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

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SECTION A. General description of project activity

A.1. Title of the project activity:

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Title: 22.5 MW Wind Power Project by Ruchi Soya Industries Limited at Palsodi, District-Ratlam, Madhya Pradesh
Version: 03
Date: 13/08/2012

A.2. Description of the project activity:

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***M/s Ruchi Soya Industries Limited*:**

M/s Ruchi Soya Industries Limited (RSIL) was incorporated as a limited company on 6th January, 1986. The company is a leader in India in Soyabean extraction, refining of edible oils and is one of the biggest exporters of Soya bean meal.

Project Activity:

1. The project activity involves supply, erection, commissioning and operation of 15 x 1.5 MW rated, Make – Suzlon, Model S-82, Wind Turbine Generators (WTGs). The total installed capacity is 22.5 MW. The generated electrical power will be sold to Madhya Pradesh State Electricity Board (MPSEB), connected with the NEWNE grid[1] at Madhya Pradesh State Electricity Board (MPSEB) - 132 KVA substation at Sailana (Ratlam). All WTGs are located on the site - "hills of Palsodi village of District Ratlam, Madhya Pradesh, India" where no renewable power plant was operated prior to the implementation of the project activity.**Purpose of the Project Activity:**
   - To utilize renewable wind energy for generation of the electricity.
   - To sell the generated electricity to Madhya Pradesh State Electricity Board connected with the NEWNE grid comprising mainly fossil fuel based power plants.
   - To contribute in mitigating the climate change.

a. Pre-project scenario:

The Project participant was not involved in generation of wind based power and supplying to grid at the same site under the pre-project scenario therefore, 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. The installed capacity is predominantly coal based and therefore is a major source of carbon dioxide emissions in India[2]. The main emission source in the pre-project scenario is the power plants connected to the NEWNE grid and main GHG involved is CO_2.

b. **Project scenario:**

The project activity is a renewable source of power generation and would supply electricity to the NEWNE grid. The total installed capacity of the project is 22.5 MW equipped with 15 sets of turbines with a unit capacity of 1500 kW (model S82-1.50 MW) produced by SUZLON. The project activity uses

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[1] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
see User Guide, Version 4.0, Table 2: The Indian electricity system is now divided into two grids, the new Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid

[2] http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
see User Guide, Version 4.0, Table 1

wind energy in producing electricity and no other input is being used, therefore, it will not produce any GHG emission during its lifetime.

c. Baseline scenario:

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following as per applied methodology:

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

Hence, pre-project scenario and baseline scenario are the same.

2. **Reduction of GHGs emissions due to the project activity:**

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

The project activity replaces anthropogenic emissions of greenhouse gases (GHGs) into the atmosphere, which is estimated to be approximately 45,851 tonnes of CO_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 expansion connected to the grid.

3. Contribution of the project activity to sustainable development:

Ministry of Environment and Forests, Govt. of India has stipulated the four indicators, as demonstrated below, for sustainable development in the interim approval guidelines for host country approval eligibility criteria for Clean Development Mechanism (CDM) projects[3]. The project participant believes that the project activity has contributed to sustainable development in following manners:

<u>Social well being:</u>

The project activity provided / provides job opportunities to some of the local people during erection and operation of the WTGs contributing up to some extent in poverty alleviation of the local tribal community. The developer developed the project site and constructed an approach road. The company also distributed solar lanterns to the villagers and arranged health awareness camps. Some of the basic amenities, like toilets, bathrooms, primary education etc., are also provided in nearby areas, leading to improvement in living standard. The project activity will also contribute in infrastructure development by improving the availability of the electricity to the grid. The evidence of such social well being claims is available in the form of minutes of local stakeholders' consultation meeting, where it was concluded that such social benefits could be possible due to the project activity. Thus, the project activity has contributed to social well being.

<u>Economic well being:</u>

[3] http://cdmindia.nic.in/host_approval_criteria.htm

The project activity has created direct and indirect job opportunities to the local community during installation and operation of the WTGs. The investment for the project activity has increased the economic activity of the local area. It shows that the project activity has contributed to the economic well-being of the local community.

Environmental well being:

As per requirement Suzlon Energy procured forest land on lease from Department of Forests, M.P. on 05/03/2008 and transferred to the project participant on 08/05/2009 for the project activity. Most of the procured land is barren and no forest was there. The developer has developed the site without cutting any tree and planted a number of trees. The project activity does not interfere any other activity including forestation programme as per provisions of land lease agreement. The project activity reduces emission of local and global air pollutants, helps in conservation of natural resources including non-renewable energy sources, and avoids solid waste that generally happens with conventional electricity generating technologies. Thus, the project activity contributes to environmental well-being.

Technological well being:

There is continuous research and development on the geometry of the wind blades, height of towers, diameters of towers etc., which augurs well for the technological well being. The project activity involves wind turbines with large rotor and a more powerful generator enabling them to reach higher generation levels. The project activity leads to the demonstration of large WTGs in the state of Madhya Pradesh. Hence, the project activity leads to technological well-being.

All the above-discussed points are the contributions of the project activity for the sustainable development. The project participant has also committed to contribute minimum 2% of the CERs revenue, towards sustainable development including society/community development.

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)
India (Host Country)	Private entity (Project Participant): • M/s Ruchi Soya Industries Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the 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.:

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State - Madhya Pradesh

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

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Village-Palsodi, District –Ratlam

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

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The project site is located in the hills of Sambharkho range falls in Village-Palsodi, District-Ratlam. The aerial distance from midpoint of the site to the Ratlam city is about 12 km. The site is easily approachable by road vehicles up to the foot of the hill. The map of Survey of India showing the relevant portion of the site is given in Figure 1. Nearest airport is at Indore and nearest railway station is at Ratlam. Ratlam is a major railway station of Western Railways, India. Ratlam is approximate 150 km away from Indore via road. The ambient conditions of the District Ratlam [4] are as follows:

-Lies 550 m above sea level
-Average temperature is 55 F.
-Average rainfall is 90 cm.

Geographical details of installed WTGs are mentioned in Table 1 below:

Table 1: Geographical details of installed WTGs

Project Site	Latitude/Longitude	Machine no.
Village: Palsodi, District: Ratlam (M.P.) India	Latitude: 23^0 20’36.0” North Longitude: 74^0 55’11.99”East	P101, P104, P107, P109, P112, P113, P114, P131, P137, P140, P143, P145, P148, P150, P154

[4] http://www.nationmaster.com/encyclopedia/Ratlam#Geography

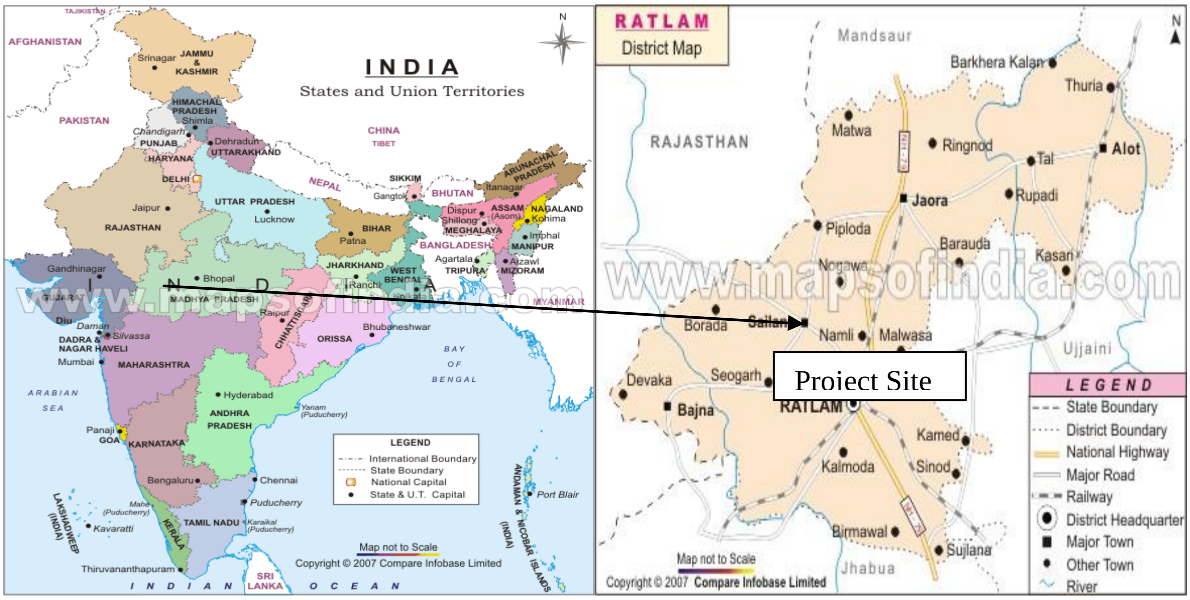

Figure 1: The location of the project activity

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

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The project activity falls into Sectoral Category 1, Energy industries (renewable- /non-renewable sources), the project activity is grid-connected renewable power generation.

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

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The purpose of the project activity is the generation of zero-emission renewable power from the windmills established in the state of Madhya Pradesh, India. The wind turbine generator as the source for the generation of clean renewable energy is now an established technology.

Pre-project scenario:

Installed capacity for electricity generation in India:

As on 31/03/2007 the installed capacity of power stations in India was 132,329.21 MW, consisting of 86,014.84 MW thermal (65%), 34,653.77 MW hydro (26%), 3,900 MW nuclear (3%), and 7,760.60 MW renewable (6%). Region wise installed electricity generation capacity in India[5] is shown below in Table 2:

Table 2: Region wise installed electricity generation capacity (MW) as on 31/03/2007

Region	Hydro	Thermal				Nu-clear	Renew-able	Total
		Coal	Gas	Diesel	Total			
Northern	13000.38	18027.50	3323.19	14.99	21365.68	1180	813.37	36359.43
Western	6918.83	22441.50	5820.72	17.48	28279.70	1840	1874.76	38913.2

[5] http://www.cea.nic.in/power_sec_reports/Executive_Summary/2007_03/6.pdf

								9
Southern	11011.71	16172.50	3586.30	939.32	20698.12	880	4971.55	37561.38
Eastern	2496.53	14149.88	190	17.20	14357.08	0	46.76	16900.37
N. Eastern	1221.07	330	771.50	142.74	1244.24	0	48.91	2514.22
Island	5.25	0	0	70.02	70.02	0	5.25	80.52
All India	34653.77	71121.38	13691.71	1201.75	86014.84	3900	7760.60	132329.21

It is evident from Table 2 that the installed capacity is predominantly coal based (53.7%) and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation. Despite the potential, India could achieve only 6% renewable power generation installations as shown in Table 2.

The Government of India aims to provide "power to all" by 2012. To achieve that promise and to provide availability of over 1000 units of per capita electricity by year 2012, it had been estimated that need based capacity addition of more than 1,00,000 MW would be required during the period 2002-12[6].

The Working Group on Power for Eleventh Plan (2007-12) has recommended addition of electricity generation capacity of 68869 MW during the XIth five year plan[7]. This recommended addition includes 50124 MW of thermal power generation. Hence at the end of XIth plan total installed generation capacity will be 201198 MW including thermal based capacity of 136139 MW. It can be concluded that even the current fuel mix shows diversity but thermal (fossil) fuels continue to be the dominant fuels with more than 50% usage in future.

