CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

5.00 MW Wind Power Project in Maharashtra
Version : 01
Date : 10/05/2008

A.2 Description of the small-scale project activity:

The proposed project activity is 5.00 MW Wind Power Project which comprise four 1.25 MW Wind Electric Generators (WEGs) in Nandurbar district of Maharashtra State.

The wind power produced; being GHG neutral will not only displaces thermal power but will reduce the associated emissions with thermal power generation in the western regional grid of India. The project activity can generate electricity about 104.76 lacs units annually that can displace approximately 9439 tonnes of CO_2 equivalent. The technology used for the project activity is Suzlon Energy Limited make, 1250 kW S-70 WEGs and is completely automated.

Project was commissioned on 29/03/2007, 31/03/2007 and is in running condition.

The owner of the WEGs is M/s UIC Udyog Ltd. (UICUL) which was formerly known as UIC Wires Limited. UICUL will sale-generated energy to State electricity utility.

Purpose of the project activity:

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for selling it to the state electricity utility and to contribute to climate change mitigation efforts.

Apart from generation of renewable electricity, the project has also been conceived for the following:

- To enhance the propagation of commercialisation of wind turbines in the region.
- To contribute to the sustainable development in the region, socially, environmentally and economically.
- To reduce the prevalent risks for this project through revenues from the CDM.

Contribution of project activity to sustainable development:

Western region's economy is highly dependent on "Coal" as fuel to generate energy and for production processes. The generation from Coal was 20916.50 MWh out of 33332.65 MWh i.e. 62.75% during the year 2004-05[1]. Thermal power plants are the major consumers of coal in Western region and yet the basic electricity needs of a large section of population are not

[1] http://www.wrpc.nic.in/htm/anrpt0405.pdf Table no.1 Page No. 04

being met, as the capacity shortage in the region was of the order of 14.03 % to 23.50% during the year 2004-05.[2]

This results in excessive demands for electricity and places immense stress on the environment. Changing coal consumption pattern will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of Renewable Energy (RE) sources.

Government of India has stipulated following indicators for sustainable development in the interim approval guidelines [3] for CDM projects.

1. Social well-being

- The plant site is an isolated rural area where unemployment, poverty and other economic backwardness are prevailing; the project would lead to the development of the region.
- During the initial stage of project development, a lot of civil works, construction work takes place, which generates employment for local people around the plant site.
- Other than these, there are various kinds of mechanical work, which would generate employment opportunity on regular and permanent basis after the commissioning of the project activity.

2. Economic well-being

- The project activity generates various employment opportunity which leads to increase in their daily wages in the local area.
- The project activity leads to investment to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which 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.
- Use of wind energy for electricity generation instead using fossil fuels like coal reduces stress on the economy of the country.
- Due the project activity land prices in the neighboring area have gone up substantially thereby benefiting the villagers.

3. Environmental well-being

- The project utilizes wind energy for generating electricity which otherwise would have been generated through fossil fuels based power plants, contributing to reduction in associated emissions (GHG).
- As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation (Coal, fossil fuel).

[2] http://www.wrpc.nic.in/htm/anrpt0405.pdf Page No. 03

[3] Ministry of Environment and Forests web site: http://envfor.nic.in:80/divisions/ccd/cdm_iac.html

- Thus the project causes no negative impact on the surrounding environment contributing to environmental well being.

4. Technological well-being

- The project activity leads to the promotion of 1250 kW of S-70 (66) WEGs into the region, demonstrating the success of this type of wind turbines, which feed the generated power into the 132kV / 33kV Nandurbar sub-station of Nandurbar, thus strengthening the grid supply and improving quality of power under the service area of the substation.
- The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units. Hence the project leads to technological well being.

In view of the above, the project participants consider that the project activity profoundly contributes to the sustainable development.

A.3 Project participants:

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)
India, Ministry of Environment & Forest (MoEF, India)	• M/s UIC Udyog Ltd.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

Refer contact information in Annex-1 to this PDD.

A.4 Technical description of the small-scale project activity:

The project activity consists of four 1250 kWh WEGs manufactured, supplied & maintained by M/s Suzlon Energy Limited (SEL) & installed in Nandurbar district. In this project activity kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. The technology is a clean technology since there are no GHGs emissions associated with the electricity generation.

Generated electricity is transmitted through a transmission lines to the nearest substation. The turbines used are certified and manufactured according to International Standards. The technological key features of the S-70 (66) are as follows:

Salient Features of 1.25 MW (S 70) WEG

Sr. No.	Particulars	Specifications
1.	Rotor diameter	69.1 m
2.	Hub height	75 m
Sr. No.	**Particulars**	**Specifications**

3.	Installed electrical output	1250 kW
4.	Cut-in wind speed	3 m/s
5.	Rated wind speed	12 m/s
6.	Cut-out wind speed	20 m/s
7.	Rotor swept area	3750 m^2
8.	Rotational speed	13.2/19.8
9.	Rotor material	GRP
10.	Regulation	Pitch
11.	Generator	Asynchronous Generator, 4/6 poles
12.	Rated output	250/1250 kW
13.	Rotational speed	1010/1515 rpm
14.	Operating voltage	690 V
15.	Frequency	50 Hz
16.	Protection	IP 56
17.	Insulation class	H
18.	Cooling system	Air cooled
19.	Gear box	3-stage gearbox, 1 planetary & 2 helical.
20.	Manufacturer	Winergy
21.	Gear ratio	77.848
22.	Nominal load	1390 kW
23.	Type of cooling	Oil cooling system
24.	Yaw drive system	4 active electrical yaw motors
25.	Yaw bearing	Polyamide slide bearing
26.	Safety system	
26.1	Aerodynamic brake	3 times independent pitch regulation
26.2	Mechanical brake	Spring power disc brake, hydraulically released, fail safe. Microprocessor controlled, indicating.
27.	Control unit	Microprocessor controlled, indicating actual operating conditions, UPS back-up system
28.	Tower	Tubular
29.	Design standards	GL/IEC

A.4.1 Location of the small-scale project activity:

A.4.1.1 Host Party(ies):

India.

