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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

>>

19.5 MW wind power project in Ossiya, Rajasthan by Gujarat Fluorochemicals Limited (GFL)
Date: 13/12/2012
Version: 06

A.2. Description of the project activity:

>>

Gujarat Fluorochemicals Limited (GFL) is essentially in the business of manufacturing chemicals. In view of India's sustainable development priorities to generate power through non-conventional energy sources, GFL has taken up the initiative to establish wind turbines in Jodhpur district of Rajasthan.

Description of Project Activity:

The project activity is the installation and operation of 13 numbers of 1500 kW Suzlon make (S-82) wind turbine generators in Jodhpur district of Rajasthan State. The project activity has been undertaken to harness the available wind energy in the district Jodhpur in State of Rajasthan state to generate cleaner power and sell it to the grid. The aggregate installed capacity 19.5 MW will generate approximately 36.64 GWh of electricity per annum, which will be supplied to NEWNE grid. The project activity will help to reduce GHG emissions by avoiding use of fossil fuel to generate power as in NEWNE Regional Grid, power is predominantly generated by coal based thermal power plant.

Pre-project scenario:

In the pre project scenario, the equivalent amount of electricity would have been generated by grid connected fossil fuel based power plants.

Baseline scenario:

This project activity is wind based renewable energy source, zero emission power project connected to the NEWNE regional grid. The project activity will generate approximately 36.64 GWh of electricity that will be supplied to NEWNE Grid. Hence the baseline is 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 in the regional Grid.

The project activity reduces the greenhouse gas emissions by generation of electricity from renewable and clean energy source, wind. The electricity thus generated is connected to the regional grid and supplied to the state electricity board. The main greenhouse gas that is prevented from being emitted into atmosphere is CO_2 which would have otherwise been emitted from the fossil fuel fired power plants that are connected to the grid.

Ministry of Environment and Forests, Govt. of India has stipulated the social well being, economic well being, environmental well being and technological well being as the four indicators for sustainable development in the host country approval eligibility criteria for Clean Development Mechanism (CDM) projects[1]. The project participant's view on the contribution of this project activity towards sustainable development follows these four indicators as explained below:

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

⇒ **Social well being:**

- The project activity will create employment opportunities to the community during construction, operation as well as for the long term maintenance. The local workforce technical skills and knowledge will improve thus leading to capacity and knowledge building.
- In addition to above the project activity will lead to local infrastructure development.

⇒ **Environmental well being:**

- The project activity will utilize available wind to generate power; hence will reduce the emissions of green house gases (GHG) to the atmosphere by avoiding the use of fossil fuel for power generation.
- The project activity helps in conservation of depleting fossil fuels such as coal, oil, natural gas which at present are predominantly used for power generation.
- The project activity will also help to reduce air pollutants e.g. SOx, NOx.

⇒ **Economic well being:**

- The generated electricity will be sold to NEWNE regional grid, thereby improving the grid frequency and availability of electricity to the consumers which will provide new opportunities for industries and economic activities to be setup thereby resulting in greater employment, ultimately leading to overall development.
- The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

⇒ **Technological well being:**

- The project activity has employed higher capacity wind turbines which will lead to better utilization of resources (wind), as capacity utilization factor for higher capacity wind turbines are more than lower capacity machine.
- Also the success of proposed project activity will lead to promote the installation of higher capacity machine.

A.3. Project participants:

>>

Name of the party(ies) involved ((Host) indicates Host party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant(Yes/No)
Government of India (Host)	Private entity - Gujarat Fluoro chemicals Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

>>

Village: Ossiya
District: Jodhpur

A.4.1.1. Host Party(ies):