Electricity Demand and Availability Position (April 2006 – March 2007)

The requirement and availability of electricity during the year (2006-07) is shown below in Table 3[8]:

Table 3: Energy demand and availability in India in the year 2006-07

Region	Energy Requirement (MU)	Energy Availability (MU)	Deficit (%)
Northern	201,970	179,921	-10.9%
Western	234,812	196,182	-16.5%
Southern	180,295	175,417	-2.7%
Eastern	68,198	66,183	-3.0%
North Eastern	7,782	7,013	-9.9%
All India	693,057	624,716	-9.9%

The project activity connected to the NEWNE grid. The NEWNE grid comprises the regions – Northern, Western, Eastern, and North-Eastern. All these regions have shortage of electricity as depicted in Table-3

[6] http://www.cci.in/pdf/surveys_reports/power_energy.pdf page 7
[7] http://www.planningcommission.nic.in/aboutus/committee/wrkgrp11/wg11_power.pdf page 13
[8] http://www.cea.nic.in/power_sec_reports/Executive_Summary/2007_03/20.pdf page 1

above. The project activity is located in the state of Madhya Pradesh which falls in the western region that is covered by the NEWNE grid. There is highest shortage of electricity is the western region (16.5%) as shown in Table 3. The state of Madhya Pradesh is also facing huge power shortage of 1,686 MW as reflected during the financial year (April 2006-March 2007)[9]. There is an urgent need to add more generation capacity to cope with ever-increasing electricity demand in all the regions particularly in western region. Therefore, in the absence of the project activity, the equivalent amount of electricity would have been generated from the connected / new power plants in the grid, which are / will be predominantly based on fossil fuels.

The main emission source in the pre-project scenario is the power plants connected to the NEWNE grid and main GHG involved is CO_2.

Project Scenario
The project activity is a renewable source of power generation and would supply electricity to the NEWNE grid. The total installed capacity of the project is 22.5 MW equipped with 15 sets of turbines with a unit capacity of 1500 kW (model S82-1.50 MW) produced by SUZLON. SUZLON is a well-known supplier of wind turbines from India and so far has installed different capacities of WTGs in various countries. Suzlon Infrastructure Services Limited (SISL), SUZLON Group, will provide all operations and maintenance services to the project activity.

As the project activity is emission free, no GHG emissions will take place during the lifetime of the project activity.

TECHNOLOGY [10]
The use of wind as a renewable energy involves the conversion of power contained in masses of moving air into rotating shaft power. The conversion process utilises aerodynamic forces (lift and/or drag) to produce a net positive turning moment on a shaft, resulting in the production of mechanical power which can be converted to electrical power.

The energy Central in wind at different region varies with latitude, land - sea disposition, altitude and season. In India the factor which mostly governs the availability of wind energy at a particular site is its geographical location with respect to the monsoon wind. The availability of data on wind speed being a basic requirement for determining the feasibility of wind power generation at any site and due to the highly uneven distribution of wind speed over the country, an assessment of the wind resource over different regions was undertaken before any plans of harnessing the wind energy were drawn for implementation.

The important parts of a WTG are:
i. Main Tower
ii. Blades
iii. Nacelle
iv. Hub
v. Main shaft

[9] http://www.cea.nic.in/power_sec_reports/Executive_Summary/2007_04/21.pdf page 1
[10] http://www.ireda.gov.in/homepage1.asp?parent_category=2&sub_category=21&category=78

vi. Gearbox, bearing and housing
vii. Brake
viii. Generator

TECHNICAL SPECIFICATIONS (MEGA WATT SERIES (S-82: 1.50 MW))

S82-1.5 MW model[11] is designed for generating the optimal power output even at sites with a modest wind speed regime. The wind turbine concept is based on robust design with pitch regulated blade operation, a 3-stage gearbox with 1650 kW rating and flexible coupling to the asynchronous induction generator. The Suzlon Flexi-slip System provides efficient control of the load and power control. The turbine operation is efficiently controlled by the Suzlon controller. These technologies are all well-known in the wind power industry and have proven themselves. The S82-1.5 MW is designed to withstand extreme conditions and operate effectively with low maintenance cost. The technical specifications are given below:

Operating Data	
Installed electricity output	1.5 MW
Cut-in wind speed	4 m/s
Rated wind speed	14 m/s
Cut-out wind speed	20 m/s
Survival wind speed	52.5 m/s
Hub height	78.5 m
Variants available	STV/LTV
Generator	
Type	Asynchronous 4 poles with slip ring
Rated Power	1500 kW
Rated Voltage	690 V, 3 phase AC
Rotational speed	1511 rpm
Frequency	50 Hz
Protection	Enclosure (Generator): IP54
	Enclosure (Slip ring-unit): IP 23
Cooling system	Air cooled
Insulation	Class H
Slip control	Unique Macro Slip
	Providing slip up to 16%
Rotor	
Type	3 bladed, horizontal axis
Diameter	82 m
Swept area	5281 m^2
Braking system	
Aerodynamic braking	3 independent systems with blade pitching
Mechanical braking	hydraulic disc brake
Yaw System	
Type	Active electrical
Bearing	Polyamide slide

[11] http://www.suzlon.com/pdf/S82%20product%20brochure.pdf

Gearbox	
Type	3 stage
Ratio	1:95.90
Nominal Load	1650 kW
Certifications	
Design standard	GL/IEC
Quality	ISO 9001

Madhya Pradesh Electricity Regulatory Commission (MPERC) consulted the different stakeholders to find out life of the wind power generation units. Based on the stakeholders' inputs and experiences elsewhere, the Commission considered the plant life as 20 years for wind power generation units[12]. The project lifetime is 20 years which is as per the power purchase agreement. The project participant has considered the same lifetime of 20 years for the wind power generation units installed in the project activity. It can also be supported from later considerations by the other electricity regulatory commissions e.g. TNERC[13]. . The windmills constituting the project activity are newly commissioned and the details of the date of commissioning are given in Appendix -1.

The power production through wind turbines depends on the speed of wind and the grid availability factor, which are external factors to the system. The project proponent hired an engineering company to estimate PLF at the site that could be achieved with the WTGs of higher capacity, 1500 kW, being installed first time in the state of Madhya Pradesh. The PLF estimated by the third party is 25.68%, which is conservative also as PLF estimated by the supplier is 25.49% and estimated by MPERC[14] is 22.50% . The PLF estimated by engineering company, third party, is taken into financial calculations.

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following as per applied methodology:

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

Hence, pre-project scenario and baseline scenario are the same.

The power generation from wind is a clean technology as there are no GHG emissions associated with it. Technology is indigenous, available within the country, and environmentally safe and sound.

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

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[12] http://www.mperc.org/windenergy.pdf page 14
[13] http://www.tnerc.gov.in/orders/draft%20order%2020-3-2009%20complete%20final.pdf page 18
[14] http://www.mperc.org/Review-order-1-3-2006-of-wind-power.pdf

The project participant has chosen the fixed crediting period of ten years, which will start from the date of registration. The estimated emission reductions for chosen crediting period are as follows:

Years	Annual estimation of emission reductions in tonnes of CO2 e
2010-11	45,851
2011-12	45,851
2012-13	45,851
2013-14	45,851
2014-15	45,851
2015-16	45,851
2016-17	45,851
2017-18	45,851
2018-19	45,851
2019-20	45,851
Total estimated reductions (tonnes of CO_2 e)	458,510
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	45,851

A.4.5. Public funding of the project activity:

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There is no public funding from Annex-1 and also there is no diversion of Official Development Assistance (ODA) for 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 of the approved baseline and monitoring methodology applied to the project activity:
"Consolidated baseline methodology for grid-connected electricity generation from renewable sources";

Reference of the methodology applied to the project activity: ACM0002; Version 11 (EB 52).
http://cdm.unfccc.int/UserManagement/FileStorage/HGY3TLRFPQVM016WA4I7XCZD92KE5S

Title and reference of tools applied to the project activity:

1. "Tool for the demonstration and assessment of additionality"; Version: 05.2 (EB 39)
   http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

2. "Tool to calculate the emission factor for an electricity system"; Version: 02 (EB 50)
   http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf

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

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The methodology, ACM0002, version 11, is applicable to grid-connected renewable power generation project activities that

(a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant);
(b) involve a capacity addition;
(c) involve a retrofit of (an) existing plant(s);or
(d) involve a replacement of (an) existing plant(s).

The project activity satisfies applicability criterion (a) as it involves installations of new wind turbines at a site where no renewable power plant was operated prior to this project activity.

The other applicability conditions of the methodology on the project activity are demonstrated as follows:

Sr. No.	Applicability Conditions as per ACM0002	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: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project activity involves installation of new wind power units. Therefore, the project activity satisfies this applicability criterion.
2.	In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 of the methodology to calculate the parameter $EG_{PJ,y}$): 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.	There is no capacity addition, retrofit or replacement in the project activity. Therefore, this condition is not applicable.
3.	In case of hydro power plants: • The project activity is implemented in an existing reservoir, with no change in the volume of reservoir, or • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project	This condition is not relevant, as the project activity does not have hydro power plant.

	activity, as per definitions given in the project emissions section of the methodology, is greater than 4 W/m^2, or • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section of the methodology, is greater than 4 W/m^2.	

The description provided in table above shows that the project activity satisfies the applicable conditions of the methodology, ACM0002, version 11.

As per the requirement of the applied methodology, ACM0002 for demonstrating and assessing the additionality the latest version 05.2 of the "Tool for the demonstration and assessment of additionality" is applied to the project activity.

The project activity supplies the generated electricity to the grid. Hence, the latest version of the Tool "Tool to calculate the emission factor for an electricity system", version 02 is applied in order to estimate the OM, BM and/or CM for the purpose of calculating baseline emissions for the project activity.

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

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The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to. The project activity would be feeding the electricity in the NEWNE grid, managed by Regional Load Dispatch Centre (RLDC) and Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid, which constitutes four regions (viz Northern, Western, Eastern and North-Eastern). The proposed project would have marginal impact on all the generation facilities in the NEWNE grid. Thus all the power generation facilities connected to this grid form the project boundary is used for the purpose of baseline estimation. The NEWNE grid is also connected with Southern grid; there is inter-state and inter-regional exchange. A small power exchange also takes place with the neighboring countries Bhutan and Nepal, however, the net exchange of energy within the electricity grids is very small, and thus the Southern grid and the neighboring countries Bhutan and Nepal are not included in the boundary. The wind farm (project activity) has a distinctive physical demarcated boundary.

Flow diagram of the project boundary (flow from left to right):

15 WTGs **Transformers (for each WTG)** **Common metering point *** **Sub-station (s)** **CO_2 emission in Baseline-NEWNE grid**

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G R I D

Power Plants connected to NEWNE Grid

* There are two common meters at the project site, one for seven and another for eight machines.

From regional grid electricity is distributed to end users who are outside the project boundary.

As per the baseline study in the NEWNE grid, it is estimated that the primary and critical source of GHG emission is the CO_2 emissions from the conventional power generation systems, which is a part of the baseline study. The other likely emissions are that of CH_4 and N_2O, but both emissions were conservative and are excluded for simplification of the project. Also, indirect emissions can result from project construction, transportation of materials and other upstream activities. In the case of this project activity, these emissions are thought to be comparable or less to the life cycle emissions that would result from the eventual construction and operation of alternative power plant. The project does not claim emissions reductions from these activities. Therefore, no significant net leakage from the above activity was identified. The methodology does not take into account the leakage that would arise from the import and export of electricity to the local grid. It is concluded that, since this is a wind power project, there would be minimum or no leakage and hence this is not considered significant.

	Source	**Gas**	Included/ Excluded	**Justification / Explanation**
Baseline	CO_2 emissions from fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Included	Main emission source as per ACM0002.
		CH_4	Excluded	Minor emission source as per ACM0002.
		N_2O	Excluded	Minor emission source as per ACM0002.