A.4.1.2 Region/State/Province etc.:

Western Region / Maharashtra.

A.4.1.3 City/Town/Community etc:

Nandurbar / Nandurbar / Akrale

A.4.1.4 Details of physical location, including information allowing the unique identification of this small-scale project activity :

The project site Nandurbar can be reach by road, Mumbai - Nagpur highway (NH -06) about 350 kms from Mumbai. Project site is connected to this highway by Sakri-Nandurbar road. The nearest railway station is Nandurbar junction. Nearest airport is Mumbai.

Figure 01, Location Map

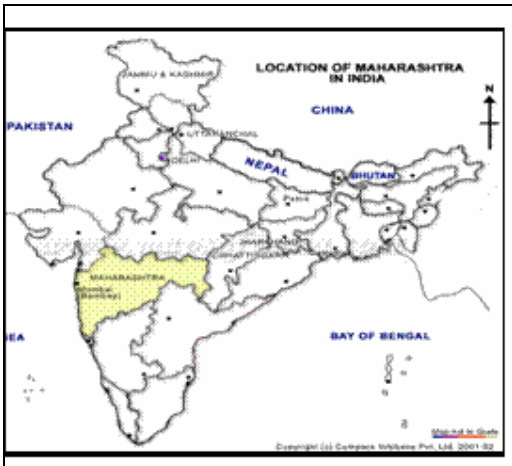
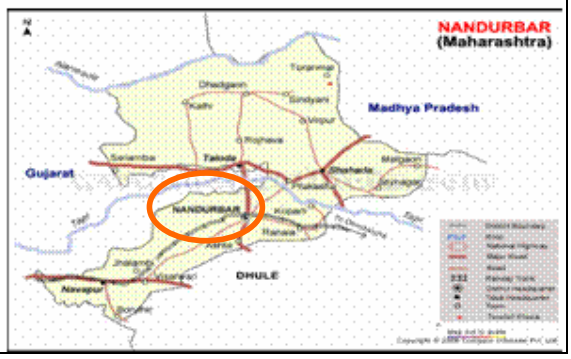


Figure 1, Geographical Map & Site Details

Site	Akrale (4 nos. x 1.25 MW)
Taluk	Nandurbar
District	Nandurbar
Latitude	20.03N
Longitude	73.71E
Unique location	R.S. No. – 30, 136, 79 & 43.



A.4.2 Type and category(ies) and technology/measure of the small-scale project activity:

As per Clause 1 of Type I.D of Appendix B of simplified modalities and procedures for small scale CDM project activities (Version 13, 14th December 2007), the project activity is a small-scale activity which does not crosses the ceiling capacity of 15 MW; as the aggregate capacity is 5.00 MW, and hence can be defined as -

Project Type : **I –** Renewable Energy Projects

Project Category : **I.D. –** Grid connected renewable electricity generation (Version 13, 14th December 2007)

Technology

This project (1.25 MW X 4 nos. WTGs) is a clean renewable energy project that uses wind energy for generation of electricity with available proper conversion technology. This meets the basic requirement of type I.D of Appendix B of the simplified modalities and procedures for small-scale CDM project activities.
The project technology manufactured, operated & maintained indigenously and doesn't involve any technology transfer from foreign countries.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Years	Estimation of annual emission reductions in tonnes of CO_2 e
2008 – 09[4]	9439
2009 – 10	9439
2010 – 11	9439
2011 – 12	9439
2012 – 13	9439
2013 – 14	9439
2014 – 15	9439
2015 – 16	9439
2016 – 17	9439
2017 - 18	9439
Total estimated reductions (tonnes of CO_2 e)	**94390**
Total number of crediting years	10
Annual average of the estimated reductions over the crediting period (tCO_2 e)	9439

A.4.4 Public funding of the small-scale project activity:

The project has not received any public funding from Annex I countries and Official Development Assistance (ODA). The project is a unilateral project.

A.4.5 Confirmation that the small-scale project activity is not a de-bundled component of a large scale project activity:

According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities (UNFCCC/CP/2002/7/Add.3), a small-scale project is considered a de-bundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants
- In the same project category and technology
- Registered within the previous two years; and

[4] Project activity is expected to get registration with CDM EB by September 2008. Hence start date has been taken from September 2008. Start date will be actual date of registration.

- Whose project boundary is within 1 km of the project boundary of the proposed small scale activity

None of the above applies to the above project and project participant has not registered or applied for registration of another wind power project. Therefore, the proposed project is not a de-bundled component of a larger CDM 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 small-scale project activity:

Title: Grid connected renewable electricity generation

Reference: The project activity meets the eligibility criteria to use the simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities".

Methodology	:	AMS I. D (Version 13, 14th December 2007)
Type I	:	Renewable Energy Project (Small Scale)
Category	:	"D", Grid connected Renewable Electricity Generation

Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

B.2 Justification of the choice of the project category:

Renewable technologies that supply electricity to the grid are covered in category I.D. The category comprises renewable technologies such as small hydro, wind, geothermal and renewable biomass that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generation unit.