>>

India

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

>>

Rajasthan

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

>>

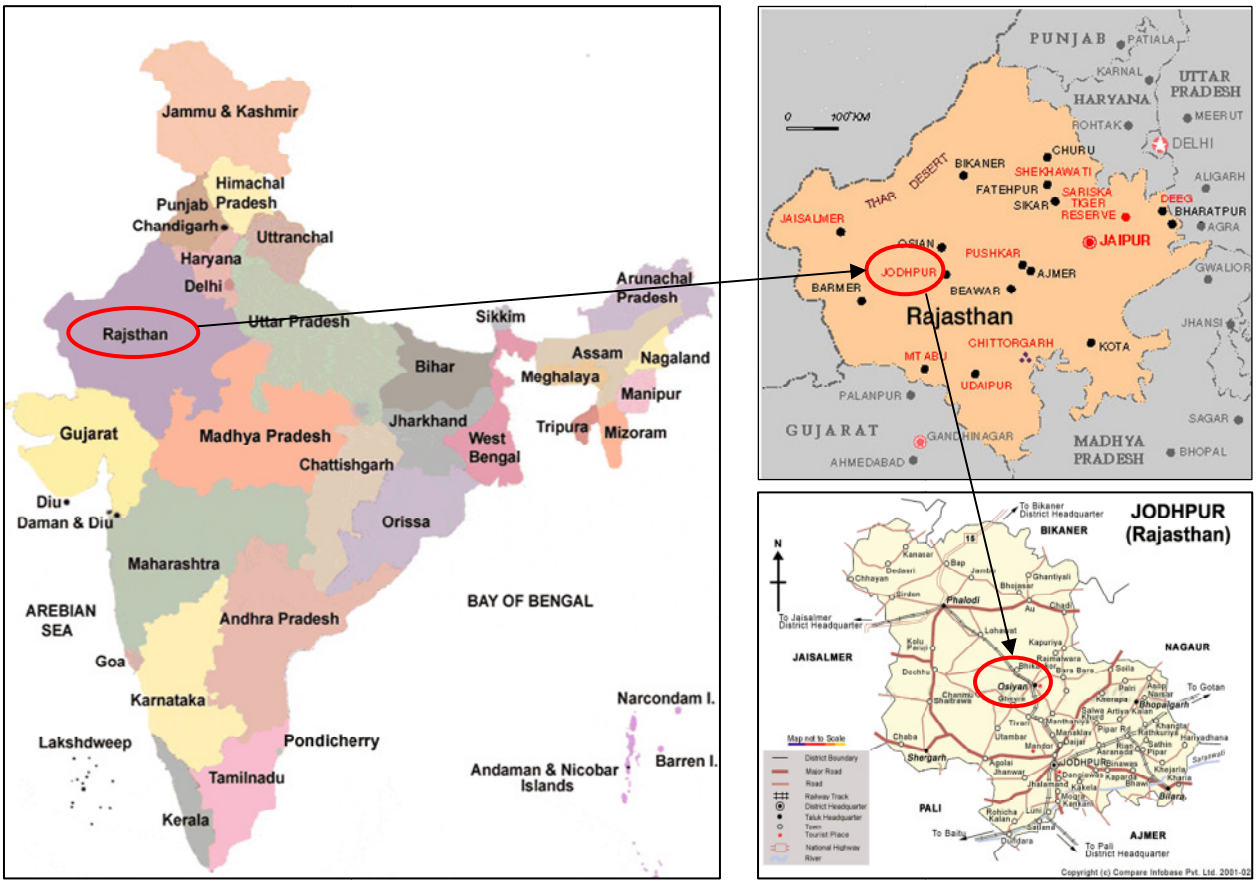
Jodhpur District

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

>>

The project site is well connected by road and railways. It is located at village Ossiya in District Jodhpur of Rajasthan State, India. The geo-coordinate of WTGs is given in the table below:

S. No.	Unique ID	Location	Latitude N	Longitude E
1.	J741	Ossiya	N 26° 45' 10.1"	E 73° 02' 54.6"
2.	J742	Ossiya	N 26° 44' 59.2"	E 73° 03' 03.5"
3.	J743	Ossiya	N 26° 44' 48.4"	E 73° 03' 11.1"
4.	J745	Ossiya	N 26° 44' 29.2"	E 73° 03' 11.2"
5.	J746	Ossiya	N 26° 44' 19.9"	E 73° 03' 21.8"
6.	J747	Ossiya	N 26° 43' 32.7"	E 73° 03' 14.0"
7.	J748	Ossiya	N 26° 43' 14.0"	E 73° 02' 49.7"
8.	J749	Ossiya	N 26° 43' 13.6"	E 73° 03' 09.9"
9.	J750	Ossiya	N 26° 43' 00.5"	E 73° 03' 13.6"
10.	J751	Ossiya	N 26° 42' 45.2"	E 73° 03' 08.8"
11.	J752	Ossiya	N 26° 42' 38.5"	E 73° 03' 22.2"
12.	J753	Ossiya	N 26° 42' 23.8"	E 73° 03' 25.0"
13.	J754	Ossiya	N 26° 42' 04.2"	E 73° 03' 16.7"



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

>>

The project activity is a grid connected electricity generation using renewable energy sources (wind) and power generation capacity is more than 15 MW, hence it can be categorised under:

Scope number: 1
Sectoral scope: Energy industries (renewable / non-renewable sources)
Methodology – ACM0002 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 13.0.0)

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

>>

The purpose of the project activity is to generate zero-emission wind power and deliver it to NEWNE regional grid. The project activity involves installation of 13 wind turbine generators in the Jodhpur district of Rajasthan that will utilise the wind energy available in the region to generate clean power. The power generated from the WTGs will be fed to grid using a step up transformer at each WTG. The project activity will supply an annual average energy of 36.64 GWh to NEWNE regional grid and hence replace the same amount of electricity from grid connected thermal power plants.