Project Activity	CO_2 emissions from backup power generation.	CO_2	Excluded	No fossil fuel based backup power generation is involved in the project activity.
		CH_4	Excluded	No Project Emission
		N_2O	Excluded	No Project Emission

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

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National policies and circumstances relevant to the baseline of the project activity:

The Government of India introduced an Electricity Act[15] on 26/05/2003 to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalisation of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies constitution of Central Electricity Authority, Regulatory Commissions and establishment of Appellate Tribunal and for matters connected therewith or incidental thereto.

In compliance of the Electricity Act 2003 the Central Government notified the National Electricity Policy[16] on 12/02/2005. According to this policy, the generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non-conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies.

Electricity Act and National Electricity Policy both provide comparative advantage to less emissions intensive technologies or fuels (E-). The impacts of these policies have been excluded in establishing a baseline scenario as these are implemented since the adoption of the Marrakesh Accords (11/11/2001) and not provide perverse incentives to implement this type of project activity.

According to the "*Tool to calculate the emission factor for an electricity system (Version 02)",* if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

The electricity generated by the project activity is being supplied to NEWNE grid according to the delineation which is published by the CEA[17], NEWNE is considered as the "electricity system", which is defined as a part of the "project boundary" of the project activity. The project activity is the installation

[15] http://www.cea.nic.in/home_page_links/ElectricityAct2003.pdf

[16] http://www.cea.nic.in/planning/national_Electricity_policy.htm

[17] http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf Page 11

of a new grid-connected renewable power plant/unit, and is not a modification/retrofit of an existing plant/unit, the baseline scenario, according to methodology ACM0002 (Version 11), is the following:

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

Description of identified baseline scenario:

Indian Power Sector: Installed Capacity and Electricity Grids

As a result of the impressive growth attained by the Indian Power Sector[18], the installed capacity has grown from mere 1,713 MW in 1950 to 147,965.41 MW as on 31/03/2009, consisting of 93,725.24 MW Thermal, 36,877.76 MW Hydro and 4,120 MW Nuclear. Sector-wise details of installed capacity are shown in Table 2.

Table 2: Sector-wise installed capacity (MW) as on 31/03/2009

Region	Hydro	Thermal				Nuclear	Renew-able	Total
		Coal	Gas	Diesel	Total			
State	27055.76	42537.50	3672.12	602.61	46812.23	0.00	2247.68	76115.67
Central	8592.00	29620.00	6638.99	0.00	36258.99	4120.00		48970.99
Private	1230.00	5491.38	4565.50	597.14	10654.02	0.00	10994.73	22878.75
All India	36877.76	77648.88	14876.61	1199.75	93725.24	4120.00	13242.41	147965.41

It is evident from Table 2 that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there is scope for reducing the CO_2 emissions in the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

Electricity Grids:

Earlier, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states (see Table 3). Since August 2006, however, all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids will be treated as a single grid and is being named as NEWNE grid from FY 2007-08 onwards for the purpose of the CO_2 Baseline Database. The Southern grid has also been planned to be synchronously operated with rest of all Indian Grids by early 12th Plan (2012-2017). Presently Southern grid is connected with Western and Eastern grid through HVDC link and HVDC back-to-back systems.

[18] http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf Table 1

Regional Load Dispatch Centre (RLDC) manages power generation and supply within the regional grid. The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state 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. Moreover, there are also electricity transfers between regional grids, and small exchanges in the form of cross border imports and exports (e.g. from Bhutan).

Table 3: Geographical scope of the two electricity grids

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, Tamil Nadu, Pondicherry, Lakshadweep

The baseline emissions and the emission reductions from the project activity are estimated based on the quantum of electricity to be exported by the project activity to the NEWNE grid and the baseline emission factor of the NEWNE grid calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors.

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):

>>

CDM Consideration:

RSIL has seriously considered the financial incentives from CDM during taking the decision of proposed wind project that can be verified from the following facts:

RSIL is well aware about the availability of CDM revenue in wind projects as it had already one wind project registered with EB on Feb 19, 2006[19].

[19] http://cdm.unfccc.int/Projects/DB/RWTUV1135356510.37/view

RSIL first approached Punjab National Bank for part finance of its wind project without considering CDM revenue but the bank refused the proposal of part financing by mentioning that the projected project IRR is low. The refusal letter from the bank is available with the project participant for verification. Later RSIL considered the CDM revenue and evaluated the revised financial indicators. The Board of Directors of RSIL considered the proposal with CDM revenue and directed the company to place the order of WTGs and appoint the consultant and also some employees to look after the work related with CDM in the meeting held on September 29, 2007. It can be evidenced from extracts of the minutes of the meeting of Board of Directors. RSIL has appointed the CDM consultant for its all group companies and LOI for the same was issued on October 4, 2007.

The chronology of the events related with CDM consideration is given below:

Date	Project Activity	CDM Activity
04/07/2007	PLF Estimation report	PLF Estimation report
08/08/2007	Proposal for WTGs from SUZLON	-
13/08/2007	Approaching to Punjab National Bank (PNB) for part finance	-
17/08/2007	Refusal from PNB	-
29/09/2007	Decision of the Board of Directors to implement the project activity with CDM revenue.	Decision of the Board of Directors to implement the project activity with CDM revenue.
04/10/2007	-	Appointment of CDM consultant
20/11/2007	Issuing the purchase order (PO)	-
11/01/2008	Approaching to State Bank of India (SBI) for part finance	-
29/03/2008	Loan sanctioned by SBI	-
29/02/2008 to 30/05/2008	Commissioning of the WTGs	-
25/04/2008	-	Invitation to the local stakeholders for stakeholders' consultation meeting
13/05/2008	-	Stakeholders consultation meeting
16/06/2008	-	Consulting the DOEs for validation
15/07/2008	-	Appointment of the DOE
11/08/2008	Power Purchase Agreement	-
06/03/2009	-	Web hosting for global stakeholders' comments
08/05/2009	Land lease agreement	-
23/09/2009	-	Presentation for Host Country Approval
25/11/2009	-	Host Country Approval

RSIL was interested to develop a bundle including other WTGs installed by the other project proponent on the same site. Earlier both PPs decided for the same and accordingly DOE was appointed for the combined project. Later both PPs decided to go separately and two different PDDs were developed. Therefore, web hosting of the project activity was delayed.

The chronology of events shows that the project participant has seriously considered the CDM revenue and acted in parallel with the implementation of the project activity to avail the CDM revenue.

Demonstration of Additionality for the project activity as required in ACM0002:

The additionality of the project activity is demonstrated and assessed by adopting the steps as given below in Figure 2 as per the Tool for the demonstration and assessment of additionality, version 05.2:

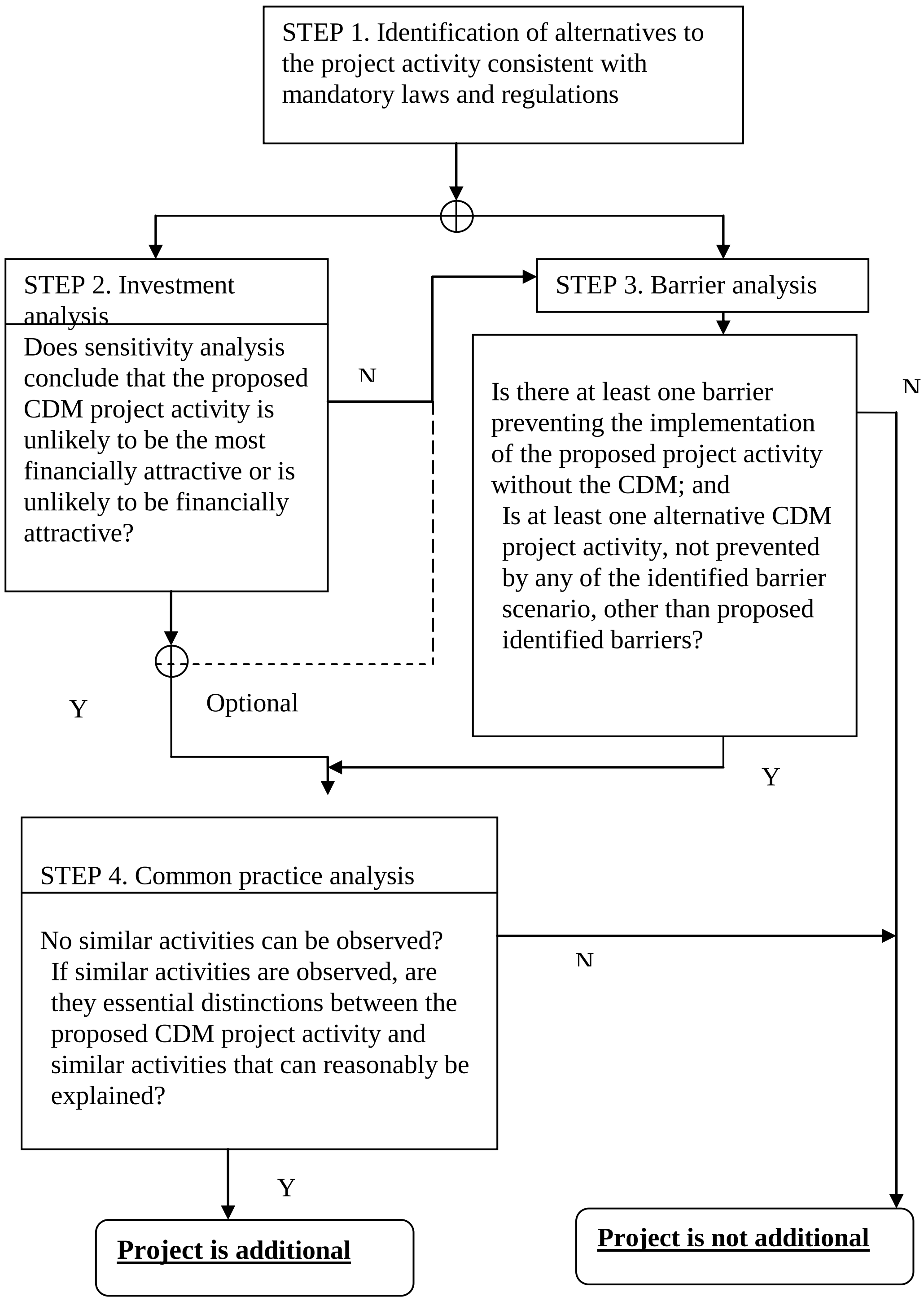

Figure 2: Flowchart of the “Tool for the demonstration and assessment of additionality”

Additionality has been demonstrated and assessed using the latest version of the *"Tool for the demonstration and assessment of additionality"*.