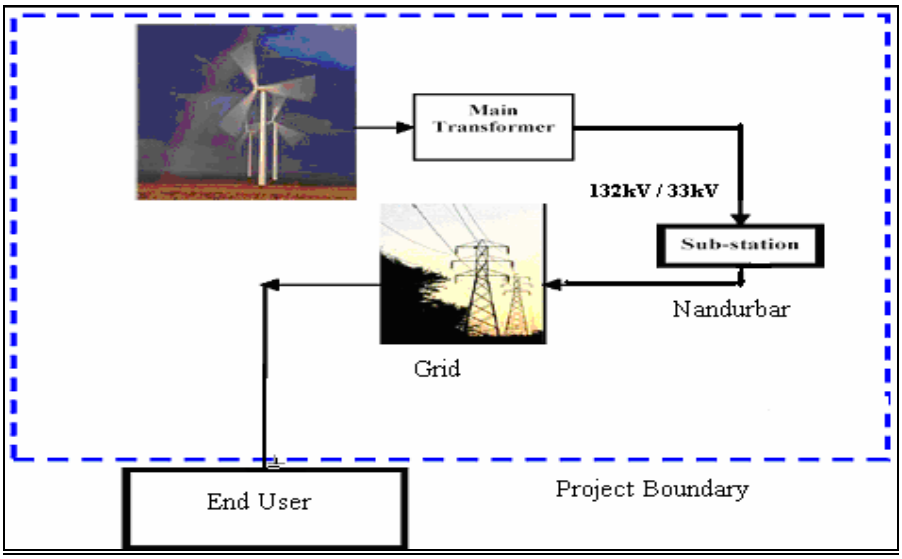
The project activity is 5.00 MW wind power project & remains same throughout the crediting period, which is less than the specified limit of 15 MW for small scale project activities. The project activity feeds the generated power into the 132kV / 33kV Nandurbar sub-station. Hence, the project activity qualifies the small-scale methodology applicability criteria, which is as follows:

Methodology	**:**	AMS I. D (Version 13, 14th December 2007)
Type I	**:**	Renewable Energy Project (Small Scale)
Category	**:**	"D", Grid connected Renewable Electricity Generation

B.3 Description of the project boundary:

Project boundary specified in the Appendix B of simplified modalities and procedures is that encompasses the physical and geographical site of the renewable generation source. This includes the wind turbine installation, pooling and MSEDCL's Nandurbar sub-stations. The proposed project activity evacuates the power to the Western Region Grid. Therefore, all the power plants contributing electricity to the Western Grid are taken in the connected (project) electricity system for the purpose of baseline estimation.

Figure 02, Project Boundary



B.4 Description of baseline and its development:

The wind power project produces electricity, which is otherwise being produce by using fossil fuel. This leads to the GHG emissions. The wind power produced being GHG neutral will not only displaces thermal power but will reduce the associated emissions with thermal power generation in the western regional grid of India.

As per the latest guidelines in I.D Version 13, 14th December 2007 to estimate the baseline emissions, the emission factor is calculated as per the procedures laid in paragraph 9 (a).

Variable	**Data Source**
EG_y = Electricity generated	Records maintained by project proponent
Parameter	**Data Source**
$EF_{grid, OM, y}$ = Build Margin Emission Factor (tCO_2/MWh)	CEA Data, version 3 dated 15/12/2007
$EF_{grid, BM, y}$ = Operating Margin Emission Factor (tCO_2/MWh)	CEA Data, version 3 dated 15/12/2007
$EF_{grid, CM, y}$ = Grid Emission Factor	Calculated as the weighted average of the Operating margin and build margin

The baseline emissions factor is calculated as follows:

$BE_y = (EG_y – EG_{baseline}) EF_y$

Since the following project does not involve any modification or retrofit of the existing generation facility hence $EG_{baseline} = 0$

$EF_{y =} EF_{grid, CM, y}$

Hence the baseline emission factor ($EF_{grid, CM, y}$) is determined as follows:

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

As per the 'Tool to calculate the emission factor for an electricity system' for wind and solar projects, the default weights are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature)

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 small-scale CDM project activity:

The installed capacity of the project is 5 MW, which is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. Further, the project activity is generation of electricity for a grid system using wind energy. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.

✓ **Justification for additionality of the project**

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way. Project participants identified following barriers for the proposed project activity.

✓ **Investment Barrier**

Since the CDM Project activity generates financial benefits other than CDM related income the sub-step 2b-Option I is not followed. The Benchmark is calculated with reference of CDM – Executive Board, "Tool for demonstration and assessment of additionality" Version 05 Step 2 (b), Sub step 2b – Option III 6 (d)

Equity IRR is identified as the appropriate financial indicator. As per Maharashtra Electricity Regulatory commission (MERC) report dt. 24.11.2003 a private sector investor participating in electricity generation is expected to earn a minimum return of **16% p.a.**[5] on the equity contribution. We have considered the same rate as the rate required by the equity investors. Please refer annex-5 for further assumptions were made for the investment analysis.

[5] http://www.mercindia.org.in/ORDERS2003.htm Tariff Order dated 24.11.2003 Pageno46

All the reasonable costs and benefits accruing to the project have been considered in the calculation of the project return. Refer annex-5 for financial calculation assumptions.

The project set up by the proponent generate Equity IRR of **12.49**% only which is substantially below the benchmark of **16 %**. Hence the project activity cannot be considered as financially attractive.

