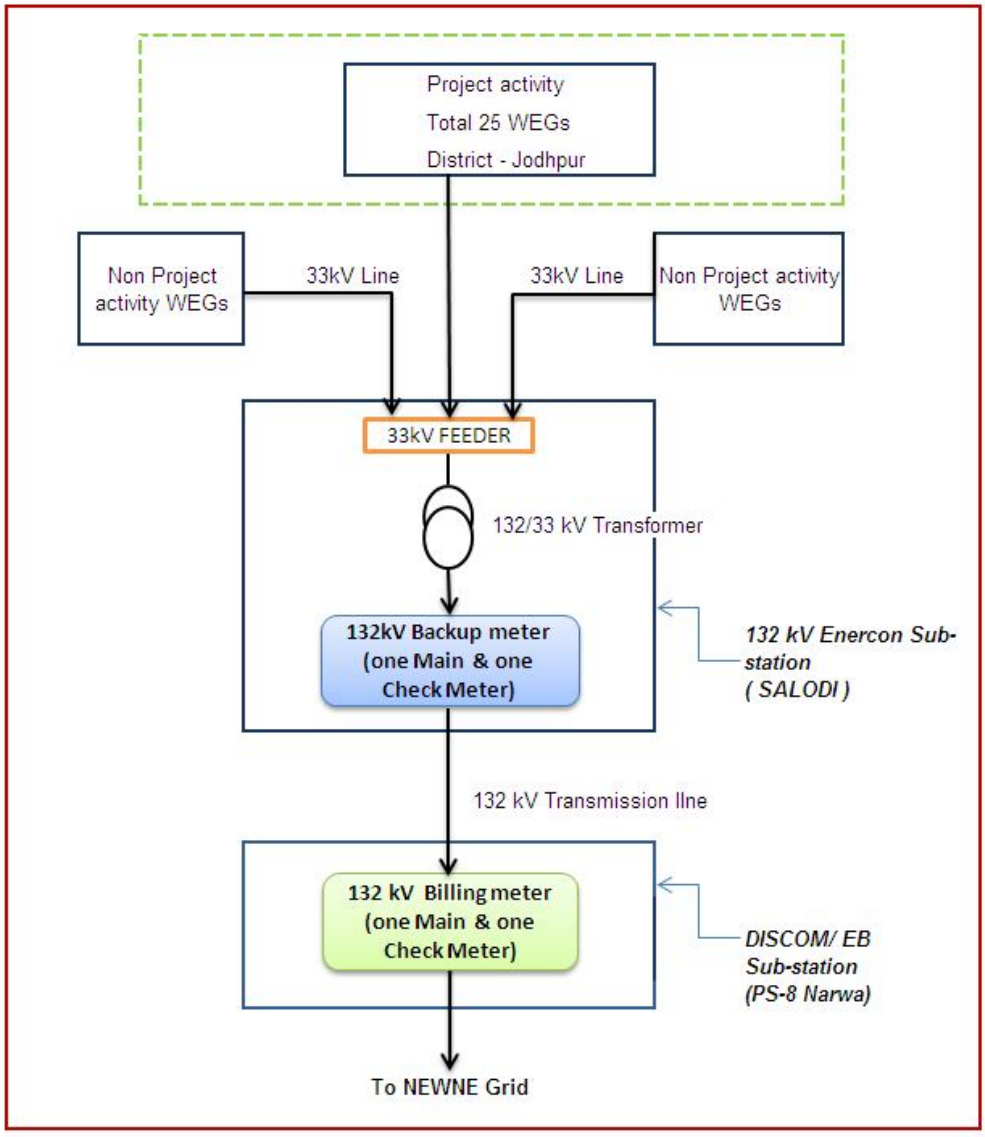
- Operating margin emission factor and build margin emission factor of the grid, where *ex post* determination of grid emission factor has been chosen

Emission factor of NEWNE electricity grid of the project activity is fixed ex ante hence no further monitoring of this parameter is required. As per ACM0002 leakage need not be considered hence leakage has not been considered for the project activity. Hence, the sole parameter for monitoring is the net electricity supplied by the project activity to the grid.