Steps	**Additionality Requirements**	**Status of Additionality Check**
Step 1: Identification of alternatives to the project activity consistent with current laws and regulations		
Sub-step (1a): Define alternatives to the project activity	RSIL has set up a 22.5 MW wind power project to generate electricity and sold to the MPSEB. The following alternatives were available with the project participant to meet the same objective: • Setting up the project activity without CDM benefits: As per this alternative the project participant would have gone ahead with the implementation of the project activity, generating renewable electricity and exporting the same to the grid under the power purchase agreement thereby displacing equivalent amount of electricity generated by the currently running power plants in the grid. No emissions of greenhouse gases to atmosphere through this alternative. This alternative may be a part of the baseline. However, this alternative faces investment barrier as shown by the investment analysis conducted in the subsequent step 2. • Continuation of current scenario i.e. additional power is supplied by current power generating units and / or new power generating units coming up in the NEWNE grid: India is seeing tremendous growth of about 8-9% per year and there is an increasing demand of power to sustain this growth. The grids in India are running on deficit and it requires to install more power generating units. New capacity additions may come from a number of sources like fossil fuels, biomass, hydro etc. The probable sources of power are discussed below: a. Coal based power plant: Coal is an obvious choice of generating power in India as it is available in abundance. The conventional coal based	The additionality check has crossed Step 1, and may proceed to Step 2 (Investment Analysis) or Step 3 (Barrier Analysis). In the present case, Step 2 has been used for additionality check

	power plant could be a possible alternative to the project activity. Due to simplicity, higher reliability, better cost utilization and low technology risk, it is and would continue to be the most plausible baseline scenario for the project activity. b. Gas based power plant: Gas is another choice of fuel in India for power generation. However, use of gas carry various uncertainties like price and availability, specially in Madhya Pradesh. c. Renewable energy based power plant: Renewable energy sources are an important element of India's power policy aimed to maximally develop domestic supply options as well as to diversify the energy sources. The renewable energy sources other than the wind can be solar, hydro and biomass. Solar: Solar energy has a large potential in the country. This can be exploited by many direct thermal applications such as cooking, heating etc. It can also be exploited to generate electricity using photovoltaic cells that directly convert sunlight to electricity. The present conversion efficiency of commercially available photovoltaic cells is less than 15 percent. With this efficiency the cost of electricity generation comes out about Rs. 15-20/kWh at present[20]. Hence, the project participant also not considered this option for electricity generation and selling. Hydro: India is endowed with rich hydropower potential; it ranks fifth in the world in terms of usable potential. This is distributed across six major river systems (49 basins), namely, the Indus, Brahmaputra, Ganga, the central Indian river systems, and the east and west flowing river systems of south India. The Indus, Brahmaputra and Ganga together account for nearly 80% of the total potential. The total hydro power potential available in the western region (where the project activity located) is relatively limited	

[20] Integrating energy policy –Report of Expert Committee –GOI –Planning Commission-Aug-2006-Page 124
http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf

	constituting about 6.76% (5679 MW) of the total potential in India[21]. There is balance potential of hydropower is just 39.53%. Further the hydro potential of this region is from the peninsular rivers, which have more than 80% flows during monsoon and requiring construction of storage reservoirs for economic hydropower generation. The hydro development scenario in the western region indicates that the future growing needs of this region would have to be met from other power sources. In addition, development of small hydro (up to 25 MW) often suffer due to inaccessibility of the sites, lack of power evacuation infrastructure, investigation and construction difficulties, land acquisition and financing difficulties, inadequacies in institutional support and in some cases law and order problems. The hydropower projects also face the problems of environment and ecology, and the problems of resettlement of affected people. These problems delay the implementation of hydro projects. Seeing these difficulties it can be concluded that the hydropower project would not be a feasible and attractive option to the project activity. Biomass: Power plants using renewable biomass are generally installed in small scale category. And moreover, in India biomass based power project would also face the financial constraints due to huge capital investment and high unit generation cost[22]. There is problem in collection and delivery channel for biomass fuel. Hence there is a lot of uncertainty associated with the fuel itself. Moreover because of lack of established market, price of biomass is also very unstable. There are many operational difficulties associated with biomass based projects, for example clinker formation and slagging in the boiler, presence of lots of impurities in biomass as it is generally collected from open fields, storage of biomass is also a huge problem as the bulk density is low so it requires huge area, during monsoon it becomes very difficult to fire biomass as moisture content increases and it cannot be dried in open. Hence conceptualizing a project which has a lot of uncertainty with fuel availability, price and technology is not considered as a credible alternative for	

[21] http://www.adb.org/Documents/Reports/Hydropower-Devt-India/Chapter-IV.pdf Table 3

[22] Integrating energy policy –Report of Expert Committee –GOI –Planning Commission-Aug-2006-Page 124 http://planningcommission.nic.in/reports/genrep/rep_intengy.pdf

	the project activity. d. Nuclear power plant: Nuclear power projects are facing the problems of fuel supply and the environmental problems of solid waste, liquid effluent, thermal impact on receiving water, environment and ecology, and the social problems of resettlement of project-affected people. Simultaneously this sector has not been opened to the private players by the Government of India. Hence it cannot be a feasible alternative to PP. The following is the possible baseline option to the project activity as per ACM0002: Continuation of current scenario i.e. additional power is supplied by current power generating units and / or new power generating units coming up in the NEWNE grid. The above mentioned alternatives are in compliance with all mandatory applicable legal and regulatory requirements as shown below:	
*Sub-step (1b): Consistency with m*andatory laws and regulation	• The implementation of the project activity is a voluntary initiative and it is not mandatory or a legal requirement. • The Indian Electricity Act, 2003 does not restrict or empower any authority to restrict the fuel choice for power generation. • The applicable environmental regulations do not restrict the use of wind energy for power generation. • There is no legal requirement on the choice of a particular technology for power generation.	
Step 2. Investment analysis		
Sub-step (2a): Determine appropriate analysis method	The project activity generates revenue by selling electricity to MPSEB. 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.	The additionality check has crossed Step 2(a), and may proceed to Step 2(b) – Option III.

<table>
<tr><td></td><td>In this case the benchmark analysis (option III) is most appropriate as no investment is required in baseline alternative and the baseline, grid, is outside of direct control of PP.</td><td></td></tr>
<tr><td>Sub-step (2b): Option-III: Apply benchmark analysis</td><td>Internal Rate of Return (IRR) is one of the known financial indicators used by banks, financial institutions and project developers for making investment decisions. Hence, to conduct the investment analysis of the project activity the post tax project internal rate of return (Project – IRR) is selected as the financial indicator.

As per para 11 of ‘Guidance on the assessment of investment analysis, (EB 41, Annex 45)’ Prime Lending Rate (PLR) can be taken as an appropriate benchmark for project IRR. PLR or Prime Lending Rate is defined as the benchmark rate for all bank loans. Historically, the PLR has been the rate at which banks lend to the best borrower—one who is the safest or the least likely to default on the loan. As per the guidance on assessment of investment analysis, PLR is comparable with project IRR. If the project does not even earn sufficient returns to cover the PLR then investment in the project can be considered financially unattractive.

The weighted average benchmark prime lending rate (BPLR) of different types of banks in India was as follows in July 2007[23]:

Public sector banks: 13.1%
Private sector banks:14.9%
Foreign banks: 13.9%

The project participant has taken lowest weighted average prime lending rate (conservative), 13.1%, as benchmark for the project activity.</td><td>The additionality check has crossed Step 2(b), and may proceed to Step 2(c)</td></tr>
<tr><td>Sub-step (2c): Calculation and comparison of financial indicators</td><td>The project participant has taken following assumptions for investment analysis as per information available at the time of decision making and references are given in attached financial calculations (excel sheets):

<table><tr><td>Capacity of the wind power project</td><td>22.5 MW</td></tr><tr><td>No. of machines</td><td>15 machines</td></tr><tr><td>Capacity of machines</td><td>1.5 MW each</td></tr></table></td><td>The additionality check has crossed Step 2(c), and may proceed to Step 2(d)</td></tr>
</table>

[23] http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/79250.pdf - Page 1381, Reserve Bank of India Monthly Bulletin – August 2007.

Plant load factor/Capacity utilization factor[24]	25.68%
Reference: Third party contracted by the PP. .	
Project cost	INR 1320.36 Million
Reference: PO data is used as final negotiated value of the supplier's offer	
Debt Equity	INR 950 Million INR 370.36Million
Reference: Loan documents	
Deprecation rate	4.5% (SLM)
Max. Depreciation	90%
Full (100%) depreciation on lease cost of land, pre-operating expenses, and loan processing fee.	
Reference: http://www.mperc.org/windenergy.pdf	
Salvage Value*	10%
Interest rate on debt Tenure Moratorium	11.00 % 6 Years 1 Year
Reference: Loan sanction letter.	
Insurance Charges (INR millions)	1.05
Reference: Insurance policy	
O&M charges (first year) O&M Charges (2nd year onwards)	Nil 'INR 1.4 Million/WTG +service tax of 12.36%' for 2nd year & 5% escalation afterwards
Reference: PO data is used as 'final negotiated value of the supplier's offer'	
Power tariff (as per MPERC) per kWh	1st Year: INR 4.03 2nd Year: INR 3.86 3rd Year: INR 3.69 4th Year: INR 3.52 5-20th Years: INR 3.36
Reference: http://www.mperc.org/Wind-tariff-order-21-11-07.pdf	

* The project participant has considered the salvage value as 10% of the project cost as estimated by the Madhya Pradesh Electricity Regulatory Commission for wind turbines[25].

[24] As estimated by an engineering company, third party

[25] http://www.mperc.org/windenergy.pdf page 14, para 3.36

	The post tax project IRR without CDM revenue for 20 years of cash flow comes out 10.86% and improves to 13.68% when CDM revenue is considered. (Assumptions in this case are: 1.CER Price- 16 Euro/CER; **Reference:** http://www.chicagoclimatex.com/news.jsf?story=1801 2. Exchange Rate- 1Euro=INR 56 **Reference:** http://www.x-rates.com/d/INR/EUR/hist2007.html The project IRR crosses the benchmark after including CDM benefits in financial calculations. It shows that CDM revenue makes the project activity financially viable.	
Sub-step (2d): Sensitivity analysis	The following sensitivity analysis has been conducted on project IRR to check the robustness of the financial attractiveness of the project without CDM revenue by using Guidance on the Assessment of Investment Analysis, version-02, Annex-45, EB 41. The total cost associated with the following cost parameters affect the total project cost more than 20%: • Cost of WTGs • Interest Rate • O&M Charges Cost of WTGs is decided initially and will remain unchanged during whole crediting period. Interest rate may vary as it depends on PLR. Even O&M cost is decided at the time of investment decision for initial period of 10 years but after that it will be mutually decided hence this parameter may also be considered as a variable. Therefore, variations of ±10% in interest rate and O&M charges have been considered for the sensitivity analysis. Other cost parameters like insurance and loan processing fee have very less impact on total cost of the project. Therefore, these parameters were not considered for conducting sensitivity analysis. The project revenue is mainly affected by following parameters: • Plant Load Factor (PLF) • Tariff PLF and Tariff are very important parameters to see the financial viability of the project. Hence, variations in PLF and tariff by ±10% are considered for the sensitivity analysis. The following scenarios are developed without taking CDM revenue into account for sensitivity analysis:	The additionality check has crossed Step 2(d), and may proceed to Step 4 directly

Scenarios	Project IRR (20-year cash flow) without CDM revenue		
Variation	-10%	0%	+10%
On varying the O&M charges	11.18%	10.86%	10.52%
On varying the interest rate	10.76%	10.86%	10.96%
On varying the tariff rate	8.71%	10.86%	13.08%
On varying the PLF	8.97%	10.86%	12.81%

Project IRRs (20-year cash flow) without CDM revenue fall in the range of 8.71% to 13.08% in all the scenarios and could not cross the selected benchmark of 13.10% in any scenario.
Thus, overall investment analysis clearly indicates that the project is definitely financially unattractive without CDM revenue. CDM benefits are decisive factor in the project activity as CDM revenue makes it financially viable. Therefore, it can be concluded that the project activity needs CDM revenue to become financially viable.

Step 4. Common practice analysis

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

As per the "Tool for the demonstration and assessment of additionality" (Version 05.2), the common practice analysis is carried out on similar projects in the same region and taking place in a comparable environment with regards to regulatory framework, investment climate etc.

Each state of India has its own state electricity regulatory commission to decide the tariff and formulate the relevant policies. The project activity is located in the state of Madhya Pradesh where tariff and policies are decided by the Madhya Pradesh Electricity Regulatory Commission. Therefore, the similar project activities are defined as the project activities in the same state-Madhya Pradesh (the same region), relying on wind energy technology (similar technology), and with a similar scale of installation capacity (large scale-more than 15 MW).