Sensitivity analysis

Variations in units sold to MSEDCL, for whatever reason is the most significant risk factor for the project. Hence sensitivity is considered for this variable.

Saleable unit increase (+) or Decrease (-) by..	- 10%	- 5%	Normal	+ 5%	+ 10%
Equity IRR without CDM	9.45%	10.97%	12.49%	14.01%	15.54%
Equity IRR with CDM	11.95%	13.59%	15.22%	16.86%	18.52%

From above table it is clear that with CDM benefits the Equity IRR moves up to 15.22% whereas without CDM benefits it is only 12.49%.

After the sensitivity analysis it is clearly seen that the project activity needs the CDM benefit [ie. revenue from the sale of certified emission reductions (CERs)] to make it economically or financially feasible.

So as per Step 2c para 10 (b), if the CDM project activity has a less favorable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive. The revenue from the CERs will greatly improve the financial feasibility of the Project. The increase in the IRR will provide an incentive to overcome existing barriers.

✓ **Barriers due to prevailing practices:**

- In the Western region the generation from Hydro, Coal, Nuclear, Gas, Wind + RES and Diesel has been 5844.63MWh, 20916.50 MWh, 760.00 MWh, 5057.31 MWh, 736.73 MWh and17.48 MWh respectively during the year 2004-05[1]. The respective percentage of this generation with respect to gross generation from above sources has been 17.53%, 62.75%, 2.28%, 15.17%, 2.21% and 0.05%.

- The technical wind power potential of the of Maharashtra state is approximately 3060 MW[6].While during 2004-05 about 675.4 MW (31.4%) in Tamilnadu, 201.5 MW (15.3%) in Karnataka while only 48.8 MW (1.5%) in Maharashtra state was installed as compare to their respective technical potential. This clearly shows that peoples in the Maharashtra state are not familiar/popular technology, due to which though having huge technical potential they are not able to harness it.

[6] http://mnes.nic.in/booklets/Book6-e.pdf Page no. 10 of pdf

Region	State	Installation in %	Technical Potential[6] (MW)	Installed Capacity[7] (MW)
Western	Gujarat	2.7	1900	51.5
	Maharashtra	1.5	3060	48.8
	Madhya Pradesh	0.6	1050	6.3
Total		4.9		106.6
Southern	Tamilnadu	31.4	2150	675.4
	Karnataka	15.3	1310	201.5
	Andhra Pradesh	1.0	2110	21.8
Total		47.8		898.7
Northern	Rajasthan	10.1	1050	106.3

- During the year 2004-05 total wind power installed capacity in India is about 1111.6 MW out of that southern region comprises about 80.8 % while western region comprises only 9.5 %. (Above data of the table (Installed capacity) *Source: wind power India website*[7])

Region	State	Installation in %	Installed Capacity (MW)
Western	Gujarat	4.6	51.5
	Maharashtra	4.3	48.8
	Madhya Pradesh	0.5	6.3
Total		**9.5**	**106.6**
Southern	Tamilnadu	60.7	675.4
	Karnataka	18.1	201.5
	Andhra Pradesh	1.9	21.8
Total		**80.8**	**898.7**
Northern	Rajasthan	**9.5**	**106.3**

The above-mentioned data demonstrate the fact that the project participant has invested in an unconventional and unpopular source of energy where the performance uncertainty is much higher.

✓ **Other Barrier:**

- **Regulatory Risks:**

The project participant has entered into an agreement with Maharashtra State Electricity Distribution Company Ltd. (MSEDCL) (a sub-division of Maharashtra State Electricity Board) for the sale of electricity to them. This Agreement (Article 18 Section 18.02 CDM Benefit) stipulates "MERC shall be approached to review the tariff structure (contained in the Agreement) once the project becomes eligible for CDM benefit or similar credits and any mechanism for sharing of CDM or similar credit between the seller (in this case UICUL) and MSEDCL. The decision of the MERC will be binding on both parties." Hence, though an

[7] http://www.windpowerindia.com/statyear.html during 2004 to 2005

Agreement has been signed, the rate at which electricity is sold to MSEDCL may change if UICUL obtain any benefit under CDM or they may have to share the benefit with MSEDCL. The extent of sharing of the CDM benefit has not been specified by MERC. Hence, this is a big risk undertaken by the project participant as revenue, either from the sale of electricity or from the CDM benefit may be affected depending upon the decision of MERC.

To mitigate the risks mentioned in the above paragraphs and encourage the setting up of a wind power project in Maharashtra, CDM support to the project promoter is required.

B.6 Emission reductions:

B.6.1 Explanation of methodological choices:

Baseline methodology for projects under Type I.D has been detailed in paragraphs 7-11 (Type I.D) of the above-mentioned document. Paragraph 9 (Type I.D) applies to this project activity, which states that:

For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

In the proposed project, the baseline selected as per option (a). Western Region grid is used as the reference region for estimating the Combine Margin. Using the methodology available for small-scale project activities, the Combine Margin emissions (in tCO_2 e/GWh) of regional grid of India is used for calculation of baseline. Actual CO_2 emission factor are used for the purpose.