The main greenhouse gas that is prevented from being emitted into atmosphere is CO_2 which would have otherwise been emitted from the fossil fuel fired power plants that are connected to the grid.

Turbine specification:

The project activity involves installing Horizontal Axis Suzlon make 1500 KW S-82 WTGs.

The WTGs will be composed of 3 blades each (with power control) and an active system for rotor orientation. Under wind high speed, a control system will keep the power at the plant's nominal value. Under wind slow speed, a control system will optimize the energy production, selecting an optimal combination of revolutions and angle of attack.

Salient features of WTGs:

Rotor

Blades aerodynamically optimized to take varying wind velocities while delivering the maximum power. Their fail-safe tip brakes operate hydraulically and can bring a Wind Turbine to a soft stop within a few seconds without putting any undue stress on the machine.

Rotor Diameter - 82.0 m
Cut in Wind speed - 4 m/s
Rated wind speed - 14 m/s
Regulation - Pitch

Gearbox

Keeping the conversion & transmission efficiency to the maximum is probably the most important task, which was taken on with German perfection. The gearbox with its integrated design ensures precise assembly with a high level of efficiency, which requires an extremely low level of maintenance. This leads to an extensively trouble-free operational life, devoid of any alignment problems. It has the most advanced splash-type lubricating system.

Generator

The heart of the system had to be designed with extreme ambient temperatures and humid conditions in consideration. From maintenance and reliability point of view, use of a totally closed generator to keep the moisture and dust out was paramount to Suzlon. The generator used for deployed is an asynchronous type 4 pole with two speeds of operation.

Rated output -1500 KW
Operating voltage - 690 V
Frequency - 50 Hz
Cooling system - Air-cooled

Hydraulic Fluid Coupling:

The generated is connected to the high speed gearbox through hydraulic fluid coupling. Torque is transmitted by rotating oil of the couplings accelerated by the radial turbine blades. This advance coupling allows shock load free operation, excellent peak load protection and vibration separation.

Control System

The Control unit is microprocessor-based with an 8 x 40 digital display indicating all operating and error conditions. It also has a built-in graphical display showing average wind speeds and power output with daily, monthly and annual outputs amongst other parameters. The control unit keeps the Wind Turbine fully automated in the optimal operation state. Its digital interface unit helps it to be interfaced with other digital devices to be monitored and controlled remotely. The control unit can also transfer information

about the Wind Turbine to remote places via modem. Its robust design gives a highly reliable operation even in the most severe conditions encountered.

Yaw System

To get the maximum from the available wind resources means that the Wind Turbine is in line with the wind direction. This important task is handled by the yaw system equipped with two motors with reduction gearbox. The system employs a hydraulic braking system to keep the Wind Turbine fixed in the direction facing the wind. The system ensures exact alignment of the rotor to the wind direction. This is achieved through an intelligent network of sensors for wind direction and wind speed, talking to the control unit in real time resulting in higher efficiency and reduced loads caused by oblique incident flows.

The Yaw System is incorporated with twist sensors, which direct the control unit to untwist the cables if they are twisted beyond the set levels. This ensures the safety of cables even under frequent wind direction changes in the same direction.

Safety System

Safety System consists of four levels of independent systems:

- Electronic sensing of faults by the computer for immediate action.
- Independent electrical circuitry to act when over-speed is detected.
- Hydraulic sensing and active device to prevent over-speeding.
- Mechanical flexible couplings with shearing studs.

Soft Braking

It consists of a specially designed unique mechanism for protecting the Wind Turbine against heavy loads due to sudden loss in grid power. The aerodynamic brakes are applied first and the rotor disc brakes are applied subsequently, which protect Wind Turbine components against wear & tear and fatigue.

Lightning Protection

Lightning arrestors are provided along with earthing cables connected to earthing pits. This has been done at various levels of the Wind Turbine, thereby protecting the entire Wind Turbine against lightning.

The technology used in the project is environment friendly and safe to operate. No transfer of technology is involved in the project activity, as technology employed and know-how is well developed in indigenous market.