The table below shows the installed wind power capacity (MW) in Madhya Pradesh for last five years as on March 31, 2007 [26]:

Year	Installed Wind Power Capacity (MW)
2002-03	0

[26] http://www.windpowerindia.com/statyear.html

2003-04	0
2004-05	6.25
2005-06	11.20
2006-07	17.45
2007-08	69.25
2008-09	25.1
Total	129.25

It is clear from the table that wind energy projects in the state of Madhya Pradesh have shown very little progress in the past years despite the policy initiatives from Govt. of India and the state government.

The details of the projects installed in MP state and under CDM Pipeline (http://www.cd4cdm.org)are as follows;

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

UN No.	**Name of the project ***	**Capacity in MP state**
112	Nagda Hills Wind Energy Project (India)	6.25
2266	8.5 MW Wind Energy Project by KS Oils Limited, India http://cdm.unfccc.int/UserManagement/FileStorage/2P3H098YJR71OEZG6UQ5WTB4LDAVXN	3
-	4.8 MW Wind Power Project by Enercon in Madhya Pradesh	4.8
-	4.8 MW Manganese Ore (India) Limited Wind farm in Madhya Pradesh managed by Enercon	4.8
-	4.15 MW Bundled Wind Power Project connected to Western grid of India http://cdm.unfccc.int/UserManagement/FileStorage/1SXH0G9IQNZE4MK7FLCAYV6B32TPD8	0.5
-	Bundled wind power project by Kalani Industries Pvt Ltd. http://cdm.unfccc.int/UserManagement/FileStorage/X1GIFL78RM6B4V5ZWNYUKSTC3JHQP9	1.2
-	15.2 MW wind energy project in Madhya Pradesh by Manganese Ore (India) Limited.	15.2

Sub-step 4a is satisfied.

Since Step 4 is satisfied, the project activity is not a baseline scenario, and hence is additional.

-	22.5 MW Wind Power Project by Ruchi Soya Industries Limited at Palsodi, District-Ratlam, Madhya Pradesh.	22.5
-	8.4 MW Wind Energy Project by Sanwaria Agro Oils Limited, http://cdm.unfccc.int/UserManagement/FileStorage/G68UFK91SBHZCQYXON3VIELR07TJDM	6.6
-	12.25 MW Bundled Wind Power Project in India http://cdm.unfccc.int/UserManagement/FileStorage/XLMVU6N7Z5AW4T21CSPDKBJFH3QY89	4.8
-	10.8 MW Wind Power Project by Ruchi Infrastructure Limited	10.8
-	Bundled green power supply to grid http://cdm.unfccc.int/UserManagement/FileStorage/NQ3TP4ICHG29LD1K0ZWEU5O7AYXMSB	6
-	Electricity generation through wind power project at Jaora-MP & Tenkasi- TN http://cdm.unfccc.int/UserManagement/FileStorage/IFVYT687B302JPK4UORA1MNC5GEDQ9	2
-	27.2 MW Wind Power Project in Madhya Pradesh	27.2
	Total	115.65 MW

*For bundled projects the link of PDD is provided to confirm the project capacity in the State of MP

The total capacity addition in the state of MP till the year 2008-09 is 129.25 MW since 2004, while the CDM pipeline reviewed mentions the project web-hosted for public comments under CDM to a total capacity of 115.65 MW till 2009. The remaining projects of 13.6 MW could not be traced to any specific CDM projects thus they are considered for common practice analysis. However for comparison of similar scale projects the project size of 15 MW and above shall be considered for large scale project comparison, thereby clearly indicating there are no large scale wind projects in MP which have not applied for CDM benefits.

As a result there are only 13.6 MW projects considered indicating large scale wind projects are not a common practice in MP state of India.

	Furthermore, the project activity involves Suzlon made 1.5 MW WTGs, which were not installed earlier in the state of Madhya Pradesh where wind availability and wind power density is relatively low[27]. This is supported by the fact that prior to the project activity the state has been installing the small to medium capacity wind turbines. The large capacity turbines have been installed mainly in such states where the wind availability and wind power density is higher in India. These machines are installed first time in the state of M.P. It is clear from the above discussion that no large scale wind power project was installed in the state of Madhya Pradesh without CDM consideration. From sub-step 4a it is clear that no similar project has been undertaken in the state of Madhya Pradesh prior to the project activity. Hence, it is concluded that similar project activities are not widely observed or commonly carried out. Thus sub-step 4b is not applicable.	

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The key methodological steps are as follows:

1. Calculating the Project Emission (PE_y)
2. Calculating the Baseline Emission (BE_y)
3. Calculating the Leakage Emission (LE_y)
4. Calculating the Emission Reduction (ER_y)

1. Calculating the Project Emission (PE_y):

The project activity is based on renewable wind energy, therefore, project emissions should not be considered as per methodology ACM0002, $PE_y = 0$.

2. Calculating the Baseline Emission (BE_y):

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 all project electricity generation above baseline levels 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:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{....(1)}$$

Where:

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27 http://www.windpowerindia.com/statwind2.html

BE_y = Baseline emissions in year *y* (tCO2/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" (tCO2/MWh)

2.1 Calculation of $EG_{PJ,y}$:
The project activity involves greenfield renewable energy power plant/units. The calculation of $EG_{PJ,y}$ has been carried out as per follows:

The WTGs installed are the installation of new grid-connected renewable power units at a site where no renewable power plant was operated prior to the implementation of the project activity, hence

$$EG_{PJ,y} = EG_{facility,y} \quad \text{….(2)}$$

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)

In case of the project activity the net electricity supplied to the grid ($EG_{PJ,\,y}$) is calculated as follows:

$$EG_{PJ,\,y} = EG_{export,\,y} – EG_{import,\,y} \quad \text{….(3)}$$

Where
$EG_{export,\,y}$ = Electricity exported to the grid by the project activity in year y (MWh)
$EG_{import,\,y}$ = Electricity imported by the project activity from the grid in year y (MWh)

Two main electronic meters are located at the site – one for the 7 WTGs and second for 8 WTGs. The main meters owned by the state electricity board record import, export and RKVAH consumption of electricity. The net electricity supplied to the NEWNE grid will displace an equivalent amount of electricity that would be generated by the NEWNE grid mix. Without the project activity, the same energy load would have been taken up by power plants of the project electricity system and equivalent CO_2 emissions would have been occurred due to combustion of fossil fuels. The net electricity supplied to the grid is considered for estimation of emission reductions.

2.2 Calculation of combined margin CO_2 emission factor for the grid:
The calculation of combined margin CO_2 emission factor for the grid has been carried out using the "Tool to calculate the emission factor for an electricity system", version 02 as follows:

Step 1: Identify the relevant electricity systems:
Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states as shown below in the table. Since August 2006, however, all regional grids except the Southern Grid have been integrated and

are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids are treated as a single grid named as NEWNE grid[28].

Geographical scope of the two electricity grids

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, Tamil Nadu, Pondicherry, Lakshadweep

CEA considers both Indian electricity systems, NEWNE & Southern, to calculate weighted average emission rate, simple operating margin, build margin, and combined margin CO_2 emission factor.

The WTGs of the project activity are installed in the state of Madhya Pradesh which is covered by the NEWNE grid of India. All installed WTGs are connected o the NEWNE grid. Therefore, relevant electricity system for the project activity is NEWNE grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional):
Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I corresponds to the procedure contained in earlier versions of this tool. Option II allows the inclusion of off-grid power generation in the grid emission factor. Option II aims to reflect that in some countries off-grid power generation is significant and can partially be displaced by CDM project activities, e.g. if off-grid power plants are operated due to an unreliable and unstable electricity grid. Option II requires collecting data on off-grid power generation and can only be used if the conditions outlined therein are met. Option II may be chosen only for the operating margin emission factor or for both the build margin and the operating margin emission factor but not only for the build margin emission factor.

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[28] http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf page 11

The project participant selected “Option I: Only grid power plants are included in the calculation” to calculate the operating margin and build margin emission factor.

Step 3: Select a method to determine the operating margin (OM):
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) can be carried out using 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. 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 percentage share of power generation from low cost / must run power plants for the five most recent years in the Indian grids, NEWNE & Southern, is as follows (CEA database, version 03-05[29]):

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)					
	2004-05	**2005-06**	**2006-07**	**2007-08**	**2008-09**
NEWNE	*	18%	18.5%	19%	17.3%
Southern	21.6%	27%	28.3%	27.1%	22.8%
India	18%	20.1%	20.9%	21.0%	18.6%

* NEWNE grid, comprising North, East, West and North-East grids, was not constituted at the year 2004-05, therefore, data for NEWNE grid was not available. However, it is clear that share of must-run in NEWNE grid was lower than 18% as for India it was 18% and for Southern grid it was 21.6% as per CEA database ver. 3.0[30]

The average percentage of power generation by low cost / must run plants in the NEWNE grid for latest five years is much below than 50%. Therefore, simple OM method (option a) is used for calculating simple Operating Margin.

For the simple OM the emissions factor can be calculated using either of the two following data vintages:

• *Ex ante* option: If the *ex ante* option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.

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

• *Ex post* option: If the *ex post* option is chosen, the emission factor is determined for 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*, alternatively the emission factor of the previous year *y-1* may be used. If the data is usually only available 18 months after the end of year *y*, the emission factor of the year preceding the previous year *y-2* may be used. The same data vintage (*y*, *y-1* or *y-2*) should be used throughout all crediting periods.

Ex ante option is used by the project participant for calculating simple OM.

Step 4: Calculate the operating margin emission factor according to the selected method:
Selected method: Simple OM method.

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

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

CEA used option A. Under option A, 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:

$$EF_{grid,\ OM\ simple,\ y} = [\Sigma_m EG_{m,y} \times EF_{EL,m,y}] / \Sigma_m EG_{m,y} \qquad \text{….(4)}$$

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* (tCO2/MWh)
m	=	All power units serving the grid in year *y* except low-cost / must-run power units
y	=	The relevant year as per the data vintage chosen in Step 3

Determination of $EF_{EL,m,y}$: The emission factor of each power unit *m* can be determined by using one of the following options:

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

$EF_{EL,m,y}$ = $[\Sigma_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}] / EG_{m,y}$ ….(5)

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

• **Option A2.** If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor can be determined based on the CO_2 emission factor of the fuel type used and the efficiency of the power unit, as follows:

$EF_{EL,m,y}$ = $[EF_{CO2,m,i,y} \times 3.6] / \eta_{m,y}$ ….(6)

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO_2 emission factor of fossil fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$	=	Average net energy conversion efficiency of power unit *m* in year *y* (ratio)
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

Where several fuel types are used in the power unit, the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$ is used.

• **Option A3.** If for a power unit *m* only data on electricity generation is available, an emission factor of 0 tCO_2/MWh can be assumed as a simple and conservative approach.

CEA has determined the $EF_{EL,m,y}$ using Option A1.

Determination of $EG_{m,y}$: For grid power plants, $EG_{m,y}$ is determined as per the provisions in the monitoring tables.

The project participant used ex ante option to calculate baseline simple operating margin CO_2 emission factor ($EF_{grid, OM, y}$) as 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.

Step 5: Identify the group of power units to be included in the build margin:
The sample group of power units *m* used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently; or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation.

As a general guidance, a power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plant registered as CDM project activities should be **e**xcluded from the sample group *m*. However, if the group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power unit(s) that is(are) built more than 10 years ago then:

(i) Exclude power unit(s) that is (are) built more than 10 years ago from the group; and
(ii) Include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

Central Electricity Authority evaluates build margin[31] using option (b) - The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

In terms of vintage of data, project participants can choose between one of the following two options:

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 information is available. For the second crediting period, the build margin emissions factor shall be

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

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 project participant selected Option 1 to 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. The sample group m consists of the 20 % of power plants supplying electricity to grid that have been built most recently, since it comprises of larger annual power generation. Further, none of the power plant capacity additions in the sample group have been registered as CDM project activities.