The Project activity is operated by (O&M contractor for the project activity) and managed by the Enercon. The operational and maintenance activity will be taken care by the service department of Enercon, which is an ISO 9001 certified company. Enercon follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

**Calculation of Net Electricity Supplied to the grid by project activity:**

Layout of Metering arrangement for project activity is as follows:-




From the above layout it is clear that project activity WEGs (25Nos) along with WEGs of other customers, who are not the part of project activity are connected to Enercon Sub-stations which are further connected to EB sub-station through EHV line. The 25WEGs of project activity installed in Jodhpur district is connected through 132kV Enercon (India) Limited (herein after referred as EIL) pooling sub-station (132kV SALODI sub-station), through 33kV feeder lines. At EIL pooling sub-station SALODI electricity is stepped up to 132kV, wherein the backup meter (one main & one check meter) connected. From EIL pooling sub-station electricity is transmitted to state utility (DISCOM) sub-station (PS-8 Narwa Sub-station) through 132kV transmission line/ EHV line wherein billing meter (one main & one check meter) is connected. At EB sub-station metering is done at 132kV billing meter. From EB sub-station electricity is further transmitted to NEWNE grid.

The net electricity supplied to the grid will be calculated on monthly basis at the EB/DISCOM substations (PS-8 Narwa) wherein the billing meter is connected. The monthly joint meter readings are taken by the representatives of DISCOM and Enercon (PP's representative) who also signs the JMR. Simultaneously, the monthly joint meter reading of backup meters available at EIL pooling sub-station (SALODI) is also taken by representatives of RVPN/DISCOM and Enercon. The copy of JMR at backup meters is available with Enercon.

Since the project activity WEGs are connected through common metering system along with non project activity WEGs of other customers at the main meter, apportioning of electricity export & import as recorded in JMR is being done to calculate the electricity export & import by individual WEGs/ customers. Apportioning is being done based on the net electricity generation (Gross Export – Gross Import) recorded at LCS meter installed in individual WEGs

Based on the monthly JMR reading, which is signed by representative of DISCOM and PP's representative (Enercon); Enercon prepares the monthly breakup[15] generation sheets which indicate export, import & the net electricity supplied by individual customers to the grid. An apportioning procedure is used by PP's representative to arrive at net electricity supplied to the grid by individual investors.

The monthly generation sheet is submitted to both, DISCOM as well as individual investors. PP raises the invoice based on the monthly breakup sheet corresponding to the net electricity generation value indicated in the monthly breakup sheet. DISOM based on the JMR reading along with monthly breakup sheet prepared by Enercon and the invoice raised by investors, conduct the audit to cross check the net electricity values and in case all the values are found to be correct, DISCOM release the payment against the invoice raised by individual investors.

The values of the net electricity supplied to grid by project activity can be cross checked with invoices raised by the PP on DISCOM and/or RTGS transaction or cheque copy.

**Procedure for apportioning:-**

**Procedure used by PP's representative to prepare monthly breakup sheets for project activity.**

The monthly JMR reading contains the electricity export, import & net electricity supplied by all the WEGs of project activity as well as non project activity connected to the metering system at DISCOM substation. Hence in order to arrive at the electricity export, import & net electricity supplied by WEGs of the project activity based on the net electricity generation (Gross Export – Gross Import) recorded at LCS meter, following procedure is used by O&M contractor (Enercon):-.

net electricity generation (Gross Export – Gross Import) by WEGs of project activity,

[15] As per section 4.2 (ii) of PPA 'Measurement of Energy and Metering':- The Joint Meter Reading taken at common evacuation /injection system shall be supported by controller readings of individual power producers using such common evacuation/ injection system. Based on this breakup, limited to total energy injection, the power purchase form the individual power plant shall be regulated for the purpose of payment.

$$\sum \mathbf{EG}_{\mathbf{Controller,\ j}} = \sum_{j=1}^{n} \mathbf{EG}_{\mathbf{Controller,\ j}}$$

Where, **n** is the number of WEGs (n = 1 to 25) in project activity.

net electricity generation (Gross Export – Gross Import) by all WEGs (Project activity & non project activity) connected to Discom substation,

$$\sum \mathbf{EG}_{\mathbf{Controller,\ i}} = \sum_{i=1}^{j+k} \mathbf{EG}_{\mathbf{Controller,\ i}}$$

Where, j+k is the number of WEGs (project activity & non project activity) connected to sub-station.