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

>>

The estimated emission reduction over the first renewable crediting period is **234,185 tCO_2e.** The annual estimation of emission reductions are furnished in the table below:

Year	Annual estimation of emission reductions (in tonnes of CO_2e)
01/04/2013 – 31/03/2014	33,455
01/04/2014 – 31/03/2015	33,455
01/04/2015 – 31/03/2016	33,455
01/04/2016 – 3103/2017	33,455
01/04/2017 – 31/03/2018	33,455
01/04/2018 – 31/03/2019	33,455

01/04/2019 – 31/03/2020	33,455
Total estimated reductions (tonnes of CO_2e)	**234,185**
Total number of crediting year	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**33,455**

A.4.5. Public funding of the project activity:

>>

The total project cost is funded through equity investment and debt (long-term) from nationalized banks in India. No public funding or overseas development assistance has been used in this 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:

>>

Approved baseline and monitoring methodology applied for the project activity is

ACM0002 Version 13.0.0 (EB 67) - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

The methodology uses the "Tool to calculate the emission factor for an electricity system" (Version 2.2.1) and "Tool for the demonstration and assessment of additionality" (Version 6.1.0) in order to calculate the emission reductions from the project activity.

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

>>

The project activity avoids the expansion of grid connected fossil fuel based power generation, as it utilises renewable resources (wind energy) to generate power.

The adopted baseline methodology ACM0002 Version 13.0.0 has been chosen for the project activity based on fulfilment of the applicability conditions as described below:

Applicability criteria - ACM0002 Version 13.0.0	Project activity measures
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 the installation of a greenfield wind based renewable power plant. Hence, this applicability criterion is satisfied.
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 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	The project activity is a greenfield project and does not involve retrofits, replacements or capacity additions to an existing plant. Hence, this criterion is not applicable.
In case of hydro power plants: o *The project activity is implemented in an*	The project activity is not a hydro power plant. Hence this criterion is not applicable.

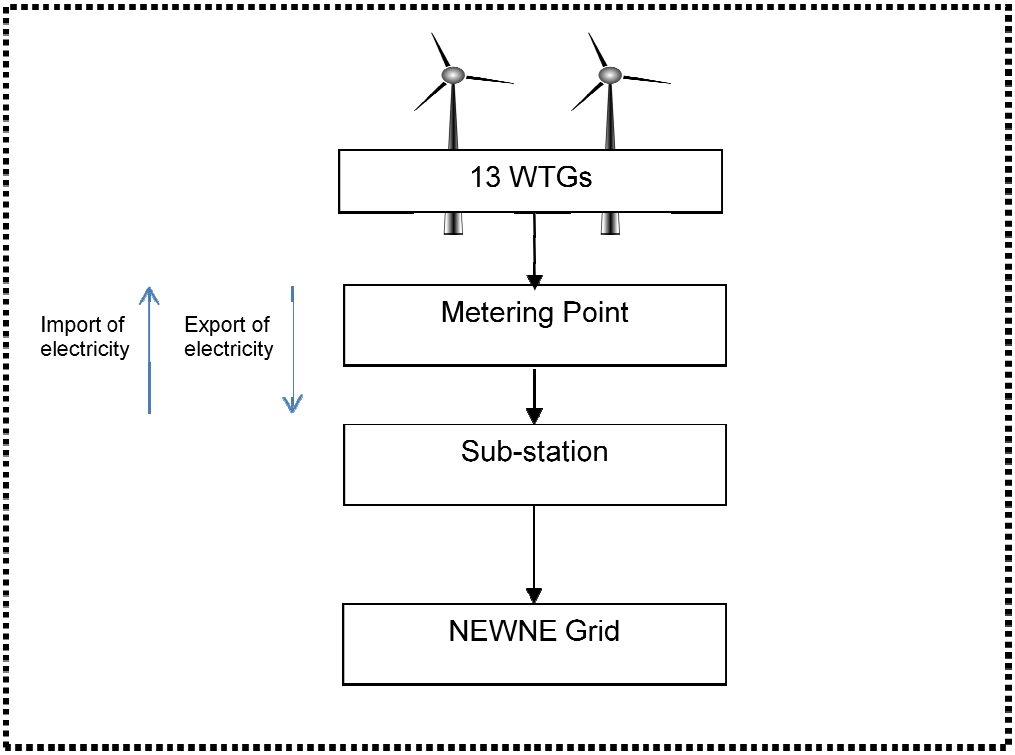
existing reservoir, with no change in the volume of reservoir; or o *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or* o *The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.*	
The methodology is not applicable to the following: • *Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;* • *Biomass fired power plants;* • *Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m^2.*	The project activity is wind based renewable electricity generation and does not involve switching from fossil fuels to renewable energy sources.
In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity is a greenfield project and does not involve retrofits, replacements or capacity additions to an existing plant. Hence, this criterion is not applicable.

It can be seen from the above table that the approved methodology ACM0002 Version 13.0.0 is applicable to the project activity.