Step 6: Calculate the build margin emission factor:

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = [\Sigma_m EG_{m,y} \times EF_{EL,m,y}] / \Sigma_m EG_{m,y} \quad \text{….(7)}$$

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 guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

Step 7: Calculate the combined margin emissions factor:

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{….(8)}$$

Where

$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor in year *y* (tCO2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year *y* (tCO2/MWh)
$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year *y* (tCO2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (%)
w_{BM}	=	Weighting of build margin emissions factor (%)

The following default values can be used for w_{OM} and w_{BM}:

• Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;

• All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

The project activity is a wind power generation project activity. Therefore, w_{OM} = 0.75 and w_{BM} = 0.25 are used to calculate combined margin. The project specific baseline emission factor is calculated in Annex 3.

3. Calculating the Leakage Emission (LE_y):

According to the applied methodology, ACM0002, no leakage is considered for the project activity. Therefore, $LE_y = 0$

4. Calculating the Emission Reduction (ER_y):

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions and minus the leakage emissions as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{....(9)}$$

Where

ER_y = Emission reductions in year *y* (t CO2e)

BE_y = Baseline Emissions in year *y* (t CO2e)

PE_y = Project emissions in year *y* (t CO2)

LE_y = Leakage emissions in year *y* (t CO2)

In case of the project activity, $PE_y = 0$ & $LE_y = 0$, therefore,

$$ER_y = BE_y \quad \text{....(10)}$$

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

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2/MWh
Description:	Operating margin CO_2 emission factor for NEWNE grid in the year y
Source of data used:	"Baseline Carbon Dioxide Emission Database[32] Version 4.0" published by the Central Electricity Authority, Ministry of Power, Government of India.
Value applied:	1.00862 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated as per ACM0002 using "Tool to calculate the emission factor for an electricity system, version 02[33]" as 3-year generation-weighted average of latest three years, 2005-2006, 2006-2007, 2007-2008, data obtained from "CO_2 Baseline Database for Indian Power Sector" version 4.0, published by the Central Electricity Authority, Ministry of Power, Government of India.

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

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

Any comment:	It is calculated *ex ante* basis and will remain same throughout the crediting period.

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build margin CO_2 emission factor for NEWNE grid in the year y
Source of data used:	"Baseline Carbon Dioxide Emission Database Version 4.0" published by the Central Electricity Authority, Ministry of Power, Government of India.
Value applied:	0.59771 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated ex ante as per "Tool to calculate the emission factor for an electricity system, ver. 02" based on the most recent year (2007-08) data available on "Baseline Carbon Dioxide Emission Database Version 4.0".
Any comment:	It is calculated *ex ante* basis and will remain same throughout the crediting period.

Data / Parameter:	w_{OM}
Data unit:	Dimensionless
Description:	Weighting factor of Operating Margin
Source of data used:	Page 16 of the tool -"Tool to calculate the emission factor for an electricity system", version 02.
Value applied:	0.75
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per the "Tool to calculate the emission factors for an electricity system, version 02" the value of w_{OM} =0.75 for wind and solar power generation project activities (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.
Any comment:	Default value for the entire crediting period.

Data / Parameter:	w_{BM}
Data unit:	Dimensionless
Description:	Weight factor of Build Margin
Source of data used:	Page 16 of "Tool to calculate the emission factors for an electricity system" , Version 02
Value applied:	0.25
Justification of the choice of data or description of measurement methods and procedures actually	As per the "Tool to calculate the emission factors for an electricity system, version 02" the value of w_{BM} =0.25 for wind and solar power generation project activities (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.

applied:	
Any comment:	Default value for the entire crediting period.

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	Combined margin CO_2 emission factor for NEWNE grid in the year y
Source of data used:	Calculated using equation $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$ The default values for w_{OM} and w_{BM} are taken as applicable to wind power generation project activities as $w_{OM} = 0.75$ and $w_{BM} = 0.25$. Reference: Page 16 of "Tool to calculate the emission factors for an electricity system", Version 02.
Value applied:	0.90589 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated ex ante as per "Tool to calculate the emission factors for an electricity system, ver. 02" as follows: $EF_{grid,CM,y} = 0.75x\ EF_{grid,OM,y} + 0.25x\ EF_{grid,BM,y}$
Any comment:	It is calculated *ex ante* basis and will remain same throughout the crediting period.

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

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Estimation of net electricity generation and emission reductions:

Installed capacity = 22.50 MW
Operating hours in a year = 365*24 = 8,760 Hours
PLF = 25.68%

Estimated Annual Electricity Export (MWh) = Installed Capacity (MW) * Operating Hours (h) * PLF (%)
= 22.50 * 8,760 * 25.68%
= 50,615.28 MWh

Assumed Electricity import = 0

Net Electricity Supplied to the NEWNE grid per year ($EG_{PJ,y}$) = Electricity export – Electricity import
= 50,615.28 – 0
= 50,615.28 MWh

As per equation (1) of section B.6.1: Baseline emissions (BE_y) = $EG_{PJ,y} \times EF_{grid,CM,y}$
For the project activity baseline emissions (BE_y) = 50,615.28*0.90589 = 45,851 tCO_2e

As per equation (10) of section B.6.1: $ER_y = BE_y$

Therefore, annual emission reductions in NEWNE grid (ER_y) = BE_y = 45,851 tCO_2e

(Detailed calculations of power generation and CERs are provided in attached Excel sheet).

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

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The fixed crediting period of ten years will start from the date of registration. The estimated emission reductions for chosen crediting period are as follows:

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)
2010-11	0	45,851	0	45,851
2011-12	0	45,851	0	45,851
2012-13	0	45,851	0	45,851
2013-14	0	45,851	0	45,851
2014-15	0	45,851	0	45,851
2015-16	0	45,851	0	45,851
2016-17	0	45,851	0	45,851
2017-18	0	45,851	0	45,851
2018-19	0	45,851	0	45,851
2019-20	0	45,851	0	45,851
Total (tonnes of CO_2e)	**0**	458,510	**0**	458,510

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_{export}
Data unit:	MWh (Mega-watt hour)
Description:	Electricity exported to the grid by the project activity in year y
Source of data to be used:	Monthly Report on Generation and Compensation (Credit report)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50,615.28 MWh
Description of measurement methods and procedures to be applied:	The main meters measure the electricity exported to the grid as well as the electricity used by the project activity. The electricity exported will be measured continuously by these meters and recorded monthly by the representatives of MPPKVV CO. LTD. and the authorized representative of the contractor (SISL) as per the applicable provisions of the power purchase agreement. Monthly Report on Generation and Compensation (Credit report) is issued to the project participant after apportioning the electricity data from the main

	meters readings. Credit report contains details of export, import, and net export and signed by MPPKVV CO. LTD. authorities.
QA/QC procedures to be applied:	*Calibration Frequency:* Once in a year. *Accuracy:* 0.5%
Any comment:	The data (electricity exported to the grid) will be archived on electronic media as well as on paper. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	EG_{import}
Data unit:	MWh (Mega-watt hour)
Description:	Electricity imported (consumed) to the project activity in year y.
Source of data to be used:	Monthly Report on Generation and Compensation (Credit report)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 MWh (assumed)
Description of measurement methods and procedures to be applied:	The main meters measure the electricity exported to the grid as well as the electricity import by the project activity. The electricity imported will be measured continuously by these meters and recorded monthly by the representatives of MPPKVV CO. LTD. and the authorized representative of the contractor (SISL) as per the applicable provisions of the power purchase agreement. Monthly Report on Generation and Compensation (Credit report) is issued to the project participant after apportioning the electricity data from the main meters readings. Credit report contains details of export, import, and net export and signed by MPPKVV CO. LTD. authorities.
QA/QC procedures to be applied:	*Calibration Frequency:* Once in a year. *Accuracy:* 0.5%
Any comment:	The data (electricity imported, consumed, from grid) will be archived on electronic media as well as on paper. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	$EG_{PJ,y}$
Data unit:	MWh (Mega-watt hour)
Description:	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*.

Source of data to be used:	Monthly Report on Generation and Compensation (Credit report)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50,615.28 MWh
Description of measurement methods and procedures to be applied:	Net electricity supplied to the grid will be calculated as $EG_{PJ,y} = EG_{export} – EG_{import}$
QA/QC procedures to be applied:	The data can be cross-checked with the invoices raised for electricity sold.
Any comment:	The data (electricity supplied to the grid) will be archived on electronic media as well as on paper. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	**$EG_{export, controller}$**
Data unit:	MWh (Mega-watt hour)
Description:	Daily gross electricity generation by each WTG at controller
Source of data to be used:	Daily Generation Report as per CMS connected with the controller of each WTG
Value of data	9.2448 for one WTG
Description of measurement methods and procedures to be applied:	The controller at the WTG measures the gross electricity generated on continuous basis. The controller readings would be available at the CMS.
QA/QC procedures to be applied:	In case of any problem related to the controller, the WTG will automatically get shut down and the controller will be replaced by a new controller immediately.
Any comment:	The data on daily gross electricity generated at controller will be archived in electronic media. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Description of the monitoring plan:

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The monitoring equipments and their locations in the systems:

Metering equipment, which consists of main and check meters, having technical standard of 0.5% accuracy class, does primary monitoring. The meters installed at metering point has four quadrants, three phase, and four wire provision for online reading. The metering is done at the 33 kV, metering yard located at site having main meters which are connected with the WTGs of the project activity. There are two main meters installed at project site: one is connected with seven WTGs (1500 kW each) of the project activity and six WTGs of 600 kW each of other project activity and second meter is connected with eight WTGs (1500 kW each) of project activity and four WTGs of 600 kW each of other project activity.

The check meters have been installed at the same locations where main meters are located. The readings of the check meters will be taken along with the readings of the main meters and will be used in case main meters stop functioning properly.

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 WTG. Each WTG is equipped with an integrated electronic controller. The generation data of individual machine can be monitored as a real-time entity at the controller installed at individual WTG.

Troubleshooting Contingency Plan:

-If electrical energy computed from the main meter in any month differs from the readings of the check meter by more than ± 0.5% both the meters shall be tested as per ISS. If on such testing the main meter error is found to exceed the permissible limit but check meter reading error found within the limit, the check meter reading will be used. If error in both main and check meters are found beyond permissible limits, the main and the check meters shall be immediately repaired and recalibrated and correction will be applied, as agreed between the parties, to the monthly main meter readings to arrive at the correct energy for billing purpose for the period of the month up to the time of such test repair and recalibration. The correction factor means the percentage of error between standard check meter and main meter. The meters will be used only after calibration.

-If during any of the monthly meter readings, the variation between the main and check meter is more than 0.5%, all the meters shall be re-tested and calibrated immediately.

-If both main and check meter fail to record energy due to any reason whatsoever, the energy net exported during the period of outrage will be calculated by apportioning the net export of the electricity recorded at the energy meter, owned by MPPKVV CO. LTD and located at the sub-station, dedicated to the wind farms developed at Palsodi site by M/s Ruchi Soya Industries Limited and M/s Ruchi Infrastructure Limited as follows:

Net export of the electricity from i^{th} WTG = (Total net export of the electricity from entire wind farm as recorded at energy meter installed at the sub-station) x (Net export of the electricity from i^{th} WTG as recorded on its controller / Sum of net exports from all WTGs of the wind farm as recorded on their controllers).

The project participant, RSIL, has entered into a contract with Suzlon Infrastructure Services Limited for operating and maintenance of the windmills installed in the project activity at Palsodi site. As per the agreement, Suzlon Infrastructure Services Limited (SISL) will prepare and submit a monthly operating status report.

Please refer to Annex 4 for further details on monitoring.