As LCS meter measures the net electricity generation (Gross Export – Gross Import) by individual WEG, which is the difference of export and import and doesn't provide individual reading of Export & Import; the apportioning of electricity export & import at recorded at billing meter as indicated in JMR sheet is done based on net electricity generation (Gross Export – Gross Import) of WEGs. This is a standard procedure that is followed in the state of Rajasthan and is accepted by the state DISCOM for payment of tariff invoices.

Electricity exported by all WEGs of project activity is apportioned on the basis of summation of net electricity generation (Gross Export – Gross Import)[16] ( by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site and the electricity export recorded at the main meter mentioned in the JMR. The formula used for computing electricity export to the grid by the project activity is as follows:-

Electricity Export to the grid by the Project activity,

$$\mathbf{EG}_{\mathbf{Export,y}} = \frac{\mathbf{EG}_{\mathbf{JMR,Export}} * \sum \mathbf{EG}_{\mathbf{Controller,\ j}}}{\sum EG_{Controller,i}[17]} \quad \text{.....(1)}$$

As LCS meter measures the net electricity generation (Gross Export – Gross Import) by WEGs and doesn't provide individual reading of Export & Import. Therefore apportioning of export as well as import for all WEG of the project activity is also apportioned on the basis of summation of net electricity generation (Gross Export – Gross Import) by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site and the electricity import recorded at the main

[16] LCS meter installed in individual WEGs control panel measures the net/ gross electricity generation (Export-Import) by WEG and therefore $\sum EG_{Controller,\ j}$ is used by developer to calculate electricity export & import by individual developer (project activity & non project activity WEGs)..

[17] The report detailing the value of $\sum EG_{Controller}$ can be provided to the verifying DOE on request.

meter mentioned in the JMR. The formula used for computing electricity import from the grid by the project activity is as follows

Electricity Import from the grid by the Project activity,

$$\mathbf{EG_{Import,y}} = \frac{\mathbf{EG}_{JMR,Import} * \sum EG_{Controller,\,j}}{\sum EG_{Controller,i}} \quad \text{.....(2)}$$

Wherein,

| | | |
|---|---|---|
| $\sum EG_{Controller,\,j}$ | = | Summation of net electricity generation (Gross Export – Gross Import) by all the WEGs (j number of WEGs) of project activity, as measured at the controller (LCS meter) at project site |
| $\sum EG_{Controller,i}$ | = | Summation of net electricity generation (Gross Export – Gross Import) by all WEG (i number of WEGs) of project activity or non project activity, as measured at the controller (LCS meter) at project site |
| $EG_{JMR,Export}$ | = | Electricity export by project and non project recorded at respective billing meters located at DISCOM sub-station. This can be checked from JMR certificates. |
| $EG_{JMR,Import}$ | = | Electricity import by project and non project recorded at respective billing meters located at DISCOM sub-station. This can be checked from JMR certificates. |
| $\mathbf{EG_{Export,y}}$ | = | Electricity export by project activity calculated as per formula 1 above |
| $\mathbf{EG_{import,y}}$ | = | Electricity import by project activity calculated as per formula 2 above. |

Therefore net electricity supplied to grid by 25 WEGs of the project activity is calculated as the difference of equation (1) & (2),

$$\mathbf{EG_{Facitlity,y} = EG_{Export,y} - EG_{Import,y}}$$

Even though the above mentioned of apportioning is done by the PP's representative and submitted to respective DISCOM, the same undergoes the series of audit by the hierarchy of auditors (Asst. Auditors, divisional auditors & account auditors) and then finally authorised by the Superintending engineer (SE) of the circle office of respective DISCOMs.

The above method of apportioning is not conducted by the PP but is described in details only to provide the clear description of entire procedure by relevant authority.

**Procedure to deal with data uncertainty:**

During the annual calibration, if the meter is found to be outside the permissible limits of the error and if that meter readings have been used in JMR, the (–ve) error value would be applied to electricity export and (+ve) error value will be applied to import of electricity from grid to all the JMR values since the date of last calibration. The meter would be replaced immediately with new calibrated meter.