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

>>

The schematic diagram of project boundary is as follows:



The proposed project is the installation of a new grid-connected renewable power plant, and the baseline scenario 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".

The spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints is defined as the project electricity system. For the proposed project, the spatial extent of the project boundary includes the proposed Wind Power Project and all power plants connected physically to the NEWNE Regional Grid of India.

	Source	Gas	Included?	Justification/ Explanation
Baseline	Electricity generation from power plants connected to the NEWNE Grid	CO_2	Included	Main emission source
		CH_4	Excluded	This source is not required to be estimated for wind energy projects under ACM0002
		N_2O	Excluded	This source is not required to be estimated for wind energy projects under ACM0002
Project Activity	Electricity generation from the Project	CO_2	Excluded	Wind energy generation does not have any direct GHG emissions.
		CH_4	Excluded	

		N_2O	Excluded	

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

>>

The baseline methodology has followed the one specified in "Baseline Methodology Procedure" of ACM0002 Version 13.0.0, if the project activity is the installation of a new grid-connected renewable power plant/unit; the baseline scenario is the following:

"Electricity delivered to the grid by the project 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".

The Combined Margin has been calculated using the "Tool to calculate the emission factor for an electricity system" Version 2.2.1. The Operating Margin (OM) and Build Margin (BM) emission factors have been considered from the information (CO_2 Baseline Database for the Indian Power Sector -Version 5.0) published by the Central Electricity Authority (CEA), Ministry of Power, Govt. of India. Considering the individual weightings assigned to the OM and the BM emission factors respectively,, the combined margin emission factor for the NEWNE Grid has been estimated at 0.9225 tCO_2e/MWh.

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:

As per the "*Guidance on the demonstration and assessment of prior consideration of the CDM"* Version 04, for project activities with start date before 02 August 2008, it is required to demonstrate that CDM was seriously considered in the decision to implement the project activity. Accordingly, GFL's serious consideration of CDM has been demonstrated as below:

Board of Directors of GFL decided to implement the project on the basis of proposal provided by Suzlon in its board meeting held on 22nd of October 2007. As stated in the board note, proposed project was financially unviable and project was taken up by the board only because of associated CDM benefits. Decision to develop project as a CDM project was taken by GFL's board in the meeting of 22nd of October itself.

GFL took continuing and real actions to secure CDM status for the project in parallel with its implementation. The project activity was initially implemented as part of the bundled CDM project activity "31.5 MW bundled wind power project in Rajasthan by Gujarat Fluorochemicals Limited (GFL)." The initial PDD web-hosting and HCA were for the bundled project activity. During the course of validation it was decided to implement the projects as two separate CDM projects and the PP had withdrawn the validation for the bundled CDM project activity on 04/05/2010. Each project was commissioned at different time intervals (12 MW Sadiya project activity got commissioned on 30/03/2008 (6 WTG) and 31/03/2008 (2 WTG), whereas the 19.5 MW Ossiya project got commissioned on 26/09/2009). The projects also had independent monitoring systems and locations. Thus, in order to simplify the validation process, monitoring plan, and reduce the time required to avail CDM benefits, it was decided by the PP to split the project into two separate CDM projects of 19.5 MW and 12 MW

capacities. Subsequently, it was decided to implement the project as a stand-alone CDM project activity. Therefore the initial validation was withdrawn, and the validation process was re-started for the stand-alone project activity. The chronology of events for project implementation and CDM consideration are as follows:

Date	Project Activity	CDM activity	Evidence
22/10/2007	Board resolution dated 22/10/2007 wherein the investment was considered and approved, after considering CDM revenue	Board resolution dated 22/10/2007 wherein the investment was considered and approved, after considering CDM revenue	Extract of Minutes of meeting of the Board of Directors dated 22/10/2007
13/11/2007		Communication with CDM Consultant on CDM consultancy services	Communication dated 13/11/2007
04/01/2008	Equipment Supply Agreement for Ossiya Wind farm		Agreement with SEL dated 04/01/2008
04/01/2008	Erection, Installation and Commissioning Agreement for Ossiya Wind Farm		Agreement with SEL dated 04/01/2008
04/01/2008	Agreement for Civil works and Site Development at Ossiya Wind Farm		Agreement with SEL dated 04/01/2008
04/01/2008	Agreement for maintenance (with parts & consumables) for Ossiya Wind farm		Agreement with SEL dated 04/01/2008
04/01/2008	Operation and Maintenance agreement for services for Ossiya Wind farm		Agreement with SEL dated 04/01/2008
11/02/2008		Notice for the stakeholder meeting	Notification dated 11/02/2008
09/03/2008		Ossiya stakeholder consultation meeting	Minutes of Stakeholder consultation Meeting dated 09/03/2008
27/03/2008		Appointment of CDM Consultant	Appointment letter dated 27/03/2008
04/04/2008	Indian Overseas Bank Sanction Letter (The loan sanction is for the combined project activity of Sadiya and Osiyan by the PP. The total loan sanctioned is 150 crores which covers 21 WTGs out of which 13 WTGs are for this project activity (Osiyan) and remaining 8 WTGs are for another project activity (Sadiya		Loan sanction letter dated 04/04/2008