The daily production report shall be made available online containing the following:

- Daily production for each WTG
- Accumulated production for each WTG

• Daily WTG and grid availability
• Details of stoppages

The project participant has also entered into a power purchase agreement with MPSEB and the operating records would be maintained as per the agreement.

At the project site 15 WTGs, rated capacity 1500 kW each, are installed in the project activity. There are two main meters installed – one is connected with 7 WTGs and second is connected with remaining 8 WTGs of the project activity. Earlier at the time of registration of the project activity no other WTG was connected to either of the main meter installed. Now, the main meter connected with seven WTGs of the project activity has also been connected with six new WTGs, 600 kW each, of another project activity. Similarly, the main meter connected with eight WTGs of the project activity has also been connected with four new WTGs, 600 kW each, of another project activity.

As new WTGs have been connected with both the energy meters apportioning would be carried out. The apportioning procedure to calculate net electricity export to the grid by the WTGs of the project activity has been described in Annex 4. In future if any more WTG is connected with any of the main meter of the project activity same apportioning procedure will be applied as proposed in Annex 4.

Procedure for apportioning of electricity supplied to the grid where dates of monitoring period are not matching with the dates of credit reports:
It may be possible that the dates of the monitoring period are not same as of credit reports. In such case apportioning will be carried out as follows:

The apportioning will be done as per the ratio of net electricity generated at controllers of the WTGs of the project activity. The daily net electricity generated at controller / CMS is monitored by the contractor and sent to the project participant. Net electricity generation for 24 hrs is recorded at the CMS. The CMS readings are archived electronically. After every 24 hrs, system automatically generates the new file for the next day.

The created file then accessed from the CMS and the same is forwarded to the project participant on daily basis through auto generated mail. In case of any problem related to the controller, the WTG will automatically get shut down and the controller will be replaced by a new controller immediately. Any change happening in controller will be reported in the concerned monitoring report during verification. Data will be used for deriving a ratio for apportioning. The apportioning is demonstrated below for the WTGs of the project activity:

Let us assume,
X = Sum of the net electricity generation at controller of the WTGs of the project activity during the partial period of the corresponding period of main meter reading (kWh)

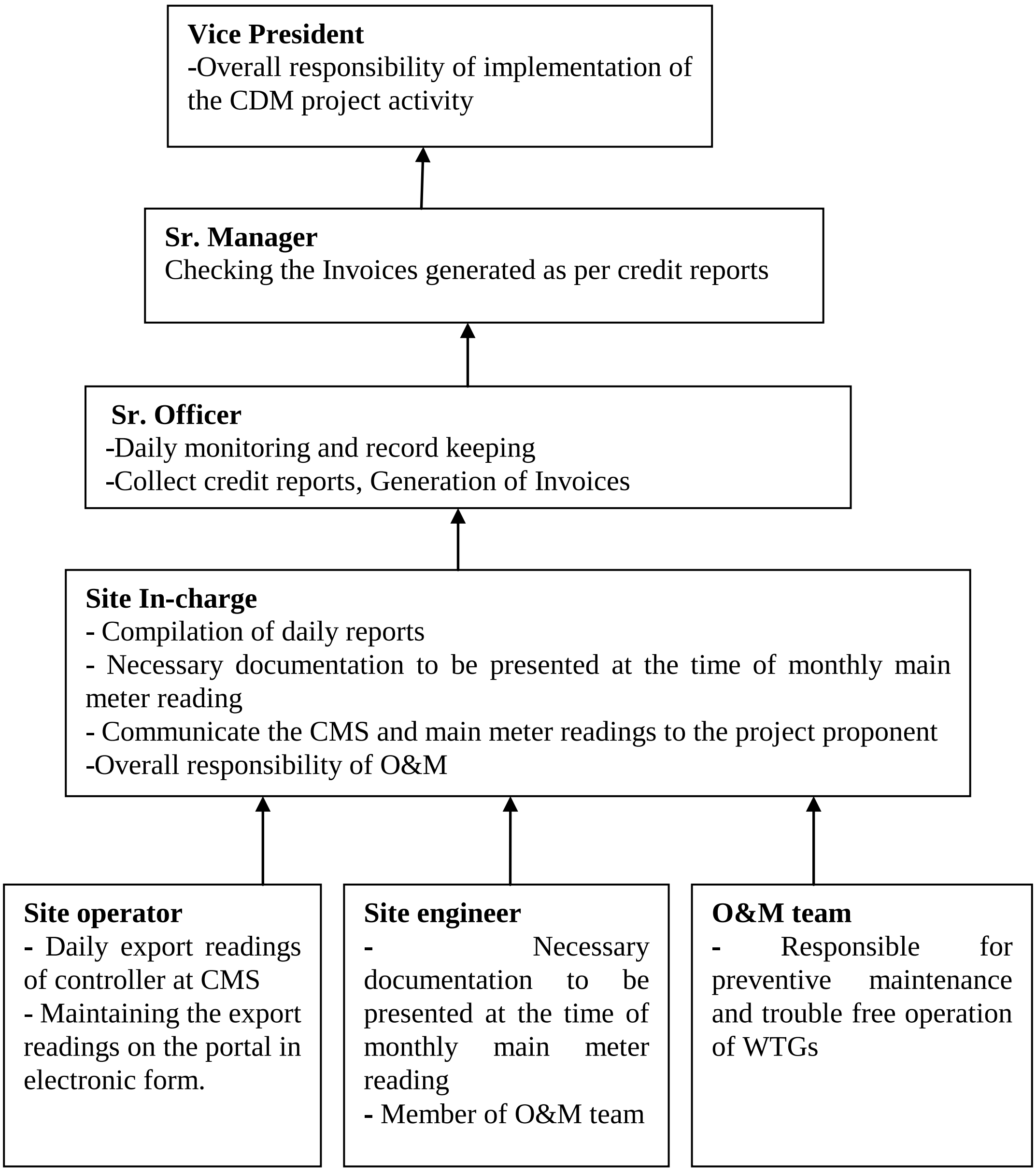
Y = Sum of the net electricity generation at controller of the WTGs of the project activity during the full period of main meter reading (kWh)

Therefore, ratio of the net electricity generation by the WTGs of the project activity during the partial period (Z) = X/Y

If G = Net electricity supplied by the WTGs of the project activity to the grid during the corresponding full period of main meter reading as per credit reports (kWh)

Then net electricity supplied by the WTGs of the project activity to the grid during the partial period (for calculating emission reduction for partial period) = G*Z

Operational and organizational chart for monitoring:



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):

>>

The date of completion of the application of baseline and monitoring methodology:
29/07/2010

Name of the person(s) / entity (ies) responsible to apply the baseline and monitoring methodology:
M/s Ruchi Soya Industries Limited (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:

>>
20/11/2007 (The date of purchase order of the WTGs)

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

>>
20 Years 0 Months

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

C.2.1. Renewable crediting period:

Not Selected

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:

>>
31/12/2010 or the date of registration with UNFCCC whichever is later.

C.2.2.2. Length:

>>

10 years 0 months

SECTION D. Environmental impacts

>>

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

>>

Wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. As per the Schedule 1 of notification issued by Ministry of Environment and Forests (MoEF), Government of India on September 14, 2006, thirty-nine activities are required to undertake environmental impact assessment studies[34]. The proposed project activity does not fall under the list of activities requiring EIA as it will not involve any negative environmental impacts. Thus, no detailed EIA study was conducted. However, an in-house environmental impact assessment was conducted and summarized below –

During construction phase

The construction phase involved erection of WTGs at the project activity site. Although movement of materials for erection produced some dust pollution, the impacts were negligible and do not have any significant impact on the local environment.

The project area does not have any housing structures/dwelling units hence Rehabilitation and Resettlement would not be an issue. The project has provided job opportunities by way of casual labour, skilled labor and office staff not only during the construction but also during the operation of project activity. Adverse impact on the health and culture of local residents is not anticipated.

No Historical and Cultural Monuments have been affected due to project location as there is no archaeological monument located as per the Archaeological Survey of India. The project site and immediate neighborhood areas with pleasing architectural design that blends with the landscape does have a positive impact on the aesthetics of the present surrounding of the site.

During operation phase

Impact on Air

There are absolutely no negative impacts on air due to the project activity, as it will not emit any local and global pollutant in the atmosphere.

Impact on Noise

Even though the project activity creates noise when WTGs rotate but the noise level remains well within the limit and do not disturb the local people.

Impact on water

[34] http://envfor.nic.in/legis/eia/so1533.pdf pages 10-18

No water is consumed for the project activity and no effluent is discharged from the project activity and hence, there is no impact on water due to the project activity.

Impact on bio-diversity

The installation of a wind farm does not cause negative impact on biodiversity. It does not affect flora and fauna in any way.

Other impacts

The operation of the WTGs has brought certain changes in the socio-economic and cultural environment by providing certain employment and livelihood opportunities improved the quality of life of the people in the surrounding habitations and also by providing cleaner environment and better health conditions to the people in the neighboring villages.

The generation of electricity from such clean process would contribute towards meeting the state's deficit in electricity requirements.

It shows that the proposed project activity does not have any significant negative impact on local and global 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 would not have any significant adverse environmental impacts and also it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. The only document, which is remotely connected, is the 'No Objection Certificate', which has been issued by the Government of Madhya Pradesh in the case of the project activity.

SECTION E. Stakeholders' comments

>>

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

>>

RSIL conducted a stakeholder's consultation meeting on 13th May, 2008 at the project activity site, Village – Palsodi (Ratlam), to get the comments and suggestions of the local stakeholders on the project activity. Following are the stakeholders identified for the project activity:

- Local Community
- Non Government Organizations
- Village Panchayat
- Wind Farm Developers (Suzlon)
- Consultants

Formal invitation letters were sent on 25/04/2008 to different stakeholders for the stakeholder's consultation meeting for the CDM project activity. The stakeholders present in the meeting were local villagers, deputy sarpanch (village chief), ex sarpanch (village chief), teachers from local school, Gram

Panchayat (Local Governing Body of a Village) members, employees of Suzlon etc. The list of the persons attended the stakeholders' consultation meeting is available with the project participant. The project participant made all the necessary arrangements for the meeting like arrangement for sitting, putting a banner, photography, provision of refreshments etc. The chairperson was elected for the meeting among the present stakeholders. The presentations were made on Kyoto Protocol, Clean Development Mechanism, role of the project activity in mitigating the GHGs emissions etc. in local language. The chairperson invited the comments from the persons present in the meeting and the concerned persons made responses.

The minutes of the meeting were written and signed by the chairperson. The minutes of the meeting will be made available to the DOE at the time of validation and verification of the project activity.

E.2. Summary of the comments received:

>>

The project activity is situated in the tribal area. The tribal people were happy with the project activity as it generated jobs to some of local persons and developed the site, approach road etc. The company in participation with local tribal people has provided amenities like solar lanterns, toilets / bathrooms inside the house, basic education etc. They were also interested to know the ways to mitigate the GHG emissions at local village level.

The meeting was very cordial and ended on a positive note. No adverse comments were received. It would be appropriate to state at this point that the stakeholders, particularly the local people / representatives left the meeting with a clear understanding of the background of the project activity and its relevance under the Clean Development Mechanism on Climate Change. They were strongly supporting the project activity and were happy due to the potential benefits to their local area.

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

>>

Only positive comments were received. The project is welcomed by all the stakeholders because it is environmentally clean, generates income and jobs, supports the development of the nearby rural areas and the state, reduces dependence on imported fuels, etc.