**Action plan for monitoring of 2% CER revenue contributed towards sustainable development**

Enercon (India) Limited is committed to contribute a minimum of 2% of the CER revenue accrued every year for sustainable development activities for the local population. The table below provides an estimation of the revenue that would be committed every year for sustainable development activities.

| Year | Estimation of total emission reduction ($tCO_{2e}$) | Estimated CER Price* (Euro) | Exchange rate (Euro to INR) | Estimation of CER Revenue generated by the project (INR) | Estimation of minimum revenue commitment for sustainable development (INR) |
|---|---|---|---|---|---|
| 1 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 2 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 3 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 4 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 5 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 6 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 7 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 8 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 9 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |
| 10 | 32,415 | 20.00 | 64.78 | 41996874 | 839937 |

*Please note that:-*

*(i) Estimation of CER revenue has been done based on the envisaged price of CER (20 Euro) at the time of revenue realization and the present conversion rate from Euro to INR (1 Euro=64.78 INR Dated 25-Apr -2011)*

*(ii) The revenue committed will vary every year as per the actual CERs generated, the CER price that is actually transacted and the prevailing exchange rate at the time of transaction.*

Enercon will undertake an annual review process of the actual CERs accrued and the price transacted. On the basis of the actual price and exchange rate, Enercon will commit 2% of the revenue for sustainable development activities in the local areas.

As part of the annual review, Enercon will undertake informal discussions with the locals at the project site and commit the revenue towards society / community developmental activities in areas that are of most concern to the local population. These areas could include health, education, sanitation, skill development, infrastructure development, etc. The annual review process will detail the exact activities

that would be undertaken using the 2% revenue and the detailed mode of implementation of the proposed activity.

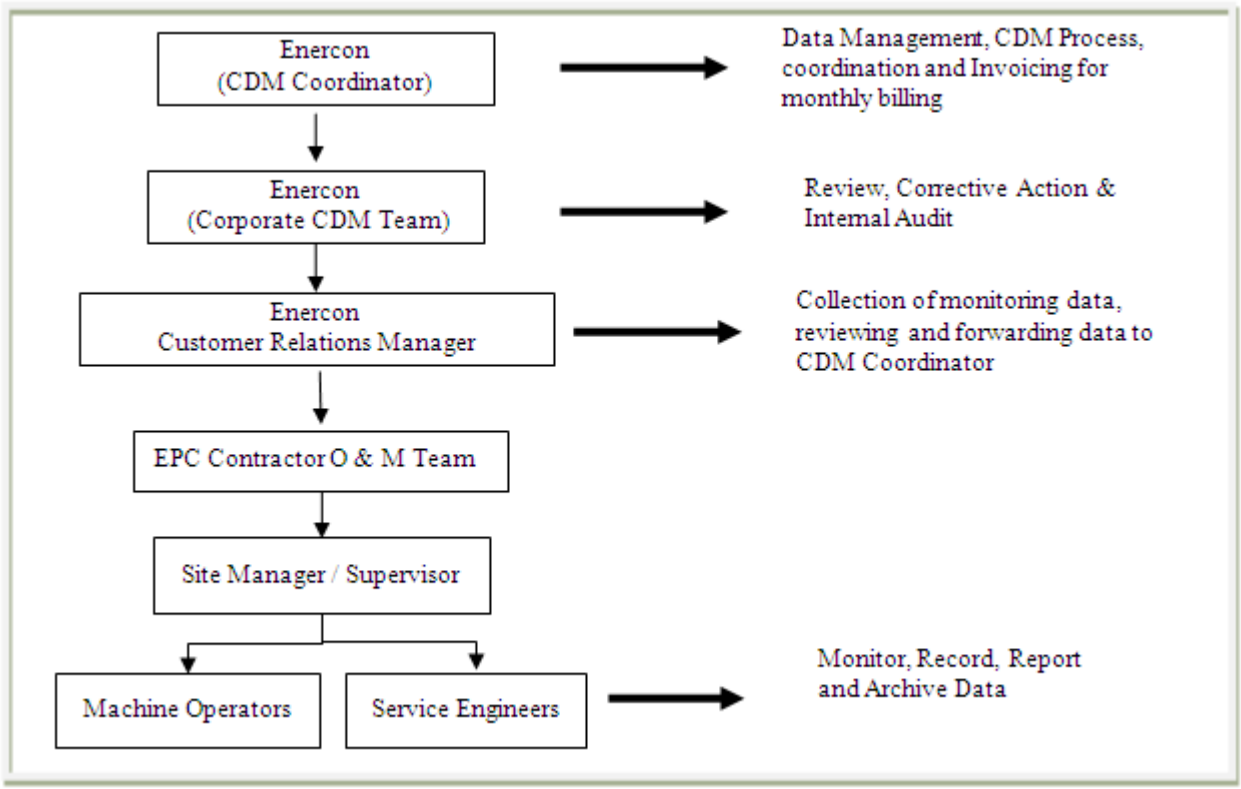
Enercon commits that a CSR team will be appointed to oversee the activities towards sustainable development and also that the activities are undertaken and concluded in a timely manner each year