The baseline emission (BE_y in tCO_2) is the product of the baseline emission factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities (*EG baseline* in MWh), as follows:

$$\mathbf{BE_y = (EG_y - EG_{baseline})\ EF_y}$$

Since the following project does not involve any modification or retrofit of the existing generation facility hence $EG_{baseline} = 0$

$$\mathbf{EF_{y} = EF_{grid,\ CM,\ y}}$$

Hence, the baseline emission factor$EF_{grid,\ CM,\ y}$ is determined as follows:

The weighted average of the Operating Margin emission factor ($EF_{grid,\ OM,\ y}$) and the Build Margin emission factor ($EF_{grid,\ BM,\ y}$) :

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

For wind and solar projects, the default weights are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature).

$$EF_{grid, CM, y} = EF_{grid, OM, y} \times 0.75 + EF_{grid, BM, y} \times 0.25$$

Where,

BE_y = Baseline emissions in t CO_2
$EF_{grid, OM, y}$ = Operating Margin Emission Factor
$EF_{grid, BM, y}$ = Build Margin Emission Factor

Step 1. Identify the relevant electric power system

The project qualifies the project electricity system criteria as per the 'Tool to calculate the emission factor for an electricity system' as it is physically connected through transmission & distribution lines of the western regional grid of Indian power sector[8].

In the Western Regional Grid, electricity generation installed capacity scenario is that Coal (20916.50 MW out of 33332.65 MW i.e. 62.75%) presides over other sources [9]. While wind and other renewable energy sources constitute only 736.73 MW out of 33332.65 MW i.e 2.21% in the total installed capacity.

Step 2. Select an operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid, OM, y}$) is based on one of the following methods:

(a) Simple operating margin;
(b) Simple adjusted operating margin;
(c) Dispatch data analysis operating margin;
(d) Average operating margin.

Since the "Tool to calculate the emission factor for an electricity system", version 01, gives the freedom to choose any of the four options of calculating the OM, Simple OM has been chosen to be the most appropriate method of calculating the emission reductions in the project. Since the low cost/ must run resources constitute less than 50% of the total grid generation in the average of the five most recent years. (refer table below)

Table B.5: Share of Must-Run (% of Net Generation)[10]

[8] http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver3.pdf, Page 11
[9] http://www.wrpc.nic.in/htm/anrpt0405.pdf Page No. 24
[10] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Baseline Carbon Dioxide Emission Database Version 03.

Regional Grid	2000-01	2001-02	2002-03	2003-04	2004-05	Average of last 5 years.
North	25.9%	25.7%	26.1%	28.1%	26.8%	26.5%
East	10.8%	13.4%	7.5%	10.3%	10.5%	10.5%
South	28.1%	25.5%	18.3%	16.2%	21.6%	21.9%
West	**8.2%**	**8.5%**	**8.2%**	**9.1%**	**8.8%**	**8.6%**
North-East	42.2%	41.7%	45.8%	41.9%	55.5%	45.4%
India	19.2%	18.9%	16.3%	17.1%	18.0%	17.9%

The above table 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 western regional grid is only 8.6% which is much lesser than 50% of the total generation. Thus, Simple OM method can be used for calculating the emission factor.

Step 3. Calculate the operating margin emission factor according to the selected method ($EF_{grid, OM, y}$)

Simple OM

The calculation for Simple OM has been taken from the latest version of Baseline Carbon Dioxide Emission Database Version 03 published by the Central Electricity Authority (CEA), Government of India, where the emission factors have been calculated based on the new tool "Tool to calculate the emission factors for an electricity system" published by CDM Executive Board as per the methodology ACM0002.

As per the, Tool to calculate the emission factor for an electricity system" Version 01 Simple OM should be calculated using any one of the two following data vintages for years(s), *y*:

- Ex ante option: 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, or

- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y,

Out of the above two options, the Ex-ante vintage is opted and the Simple OM selected will remain same throughout the entire crediting period of the project activity.

In this project, the operating margin emission factor has been calculated (E*x-ante*) using the full generation-weighted average for the most recent 3 years i.e. 2004-05, 2005-06, 2006-07 for which data are available at the time of PDD submission. The data has been taken from the CEA, Baseline Carbon Dioxide Emission Database version 03 for the Indian Power Sector. Refer Annex 5.

The $EF_{grid, OM, y}$ for Western region is estimated	tCO_2/MWh
For the year 2004-2005	1.0129
For the year 2005-2006	1.0039

For the year 2006-2007	0.9936
Average $EF_{grid, OM, y}$	**1.0035**

Step 4. Identify the cohort of power units to be included in the build margin

The value of the data has been taken from the data published by CEA as referred in earlier step. The CEA Baseline Carbon Dioxide Emission Database Version 03 has been calculated based on the new tool "Tool to calculate the emission factors for an electricity system" published by CDM Executive Board as per the methodology ACM0002. The details of the key assumptions considered to calculate the figure can be found in the Baseline Carbon Dioxide Emission Database Version 03 [10] of the same.

Two following options for years(s) *y* are present, in terms of vintage of data:

Option 1.

For the first crediting period, calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2.

For the first crediting period, the build margin emission factor shall be updated annually, *ex-post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which Out of the above two, Option 1 is selected. The Build margin emission factor has been calculated *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission.

The sample group *m* consists of the power plant capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently as this sample group comprises larger annual generation than the generation of the sample group *m* consisting of the five power plants that have been built most recently. Information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. The BM is calculated using latest year data calculated by Central Electricity Authority (CEA) in their Baseline Carbon Dioxide Emission Database Version 03[10].