	12 MW) of PP)		
26/04/2008		Appointment of DOE (BVC)	Contract with BVC dated 26/04/2008
25/07/2008		Initial Host Country Approval for bundled project activity	Letter from MoEF Ref. No. 4/7/2008-CCC dated 25/07/2008
12/07/2008		Web hosting of PDD on UNFCCC for global stakeholder comments - bundled project activity	http://cdm.unfccc.int/Projects/Validation/DB/784NCQNUUMQ6P7RWRH9A6G3C6MEYGL/view.html
26/09/2009	Commissioning date for the project activity		Commissioning Certificate for the project activity dated 15/10/2009
13/01/2010		Appointment of alternate CDM consultant[2]	Contract dated 13/01/2010
04/05/2010		Communication to DOE for withdrawal of project activity[3]	Letter dated 04/05/2010
04/08/2010		Appointment of TUV-Nord for project validation	Copy of contract with TUV Nord dated 04/08/2010
23/09/2010		Revised Host Country Approval (The initial Host Country Approval dated 25/07/2008 had been received for 31.5 MW wind power project in Rajasthan which is both for the Ossiya Project in Jodhpur and another project in village –Sadiya in Jaisalmer district. Hence, another Host Country Approval was applied for Ossiya 19.5 MW project which was received on 23/09/2010)	Letter from MoEF Ref. No. 4/7/2008-CCC dated 23/09/2010

[2] It was decided to terminate the contract with the previous CDM consultant about a week prior to appointment of alternate CDM consultant.

[3] The first DOE was appointed for validation of the bundled project. Subsequently it was decided to take up the project activity as a stand-alone CDM project. Therefore validation had to be re-started and validation proposals were invited again, based on which the second DOE was appointed. Similarly, the CDM consultant was also changed after it was decided to take up the project activity as a stand-alone CDM project.

25/09/2010 to 24/10/2010		Web hosting of PDD on UNFCCC for global stakeholder comments	http://cdm.unfccc.int/Projects/Validation/DB/2PRTXEX2D3L8N6SMULG87OVB1WWJPG/view.html

As demonstrated above there is less than 2 years of a gap between two consecutive real actions towards securing CDM status for the project activity. Hence, as per paragraph 8 of Annex 13 of EB 62 Guidelines on the demonstration and assessment of prior consideration of the CDM, continuing and real actions were taken to secure CDM status for the project activity.

Decisiveness of Board resolution of GFL's board meeting in which investment decision for the project was resolved demonstrates serious consideration for CDM.

The project activity is connected to NEWNE grid, which is dominated by fossil fuel based power generation plant. In the absence of the project activity, in view of the substantial energy deficit situation in the state of Rajasthan state electricity grid would have gone for new coal based thermal power plant or capacity addition in existing plants, as the power generation in Rajasthan is dominated by coal based thermal power plant. The project activity has displaced fossil fuel based electricity that would otherwise be provided by the operation and expansion of the NEWNE regional grid, hence reducing the emission of green house gases.

The "*Tool for the demonstration and assessment of additionality*" Version 06.1.0, has been applied to demonstrate the additionality for the project activity. The step-wise approach is provided below:

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

Sub-step 1a: Define alternatives to the project activity:

Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity.

Outcome of Sub-step-1a:

The proposed project activity includes the installation of 13 WTGs each having a capacity of 1500 kW for generation and supply of electricity to NEWNE grid. Hence, according to baseline methodology ACM0002 Version 13.0.0, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project 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".

Paragraph 105 of the "Clean Development Mechanism Validation and Verification Manual" Version 01.2 states that "*The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required*".

Since, the applied methodology ACM 0002 already prescribes the baseline, no further discussion on the alternatives is necessary.

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

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

Outcome of sub-step 1b:

Since, the applied methodology ACM 0002 already prescribes the baseline, no further discussion on the alternatives is necessary.

Step 2. Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a: Determine appropriate analysis method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

Benchmark analysis (Option III) is the most suitable method of analysis. This method determines the attractiveness of the project activity for the investors, as well as provides a measure of the viability of the investment to generate revenues during its operation. Hence, the Benchmark analysis method is found to be most appropriate. The investment analysis chosen is also in conformity with Guidance 19 of Annex 5, EB 62.