**Training and maintenance requirements:**

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that Enercon's service staffs is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The Enercon Training Academy provides need-based training to meet the training requirements of Enercon projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

**Monitoring roles and responsibilities**

The operational and management structure implemented for data monitoring is as follows:



**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)**

>>

Date of completion: 25/07/2011

Name of responsible person/entity:

- Enercon (India) Limited (Project Participant),

Contact Details of project participants have been given in Annex 1.

## 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:

>>

07/05/2011,(Date of internal communication circulated by PP.

As per the' Glossary of CDM terms', version 06.0, definition of start date is as follows: '*In the context of a CDM project activity or PoA, the earliest date at which either the implementation or construction or real action of a CDM project activity or PoA begins'*. Enercon (India) Limited in its Board Meeting dated 05 May 2011 considered the project returns and finalised the decision to install the project after considering the CDM benefits. Since project activity has been implemented by Enercon (India) Limited which is also the WEG supplier for project activity, therefore its not possible to place purchase order internally. Further based on the board decision, Enercon (India) Limited issued an official circular dated 07 May 2011 mandating concerned departments to take necessary steps for the installation of project activity. In addition to this, SAP entry details also confirm that the transfer of material to site for installation of project activity was started from 16 May 2011 onwards.

As evident from the chronology, issuance of official circular based on the Board decision is the foremost and earliest step towards the implementation of project activity and commitment of expenditure by Project Participant for the same.

Therefore, date of issuance of official circular i.e. 07 May 2011 has been considered as the project start date.

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

>>

20 Years 0 Months

### C.2 Choice of the crediting period and related information:

The project proponent has selected the fixed crediting period for the project activity.

#### C.2.1. Renewable crediting period

##### C.2.1.1. Starting date of the first crediting period:

>>

Not applicable

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

>>

Not applicable

**C.2.2. Fixed crediting period:**

**C.2.2.1. Starting date:**

>>

01/08/2012 or date of registration of project with UNFCCC whichever is later.

**C.2.2.2. Length:**

>>

10 years and 0 months

## SECTION D. Environmental impacts

>>

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

>>

As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 27, 1994 and EIA Notification (S.O 1533) dated 14th September 2006 ( web-link: http://envfor.nic.in/legis/eia/so1533.pdf ), a list of activities that require undertaking environmental impact assessment studies has been provided. EIA is not a regulatory requirement in India for wind energy projects and PP does not expect any adverse impacts of the proposed CDM project activity on the environment.

**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:**

>>

The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. Hence, EIA is not required by the host party.