Step 5. Calculate the build margin emission factor ($EF_{grid, BM, y}$)

As per the CEA Baseline Carbon Dioxide Emission Database Version 03[10], the BM for the 2006-07 has been calculated to be:
$EF_{grid, BM, y}$ = 0.5938 tCO_2e/MWh

Step 6. Calculate the combined margin (CM) emissions factor ($EF_{grid, CM, y}$)

$EF_{grid, CM, y}$ is determined as follows:

The weighted average of the Operating Margin emission factor ($EF_{grid, OM, y}$) and the Build Margin emission factor ($EF_{grid, BM, y}$) :

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

For wind and solar projects, the default weights are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature).

$$\mathbf{EF_{grid, CM, y} = EF_{grid, OM, y} \text{ x } 0.75 + EF_{grid, BM, y} \text{ x } 0.25}$$

$$= 1.0035 \times 0.75 + 0.5938 \times 0.25$$
$$= 0.9011 \text{ t } CO_2/MWh$$

Thus, the CM emissions factor ($EF_{grid, CM, y}$) for the project has been calculated to be:
$EF_{grid, CM, y}$ = 0.9011 tCO_2/MWh

Baseline Emission factor: 0.9011 t CO_2/MWh

The project proponent wishes to use the BEF calculated Ex-ante, and has fixed the same for the entire crediting period.

Leakage

According to Methodology AMS I.D, if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered.

As the project activity does not involve any such type of transfer of equipment. Hence no leakage is to be considered.

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

Data / Parameter:	**$EF_{grid, CM, y}$**
Data unit:	t CO_2 / MWh
Description:	Carbon Emission Factor of the Western regional grid
Source of data used:	Baseline Carbon Dioxide Emission Database Version 03 for the Indian Power Sector, by CEA [10]
Value applied:	0.9011
Justification of the choice of data or description of measurement methods and procedures actually applied :	The values for OM and BM have been calculated by Ministry of Power, Central Electricity Authority hence are authentic and reliable. **$EF_{grid, CM, y}$** is calculated as suggested in baseline methodology **"Tool to calculate the emission factor for an electricity system"** version 01
Any comment:	The values are calculated by using latest database from CEA. Data will be archived during the whole crediting period + 2 years or of the last issuance of CERs for this project activity, whichever occurs later

Data / Parameter:	$EF_{grid, OM, y}$
Data unit:	t CO_2/MWh
Description:	CO_2 value of Operating Margin (including import) is considered as average of last three years for the Western Grid
Source of data used:	Baseline Carbon Dioxide Emission Database Version 03 for the Indian Power Sector, by CEA [10]
Value applied:	1.0035
Justification of the choice of data or description of measurement methods and procedures actually applied :	The values have been calculated by Ministry of Power, Central Electricity Authority hence is authentic and reliable.
Any comment:	The values are calculated by using latest database from CEA. Data will be archived during the whole crediting period + 2 years or of the last issuance of CERs for this project activity, whichever occurs later

Data / Parameter:	$EF_{grid, BM, y}$
Data unit:	t CO_2/MWh
Description:	CO_2 value of Build Margin Emission Factor of the recent available year ie 2006-07 for the Western Grid is considered.
Source of data used:	Baseline Carbon Dioxide Emission Database Version 03 for the Indian Power Sector, by CEA [10]
Value applied:	0.5938
Justification of the choice of data or description of measurement methods and procedures actually applied :	The values have been calculated by Ministry of Power, Central Electricity Authority hence is authentic and reliable.
Any comment:	The values are calculated by using latest database from CEA. Data will be archived during the whole crediting period + 2 years or of the last issuance of CERs for this project activity, whichever occurs later

B.6.3 Ex-ante calculation of emission reductions:

Electricity generation (as per Purchase Order): 10800 MWh/yr

Baseline Emission = Units of electricity generated X Carbon Emission Factor

$$\mathbf{BE_y = (EG_y - EG_{baseline}) EF_y}$$

Since the following project does not involve any modification or retrofit of the existing generation facility hence $EG_{baseline} = 0$

As per paragraph 9 (a) of I.D., $EF_y = EF_{grid, CM, y}$

Units of electricity generated = Gross generation - transmission loss of 3 % of Gross generation

= 10800 MWh – 324 MWh

Unit Generated (EG_y) = 10476 MWh

$BE_y = EG_y * EF_{grid, CM, y}$

$= 10476 \text{ MWh / yr} \times 0.9011 \text{ t } CO_2 \text{ / MWh}$
$= 9439.92 \text{ t } CO_2 \text{ / yr}$
$= 9439 \text{ t } CO_2 \text{ / yr}$

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

Year	Estimation of project activity emissions ($tCO_2 e$)	Estimation of baseline emissions ($tCO_2 e$)	Estimation of leakage ($tCO_2 e$)	Estimation of overall emission reductions ($tCO_2 e$)
2008 – 09	0	9439	0	9439
2009 – 10	0	9439	0	9439
2010 – 11	0	9439	0	9439
2011 – 12	0	9439	0	9439
2012 – 13	0	9439	0	9439
2013 – 14	0	9439	0	9439
2014 – 15	0	9439	0	9439
2015 – 16	0	9439	0	9439
2016 – 17	0	9439	0	9439
2017 - 18	0	9439	0	9439
Total (tonnes of $CO_2 e$)	**0**	**94390**	**0**	**94390**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Electricity supplied to the grid by the project. Net electricity export by the project annually to grid obtained from joint meter reading by Regional Electricity Utility and project promoter on monthly basis. Note: Net electricity export to grid = Electricity export to grid – Electricity import from grid
Source of data to be used:	Measured
Value of data	10476
Description of measurement methods and procedures to be applied:	Monitoring: trivector meter will be used for monitoring Data Type: measured Frequency: hourly measured Recording: Monthly from joint meter Archiving Policy: Paper & Electronic Responsibility: Project Site Incharge would be responsible for regular calibration of the meter. Calibration Frequency: Once a year.