Sub-step 2b. – Option III. Apply benchmark analysis

Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in $/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision context.

Guidance 19 of Annex 5, EB 62 states that "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate". Since, the project activity supplies electricity to grid, hence in accordance with the guidelines, benchmark analysis has been used for demonstrating investment barrier for the project activity

Project Internal Rate of Return (IRR) is one of the most commonly used financial indicators in capital budgeting. Project IRR is considered to be the appropriate financial indicator for the project type and decision making context and is commonly applied by project promoters and financing institutions for assessment of investment decisions. Project IRR is also one of the financial indicators recognized by Additionality tool and Annex 5, EB 62. Hence, the selection of project IRR as financial indicator for additionality demonstration is appropriate for this project. Therefore, the Project IRR was found to be the most appropriate financial indicator for feasibility analysis of this project activity.

Paragraph 12 of Guidelines on investment analysis Version 5 states that 'In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local

commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR'. Since the project has used project IRR to determine financial returns from the project. Hence, WACC has been used to determine benchmark for the project.

As per paragraph 15 of the Guidelines on the assessment of Investment Analysis Version 5 (EB 62), '*If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors.*'

The project proponent has selected option (a) for calculation of the cost of equity. According to paragraph 7, Appendix of Guidelines on the assessment of Investment Analysis Version 5 (EB 62), 'In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used.'

The inflation forecast of the Central Bank for the host country, India, for the period 2007 and 2008 is not available and also the target inflation rate of the Central Bank for India is not available.

Accordingly, the average forecasted inflation rate for the host country, India, published by IMF (International Monetary Fund World Economic Outlook)[5], has been considered for the five year period from 2008-2013(five year period from project start date for the project activity) to convert the default real term return on equity values provided in the table of Appendix A of the Guidelines on the assessment of Investment Analysis (Version 5, EB 62) to nominal values by adding the inflation rate. The calculations of the inflation rate are provided below:

Source: International Monetary Fund

Year	**Inflation, average consumer prices**	**Inflation, average consumer prices**
2007	130.75	
2008	141.667	141.667
2009	157.083	157.083
2010	175.917	175.917
2011	194.478	194.478
2012	211.178	211.178
2013		226.11

[5]http://www.imf.org/external/pubs/ft/weo/2011/02/weodata/weorept.aspx?sy=2007&ey=2016&scsm=1&ssd=1&sort=country&ds=.&br=1&c=534&s=PCPI&grp=0&a=&pr1.x=15&pr1.y=10

2014		238.245
Inflation CAGR (Compounded Annual Growth Rate)	10.063%	8.687%

Compounded Annual Growth Rate of Inflation has been considered for a five year period from the Board decision and start date of project activity and the lowest of the two values has been considered as the inflation rate for the purpose of computing the nominal return on equity as a conservative approach.

Rate of return on equity or cost of equity benchmark is calculated as below:

Return on Equity for India (in real terms) [6] = 11.75%

R_E ,Return on Equity (inflation adjusted in nominal terms)[7] = (1+11.75%)*(1+8.687%)-1

R_E = 21.458%

Cost of debt is defined as the rate at which lender's agree to lend money to a project. The 'Guidance on the Assessment of Investment Analysis' clarifies that, '*In the cases of projects which could be developed by an entity other than the project participant, the benchmark should be based on parameters that are standard in the market.'*.

Accordingly, the Prime Lending Rate (PLR) quoted by the RBI at the time of decision making is identified as the appropriate yardstick considered for cost of debt.

$$WACC = \frac{E}{V} \cdot R_E + \frac{D}{V} \cdot R_D \cdot (1 - T_C)$$

Where,

V = Total investment
D = Debt component of total investment
E = Equity component of total investment
T_c = Corporate tax rate (%)
R_E = Cost of Equity (%)
R_D = Cost of Debt (%)

The debt/equity ratio for the WACC calculations has been considered as 70: 30 as per CERC (Central Electricity Regulatory Commission) tariff order[8].

Corporate tax rate has been considered as 33.99% as per the prevailing norms for the financial year 2007-08 and also the rate applicable to the project activity.

---

[6] GUIDELINES ON THE ASSESSMENT OF INVESTMENT ANALYSIS (Version 5, EB 62) http://cdm.unfccc.int/filestorage/O/H/N/OHNFC4T6RUZEQXDL20JVG7MWK35YI1/eb62_repan5.pdf?t=TVZ8bHU0bWNsfDDlQeS3BRwPeqQWMn6P0eEv

[7] Source: https://www.courses.psu.edu/for/for466w_mem14/PDFs/Ch3_Inflation.PDF

[8] Source: CERC Tariff Regulations 2004, Clause 20 (http://cercind.gov.in/13042007/Terms_and_conditions_of_tariff.pdf)

WACC = 30% * 21.458 + 70% * 13.00% * (1- 33.99%) = 12.44%

Thus the WACC benchmark works out to 12.44%[9] which has been compared with the project IRR.