## SECTION E. Stakeholders' comments

>>

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

>>

The comments from local stakeholders were invited through a local stakeholder meeting conducted at at Jodhpur on 23rd July 2011 in the state of Rajasthan. A local newspaper advertisement was placed in Nafa Nuksan on 5th July 2011 inviting the local stakeholders for the meeting. There were no stakeholders comments received through email. The local stakeholder consultation meeting had representatives from the nearby villages and CDM representative of Enercon and O&M contractor. The meeting was presided

over by Mr. Rajesh Sahani (Customer Support -EIL), Mr. Saujanya Kumar (CDM representative of Enercon). Following stakeholders are identified for the project activity:

- Local stakeholders and villagers
- Employees from wind farm developer (Enercon)
- CDM Representatives on behalf of Enercon

Following was the agenda of meeting:

1. Welcome address and introduction
2. Project profile
3. CDM, social issues and environmental issues
4. Suggestions and opinions
5. Queries from the stakeholders and response by respective authorized persons
6. Vote of thanks

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

>>

Mr. Rajesh Sahani welcomed the participants and introduced the company and explained the stake holders on the purpose of the meet is that to create awareness on global warming, its effects and on the Clean Development Mechanism

Mr. Rajesh Sahani explained the company profile of Enercon (India) Limited and explained about the current project activity.

Mr. Saujanya Kumar (CDM representative on behalf of Enercon) introduced about project activity, reasons for setting up the project, costs and benefits of setting up the project and role and benefits of wind power project to reduce the emissions of green house gases in the atmosphere thus mitigating global warming.

**Summary of comments received during the stakeholder meeting**

Mr. Roop Singh, the chairperson of meeting to express his views on the proposed Wind Power Project. The chairperson of the meeting briefed the advantages of the wind farm. The project will provide the employment opportunities to the local people as the result of which may result in increase of the income of local people as is the case of Jodhpur where the Enercon India Limited Projects has provided the employment opportunities to the local people. He also praised Enercpn for their decision to invest in district of Jodhpur

The following queries/comments were raised by the stakeholders:-

| S.No. | Name of Stakeholder | Queries/Comment raised |
|---|---|---|
| 1. | Mr. Bhairo Singh | Enquired can the local people will get works relating to project. |
| 2. | Mr. Deva Ram | Enquired how the project is useful for the villagers |
| 3. | Mr. Manohar Singh | Enquired that will the villagers will get the electricity generated from the project? |

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

>>

Clarifications that were addressed by the representatives of Enercon and CDM representatives during the meeting.

| S.No. | Name of Stakeholder | Queries/Comment raised | Responses of Queries/ Comment raised |
|---|---|---|---|
| 1. | Mr. Bhairo Singh | Enquired can the local people will get works relating to project. | Mr. Rajesh Sahani clarified that there will be opportunities for the vicinity people of project by a proper selection process. |
| 2. | Mr. Deva Ram | Enquired how the project is useful for the villagers | Mr. Saujanya Kumar clarified that by establishing the wind power projects, village development takes place and by this, the towns and the states. Also told that the job opportunities, scarcity of electricity, improved distribution of power will be of importance to the nearby villages where the WPP is established and there on to other villages. |
| 3. | Mr. Manohar Singh | Enquired that will the villagers will get the electricity generated from the project? | Mr. Rajesh Sahani informed that the electricity generated will be supplied to the state electricity grid which further distributes the electricity as per the state policy. |

The stakeholder meetings were very cordial and ended on a positive note. No adverse comments were received during the stakeholder meets. They were strongly supporting the project activity and were happy due to the potential benefits to their local area.

## Annex 1

## CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

| | |
|---|---|
| Organization: | Enercon (India) Limited |
| Street/P.O.Box: | A-9, Veera Industrial Estate, Veera Desai Road, Andheri (W) |
| Building: | Enercon Tower |
| City: | Mumbai |
| State/Region: | Maharashtra |
| Postfix/ZIP: | 400 053 |
| Country: | India |
| Telephone: | +91-22-6692 4848 |
| FAX: | +91-22 - 67040473 / 66921175 |
| E-Mail: | yogesh.mehra@enerconindia.net |
| URL: | www.enerconindia.net |
| Represented by: | |
| Title: | Managing Director |
| Salutation: | Mr. |
| Last Name: | Mehra |
| Middle Name: | |
| First Name: | Yogesh |
| Department: | Corporate |
| Mobile: | +91-98200 40301 |
| Direct FAX: | +91-22-6692 1177 |
| Direct tel: | +91-22-6702 2832 |
| Personal E-Mail: | yogesh.mehra@enerconindia.net |

## Annex 2

## INFORMATION REGARDING PUBLIC FUNDING

The project activity does not involve any public funding from parties included in Annex 1.