QA/QC procedures to be applied:	The project revenue is based on the net units exported as measured by main metering system installed at the interconnection point (substation point). The meters used are calibrated periodically by state electricity utility. The net electricity exported to the grid can be cross-verified with the joint meter readings. Also can be double checked with electricity sales receipt (Invoice)
Any comment:	Data will be archived during the whole crediting period + 2 years or of the last issuance of CERs for this project activity, whichever occurs later

B.7.2 Description of the monitoring plan:

The project participant sighed an operation and maintenance agreement with the supplier of the wind turbines i.e. Suzlon Energy Limited. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is the responsibility of Suzlon Energy Limited and are organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor.

Routine Maintenance Services:

Routine Maintenance Labour Work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, curative maintenance, cleaning and upkeep of the equipment including –

a. Tower Torquing
b. Blade Cleaning
c. Nacelle Torquing and Cleaning
d. Transformer Oil Filtration
e. Control Panel & LT Panel Maintenance
f. Site and Transformer Yard Maintenance

Security Services: This service includes watch and ward and security of the wind farm and the equipment.

Management Services:

a. Data logging in for power generation, grid availability, machine availability.
b. Preparation and submission of monthly performance report in agreed format.
c. Taking monthly meter reading jointly with utility of power generated at Wind Farm and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Technical Services:

a. Visual inspection of the WEGs and all parts thereof.
b. Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

The project activity essentially involves generation of electricity from wind, the employed WEG can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. As the operation of WEGs is emission free and no emissions are produced during the lifetime of the WEG.

Although it is being anticipated that there would be no unintended emissions/leakages from this project, however, if any such condition arises, and leakage effect is found due to the project, such leakage will be accounted accordingly as mentioned in the chosen applied baseline methodology.

- The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility (MSEDCL).
- The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue. For detail electricity measurement procedure please refer annex 4
- Metering equipment - Metering is carried out through electronic trivector meters of accuracy class 0.2% required for the project. The main meter shall be installed and owned by MSEDCL, whereas the project participant owns the check meters. The metering equipments are maintained in accordance with electricity standards.
- Meter readings - The monthly meter readings (both main and check meters) at the project site and the receiving station shall be taken simultaneously and jointly by the parties on a particular day of the following month. At the conclusion of each meter reading an appointed representative of the MSEDCL and project participant signs a document indicating the number of kWh exported to the grid.
- The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (SCADA). The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

  All the relevant data & reports for maintaining accuracy in future monitoring and reporting of GHGs emission reductions is with the UICUL. Along with the aforesaid, supervision & co-ordination with officials & technical staff of Suzlon Energy Limited in this regards is to be done by UICUL officials.

B.8	Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date of completion of the application of the baseline and monitoring methodology: 08/02/2008.

Name of person/entity determining the baseline:

M/s. UIC Udyog Ltd.
"Anandlok" , First floor, Block – A,
A. J. C Bose Road,
Kolkata - 700020
West Bengal, India

M/s. UIC Udyog Ltd (listed in Annex 1 of this document) is the project participant

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:

13/07/2006 (Based on purchase order issued to Suzlon Energy Limited)

C.1.2 Expected operational lifetime of the project activity:

20 years and 00 months

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

C.2.1 Renewable crediting period

Not opted.

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:

Opted

C.2.2.1 Starting date:

01/09/2008 or the date of registration of project activity whichever is later.

C.2.2.2 Length:

10 years 00 month

SECTION D. Environmental impacts

D.1 If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

Electricity generation by wind energy is clean source of energy, as it doesn't leads to any air or water pollution through electricity generation.

As per the Schedule 1 of Ministry of Environment and Forest, Government of India notification dated January 27, 1994, there are 30 activities which require undertaking environmental impact assessment studies, for details refer[11].

The proposed project does not fall under the list of activities requiring EIA as it will not involved in any negative environmental impacts. Thus no EIA study was conducted.

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:

Not Applicable.

SECTION E. Stakeholders' comments

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

Project participant identified local communities, farmers, and villagers, as the stakeholders. Accordingly, project participant issued letters to the respective stakeholders requesting them to attend meeting or depute representatives at Akrale village on 19/06/2007.

The agenda of the meeting was fixed as follows:

- Welcome
- Purpose of the meeting
- Background and benefits of the project
- Queries and responses from the participant and the stakeholders.
- Vote of thanks

During description project participant explained in details the project, it's capacity, geographical advantages of the site, effects of load of shedding on entire socio-economic

[11] http://envfor.nic.in/divisions/iass/eia/Annex1.htm

progress, need to switch over for eco-friendly & pollution free energy (renewable) sources, wind power in India, O & M arrangement.

E.2	Summary of the comments received:

Stakeholders had no objections from installations of WEGs instead they have openly said that wind power project helped them by-

- Additional revenue generated through land / lease to outsiders like contractors & their employees.
- Job opportunities for day -to - day maintenance and security of WEGs
- Developments of roads.
- Raining is as usual and hence, no any adverse impact on rains, agriculture.
- Villagers states that the medical facility in their village (clinic & ambulance) is provided to them otherwise they use to take from the taluka place which is time consuming & expensive.