No corrective actions were recorded due to the absence of negative comments established. The list of people attended the meeting and the minutes of the meeting are available with the project Participants and will be made available to the validator at the time of validation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	M/s Ruchi Soya Industries Limited
Street/P.O.Box:	7/5 South Tukoganj, Nath Mandir road
Building:	301, Mahakosh House
City:	Indore
State/Region:	Madhya Pradesh
Postfix/ZIP:	452001
Country:	India
Telephone:	0731-2513281
FAX:	0731-2513285
E-Mail:	vinay_shah@ruchigroup.com
URL:	www.ruchigroup.com
Represented by:	
Title:	Vice President (Banking)
Salutation:	Mr.
Last Name:	Shah
Middle Name:	-
First Name:	Vinay
Department:	Finance
Mobile:	+919826030109
Direct FAX:	+917312529367
Direct tel:	+917312528352; +917314017206
Personal E-Mail:	vinay_shah@ruchigroup.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Parties included in Annex I is involved in this project activity.

Annex 3

BASELINE INFORMATION

To evaluate the emission factor for NEWNE grid equation (8) of section B.6.1 is used follows:

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

The $EF_{grid,OM,y}$ is calculated as latest 3-year generation weighted average using latest CEA database[35] (Baseline Carbon Dioxide Emission database, Version 4.0) as follows:

Operating margin CO_2 emission factor for NEWNE grid:
Simple Operating Margin (including imports) in the year 2005-06 = 1.01948 tCO_2/MWh
Simple Operating Margin (including imports) in the year 2006-07 = 1.00835 tCO_2/MWh
Simple Operating Margin (including imports) in the year 2007-08 = 0.99917 tCO_2/MWh

Net generation in operating margin in the year 2005-06 = 359,270,979.80 MWh
Net generation in operating margin in the year 2006-07 = 379,470,597.76 MWh
Net generation in operating margin in the year 2007-08 = 401,641,585.97 MWh

Total net generation in operating margin during last three years, 2005-06, 2006-07 & 2007-08
= 1,140,383,163.53 MWh

Net Emissions in operating margin in the year 2005-06 = Simple OM x Net generation
= 1.01948 x 359,270,979.80 = 366,269,578.49 tCO_2

Net Emissions in operating margin in the year 2006-07 = Simple OM x Net generation
= 1.00835 x 379,470,597.76 = 382,639,177.25 tCO_2

Net Emissions in operating margin in the year 2007-08 = Simple OM x Net generation
= 0.99917 x 401,641,585.97 = 401,308,223.45 tCO_2

Total Net Emissions in operating margin during last three years, 2005-06, 2006-07 & 2007-08
= 1,150,216,979.19 tCO_2

Operating margin CO_2 emission factor ($EF_{grid,OM,y}$) = 1,150,216,979.19 / 1,140,383,163.53
= 1.00862 tCO_2/MWh

The value of $EF_{BM,y}$ has been taken from CEA data (Version 4.0) as latest value (2007-08) of build margin for NEWNE grid as follows:

<u>Build margin CO_2 emission factor for NEWNE Grid:</u>
$EF_{grid,BM,y} = EF_{NEWNE,BM,(2007-08)}$ = 0.59771 tCO_2/MWh

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

Combined margin CO_2 emission factor for NEWNE grid:

$EF_{grid, CM, y}$ = 1.00862*0.75 + 0.59771*0.25 = 0.75646 + 0.14943 = 0.90589 tCO_2/MWh

Combined margin CO_2 emission factor for NEWNE grid ($EF_{grid, CM, y}$) = 0.90589 tCO_2/MWh

The emission factor calculated *ex-ante* and will remain same throughout the crediting period.

Annex 4

MONITORING INFORMATION

The project Participant has undertaken maintenance and services agreement with Suzlon Infrastructure Services Limited (SISL), the contractor. The performance of the WTGs, safety in operation and scheduled / breakdown maintenances are organized and monitored by the contractor. So the authority and responsibility of project management lies with the contractor.

The project activity essentially involves generation of electricity from wind, the employed WTGs can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. Thus no special ways and means are required to monitor leakage from the project activity.

Metering:

The metering arrangement is done at site as per the provisions of the state electricity board. Billing of the metered energy is being carried out on the monthly basis. The main meters' readings shall be carried out by the Parties (MP Pashchim Kshetra Vidyut Vitaran Company Limited (hereinafter called "MPPKVV CO. LTD.") and Contractor (SISL)).

Metering Equipment and Calibration:

Main meters and check meters:

-Two main meters are installed-one main meter is connected with seven WTGs of the project activity and six more WTGs of 600 kW each (total connected capacity 14.10 MW) and second main meter is connected with eight WTGs of the project activity and four more WTGs of 600 kW each (total connected capacity 14.40 MW) . These meters record export, import and reactive electrical energy. The main meters are installed and owned by MPPKVV CO. LTD. These meters shall be tested, checked for accuracy once in a year in the presence of the parties and also be calibrated and adjusted once in a year.

-Two check meters are installed in parallel with the already installed main meters. These check meters have same specifications as of main meters and record export, import and reactive electrical energy. The check meters shall also be tested, checked for accuracy once in a year in the presence of the parties and also be calibrated and adjusted once in a year.

-The meters shall be deemed to have been working satisfactorily if the errors as determined in the tests are within the permissible limit as allowed in the relevant IS specification applicable to high precision energy meters.

-The main and check meters shall be tested by the meter relay testing staff of the MPPKVV CO. LTD. jointly with the staff of the company and results and corrections so arrived at mutually shall be applicable and binding on both the parties.

Controller:

The controller installed on each WTG records total generation of the electricity by the WTG. Its primary use is to gather data from the anemometer (weather station) located on the top of the wind turbine. With the collected data the controller points the turbine in the most desired direction with respect to wind direction. It controls the operations of the WTG to optimize working of the WTG through Central Monitoring System (CMS). The controller does not require calibration as it operates with the software.

Meter Readings:
A monthly reading of power supplied to the grid at the main/check meters shall be jointly undertaken by the representatives of MPPKVV CO. LTD. and the authorized representative of the contractor (SISL). As per the applicable provisions mentioned in the power purchase agreement the main/check meters' readings will be taken in the middle of each calendar month for previous month as far as possible. Both representatives of MPPKVV CO. LTD. and authorized representative of the contractor (SISL) will jointly certify the main meters' readings.

At controller entire day generation is recorded by the end of day (00:00). This generation is then uploaded on customer's (project participant) portal, which remains there for three years. All WTGs are connected to a central monitoring system (CMS) located at project site, from where any connected WTG is accessible from single point.

The main meters' readings are noted in the MPPKVVCL register and sent to its office. Individual metering statements are generated in the MPPKVVCL office by apportioning and sent to the project participant in form of Monthly Report on Generation and Compensation (Credit report). The project participant generates the invoice as per the credit report. The electricity export and import records as mentioned in the credit report shall form the basis of estimation of emission reductions in the project activity.

Apportioning Procedure:
Procedure to calculate export of electricity by the WTGs of the project activity:
The main meters and check meters record electricity data of WTGs of the project activity and some more WTGs not part of the project activity. Let us assume that the main meter and check meter is connected with n WTGs of the project activity and m WTGs of other project activity. Let us assume,

$EGexport_n$ = Electricity exported to the grid from n WTGs of the project activity (share of main meter reading)
EGexport = Electricity exported to the grid from all (n+m) WTGs connected as recorded at the main meter.
$EG_{export,controller,n}$ = Electricity exported by n WTGs as recorded at the controllers
(Note: Electricity generated by WTG at the controller is monitored at the Central Monitoring Station (CMS) and recorded daily in electronic form)
$EG_{export,controller,sum}$ = Sum of the electricity exported by all (n+m) WTGs connected to the main meter as recorded at their controllers

Calculation of multiplication factor for export of electricity to the grid by n WTGs:
The export multiplying factor is calculated as the ratio of electricity exported by all (n+m) WTGs connected to the main meter as recorded at the main meter to the sum of electricity export by all (n+m) WTGs connected to the main meter as recoded on their controllers. Thus,

Export multiplying factor (Mi) = EGexport / $EG_{export,controller,sum}$

Electricity exported to the grid from n WTGs is evaluated as:

$EGexport_n$ = Mi x $EG_{export,controller,n}$

<u>Procedure to calculate import of electricity by individual WTG:</u>

Let us assume,

$EGimport_n$= Import of electricity by n WTGs at main meter

EGimport = Electricity imported (consumed) by all (n+m) WTGs from the grid as recorded at the main meter

Calculation of multiplication factor for import:

The controller does not record import. Therefore, apportioning for energy imported by n WTGs is also done on the basis of electricity exported and recorded at controller of each WTG and the total electricity imported by all WTGs as recorded at the main meter. The import multiplication factor is calculated as the ratio of electricity imported (consumed) by all WTGs from the grid as recorded at the main meter to the sum of electricity export by all the WTGs connected to the main meter as recoded on their controllers. Thus,

Import multiplying factor (mi) = EGimport / $EG_{export,controller,sum}$

Electricity imported from the grid by n WTGs is evaluated as:

$EGimport_n$ = mi x $EG_{export,controller,n}$

***Net electricity exported to grid by n WTGs ($EG_{PJ,y}$)* = $\mathbf{EGexport_n}$ – $\mathbf{EGimport_n}$**

Secondary Monitoring and Contingency Plan:

-If electrical energy computed from the main meter in any month differs from the readings of the check meter by more than ± 0.5% both the meters shall be tested as per ISS. If on such testing the main meter error is found to exceed the permissible limit but check meter reading error found within the limit, the check meter reading will be used. If error in both main and check meters are found beyond permissible limits, the main and the check meters shall be immediately repaired and recalibrated and correction will be applied, as agreed between the parties, to the monthly main meter readings to arrive at the correct energy for billing purpose for the period of the month up to the time of such test repair and recalibration. The correction factor means the percentage of error between standard check meter and main meter. The meters will be used only after calibration.

-If during any of the monthly meter readings, the variation between the main and check meter is more than 0.5%, all the meters shall be re-tested and calibrated immediately.

-If both main and check meter fail to record energy due to any reason whatsoever, the energy net exported during the period of outrage will be calculated by apportioning the net export of the electricity recorded at the energy meter, owned by MPPKVV CO. LTD and located at the sub-station, dedicated to the wind farms developed at Palsodi site by M/s Ruchi Soya Industries Limited and M/s Ruchi Infrastructure Limited as follows:

Net export of the electricity from i^{th} WTG = (Total net export of the electricity from entire wind farm as recorded at energy meter installed at the sub-station) x (Net export of the electricity from i^{th} WTG as recorded on its controller / Sum of net exports from all WTGs of the wind farm as recorded on their controllers)

Operational and organizational structure for monitoring
Monitoring responsibility - contractor (SISL)
-Daily meter reading of controller at each WTG is recorded in electronic form.
-Compilation of daily reports for monthly monitoring will be done by site incharge.
-Site incharge/site engineer will do necessary documentation and will present at the time of monthly main / check meters' readings by the representative of the MPPKVV CO. LTD. also they will be authorized representative to jointly certify the meter reading.
-Site incharge will communicate all meter readings to the project participant.
-O&M team at site will be responsible for preventive maintenance and trouble free operation of WTGs under the overall responsibility of site in-charge. He/she will insure preventive maintenance of the WTGs and all meters.

Monitoring responsibility (Project Participants)
Vice President:
-Overall CDM project management responsibility including implementation.

Sr. Manager:
-Checking the invoices generated as per credit reports

Sr. Officer:
-Daily monitoring and record keeping
-Collect credit reports
-Raising invoices

Appendix -1

Date of Commissioning

Location No.	Date of Commissioning	Installed Capacity
P143, P145, P148, P150, P154	29/02/2008	7.50 MW
P109, P112, P113, P114, P131, P137, P140	29/03/2008	10.50 MW
P101, P104, P107	30/05/2008	4.50 MW
Total Installed Capacity		**22.50 MW**