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## Annex 3

## BASELINE INFORMATION

The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE Grid as published in the "$CO_2$ Baseline Database for Indian Power Sector"[18], Version 6.0, 1st March, 2011, published by Central Electricity Authority (CEA), Government of India have been used for the estimation of the Baseline Emission. The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE are as follows:

**Simple Operating Margin**

| | **NEWNE Grid ($tCO_2e/GWh$)** | **Net Generation Total (MWh)** |
|---|---|---|
| Simple Operating Margin – 2007-08 | 0.99990 | 496.119 |
| Simple Operating Margin – 2008-09 | 1.00655 | 510.693 |
| Simple Operating Margin – 2009-10 | 0.97774 | 544.915 |
| Weighted Average Operating Margin * | | 0.99431 |

** Calculated as per Option A, i.e. generation weighted average CO2 emissions per unit electricity generation has been used*

**Build Margin**

| | **NEWNE Grid ($tCO_2e/GWh$)** |
|---|---|
| Build Margin- 2009-10 | 0.81231 |

**Combined Margin Calculations**

| | Weights | **NEWNE Grid ($tCO_2e/GWh$)** |
|---|---|---|
| Operating Margin | 0.75 | 0.99431 |
| Build Margin | 0.25 | 0.81231 |
| Combined Margin | | **0.94881** |

Detailed information on calculation of Operating Margin Emission Factor and Build Margin Emission Factor is available at www.cea.nic.in.

[18] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

## Annex 4

## MONITORING INFORMATION

Detailed metering information has been provided in section B.7.2**.**

## Appendix 1: Latitude-Longitude detail for individual WEGs.

Location details for 25 WEGs of project activity installed in Jodhpur District of Rajasthan state is as follows:-

| S.No. | WEG Loc No. | Village | Latitude (N) | Longitude (E) |
|---|---|---|---|---|
| 1 | 9 | SALODI | 26.42828 | 72.80512 |
| 2 | 48 | Chain singh Nagar/Balrva | 26.45382 | 72.87220 |
| 3 | 49 | Chain singh Nagar/Balrva | 26.45383 | 72.86990 |
| 4 | 50 | Chain singh Nagar/Balrva | 26.45661 | 72.87060 |
| 5 | 51 | Chain singh Nagar/Balrva | 26.45580 | 72.86707 |
| 6 | 53 | Chain singh Nagar/Balrva | 26.45745 | 72.86628 |
| 7 | 82 | Bari | 26.47798 | 72.83214 |
| 8 | 83 | Bari | 26.47596 | 72.82855 |
| 9 | 112 | Malunga | 26.45374 | 72.77689 |
| 10 | 113 | Malunga | 26.45609 | 72.77677 |
| 11 | 114 | Malunga | 26.45756 | 72.77531 |
| 12 | 115 | Malunga | 26.46012 | 72.77523 |
| 13 | 116 | Malunga | 26.45891 | 72.77188 |
| 14 | 129 | Digadi Dhani (Malunga) | 26.49696 | 72.79726 |
| 15 | 130 | Bada Kotacha | 26.50309 | 72.80070 |
| 16 | 131 | Bada Kotacha | 26.50395 | 72.79868 |
| 17 | 133 | Bada Kotacha | 26.50955 | 72.79788 |
| 18 | 134 | Bada Kotacha | 26.51170 | 72.79732 |
| 19 | 136 | Digadi Dhani (Malunga) | 26.50604 | 72.79201 |
| 20 | 137 | Digadi Dhani (Malunga) | 26.50539 | 72.79512 |
| 21 | 501 | Chain singh Nagar/Balrva | 26.45836 | 72.86488 |
| 22 | 504 | Beru | 26.42481 | 72.87424 |
| 23 | 515 | Digadi Dhani (Malunga) | 26.50039 | 72.79619 |
| 24 | 516 | Digadi Dhani (Malunga) | 26.50245 | 72.79325 |
| 25 | 517 | Digadi Dhani (Malunga) | 26.50828 | 72.79092 |