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

As per stakeholder's opinion, the project activity is contributing positively to local economy & development by promoting renewable technology.
The stakeholders have given positive feedback, as there is no negative comment thus no measures are required to be taken.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	UIC Udyog Ltd.
Street/P.O.Box:	A. J. C Bose Road,
Building:	"Anandlok" , First floor, Block – A,
City:	Kolkata
State/Region:	West Bengal
Postfix/ZIP:	700020
Country:	INDIA
Telephone:	+ 91-33-22808811, 22808812, 22808813
FAX:	+ 91-33-022809492
E-Mail:	rcbajaj@uicwires.com
URL:	www.uicwires.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Bajaj
Middle Name:	C.
First Name:	R.
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Direct tel:	+ 91-33-22808811, 22808812, 22808813
Personal E-Mail:	rcbajaj@uicwires.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

- The project has not received any public funding and Official Development Assistance (ODA).
- The project is a unilateral project.

Annex 3

BASELINE INFORMATION

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE [10]
VERSION : 3.0
DATE : 15 December 2007
BASELINE METHODOLOGY: ACM0002 / Ver 07

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.72	0.73	0.74	0.71	0.72	0.73	**0.7373**
East	1.06	1.03	1.09	1.08	1.05	1.05	**0.9957**
South	0.74	0.75	0.82	0.84	0.79	0.74	**0.7219**
West	0.90	0.92	0.90	0.90	0.92	0.89	**0.8629**
North-East	0.42	0.41	0.40	0.43	0.52	0.33	**0.3974**
India	0.82	0.83	0.85	0.85	0.84	0.81	**0.8001**

Simple Operating Margin (tCO2/MWh) (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	0.98	0.98	1.00	0.99	**0.9801**	**0.9992**	**0.9985**
East	1.22	1.19	1.17	1.20	**1.1745**	**1.1291**	**1.0909**
South	1.02	1.00	1.01	1.00	**1.0009**	**1.0079**	**1.0030**
West	0.98	1.01	0.99	0.99	**1.0129**	**1.0039**	**0.9936**
North-East	0.74	0.71	0.74	0.74	**0.9019**	**0.6994**	**0.7031**
India	1.01	1.02	1.02	1.02	1.02	1.02	1.01

Build Margin (tCO2/MWh) (not adjusted for imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North					0.53	0.60	**0.6283**
East					0.90	0.97	**0.9281**
South					0.70	0.71	**0.7055**
West					0.77	0.63	**0.5938**
North-East					0.15	0.15	**0.2265**
India					0.69	0.68	0.68

Annex 4

MONITORING INFORMATION

The points given below detail the monitoring plan:

- The electronic meter that is used for monitoring is the Export-Import Energy Meter and is, installed before the grid.
- It is a three phase, four wire, 50 Hz, 110 Volts, 6 Amp, Time of Day (ToD), 0.2 class Export-Import tri- vector Energy meter.
- The calibration frequency of the energy meter is once in a 12 month, by the MSEDCL. However, if during any monthly meter reading, the variation between the main meter & check meter is more than 0.5%, both meters are retested & calibrated immediately by MSEDCL, at seller's cost.
- The import and export of electricity is continuously monitored by the export/ import meter and the data is recorded on a monthly basis jointly by the participant and the electricity utility
- This meter is located at the delivery point of wind power in MSEDCL grid. This accounts for the import of electricity that is used by the project participant. Hence the net electricity generated is calculated from the joint meter reading and recorded /archived in paper/electronic.

The complete monitoring responsibility is carried out as follows:

- Monitoring is joint responsibility of both owner as well as MSEDCL hence, daily monitoring is in the scope of owner
- Monthly monitoring is a joint responsibility of MSEDCL & owner of WTGs.
- Though the ownership of the meter is with owner, but it is in possession of utilities sealed meter box under lock & key as per statutory requirements. Owner can only see readings through glass window of sealed meter box.

Annex 5

FINANCIAL ANALYSIS – ASSUMPTIONS

Assumptions	**Units**	**UICUL**
Capacity	KW	1250
No. of WTGs	No.	04
Total Capacity of the project	KW	5000
Annual Generation from the project for 1st year as per Purchase Order	Lac KWh	108.00
Reduced to Machine Availability 3%	Lac KWh	104.76
Reduced to Grid Availability 3%	Lac KWh	101.61
Internal Losses	%	2
Net annual Generation for 1st year	Lac KWh	97.57
Plant load factor for 1st year	%	22.26
Annual Generation from the project for 2nd year & onwards as per MERC Order @ 20% CUF	Lac KWh	87.60
Internal Losses	%	2
Net annual Generation for 2nd year & onwards	Lac KWh	85.80
Selling rate considered	Rs./KWh	3.50
Escalation in the selling rate upto 13th year	Rs./KWh	0.15
CO_2 emission reductions per annum	tCO_2 e	7464
Rate per tonne of CO_2	Euro	10
Exchange Rate per Euro	Rs.	57
Total CER sale Value per annum	Rs. Lacs	42.5
Insurance p.a. for all WTGs	Rs. Lacs	3.6
O & M Charges-Inclu. of adm.expenses, spares, consumables & Insurance	Rs. Lacs	47.16
O & M Charges-applicable from year	Year	2nd
Escalation in the O & M expenses	%	5.00
Deration in Energy after 10 Years	%	5.00
Bank Loan Interest Rate	%	12.00
Contribution towards common power evacuation infrastructure facility@25 lacs / MW	Rs. Lacs	125.00
Term for loan	Yrs.	7
Moritorium	Year	1
Total Cost of Machine	Rs. Million	259.25
Debt	Rs. Million	77.77
Equity	Rs. Million	181.47