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

The financial indicator, namely the project IRR, has been calculated for the technical lifetime of the project i.e. 20 years has been used as the assessment period for cash flow projections, which is also the operating life of the project activity as evidenced by the letter from the manufacturer (which conforms to Annex 15, EB 50). All relevant costs (including the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but including subsidies/fiscal incentives *where* applicable) are included.

The project IRR for project activity has been calculated on the based on following assumption:

Assumptions	Value	Units	Source
Capacity of turbine	1.5	MW	Offer from Suzlon dt. 20/09/2007
Number of turbines offered	13	Nos.	Offer from Suzlon dt. 20/09/2007
Energy Generation			
Generation	36269720	kWh	Power & Energy Consultants study report on PLF dt. 10/10/2007
Net PLF	21.23	%	Power & Energy Consultants study report on PLF dt. 10/10/2007
Tariff			
Tariff	3.48	Rs/kWh	RERC Tariff order dt. 09/03/2007 (http://www.rerc.rajasthan.gov.in/TariffOrders/JS_(PO)_Order_RE_Tariff_15.03.07.pdf)
Escalation in Tariff: First 12 Years	0.02	Rs/kWh/pa	RERC Tariff order dt. 09/03/2007 (http://www.rerc.rajasthan.gov.in/TariffOrders/JS_(PO)_Order_RE_Tariff_15.03.07.pdf)
Escalation in Tariff: After 12 Years	0.01	Rs/kWh/pa	RERC Tariff order dt. 09/03/2007 (http://www.rerc.rajasthan.gov.in/TariffOrders/JS_(PO)_Order_RE_Tariff_15.03.07.pdf)

[9] In the webhosted PDD benchmark was considered at 14.82% and hence this benchmark is conservative. Reference: http://cdm.unfccc.int/Projects/Validation/DB/2PRTXEX2D3L8N6SMULG87OVB1WWJPG/view.html

Project Cost			
Price per turbine	975.00	x Rs. 100,000	Offer from Suzlon dt. 20/09/2007
Cost per MW	650.00	x Rs. 100,000	Calculated
Total Project Cost	12675.00	x Rs. 100,000	Calculated
Debt	9285.71	x Rs. 100,000	The loan sanction is for the combined project activity of Sadiya and Osiyan by the PP. The total loan sanctioned is 150 crores which covers 21 WTGs out of which 13 WTGs are for this project activity (Osiyan) and remaining 8 WTGs are for another project activity (Sadiya 12 MW) of PP
Equity investment	3389.29	x Rs. 100,000	Calculated
Operation and Maintenance			
Total O&M Cost	17.00	x Rs. 100,000/WTG	Offer from Suzlon dt. 20/09/2007
Free O&M	1	Yrs	Offer from Suzlon dt. 20/09/2007
O&M Escalation	5.00%	%pa	Offer from Suzlon dt. 20/09/2007
Administrative Expenses			
Administrative Expenses	6.00	x Rs. 100,000	Board Note dated 18/10/2007
Escalation in administrative expenses	5.00%	%pa	Board Note dated 18/10/2007
Interest Rates			
Debt (% of total project cost)	9285.71	x Rs. 100,000	Board Note dated 18/10/2007
Loan Moratorium	1	Yr	Board Note dated 18/10/2007

Loan Repayment	9	Yrs	Board Note dated 18/10/2007
Interest rate	10.00%	%pa	Board Note dated 18/10/2007
Depreciation Rates			
Book Depreciation (SLM)	5.28%	%pa	Schedule XIV of companies act, 1956 (SLM) http://www.mca.gov.in/Ministry/latestnews/Explanatory_Statement_alongwith_Schedule_XIV_4dec2008.pdf
Tax Depreciation: WTGs	80%	%pa	Income tax rules (WDV) http://www.docstoc.com/docs/87409589/Rates-of-Depreciation-as-per-Income-Tax
Tax Depreciation: other P&M	15%	%pa	Income tax rules (WDV) http://www.docstoc.com/docs/87409589/Rates-of-Depreciation-as-per-Income-Tax
Tax Depreciation: civil works	10%	%pa	Income tax rules (WDV) http://www.docstoc.com/docs/87409589/Rates-of-Depreciation-as-per-Income-Tax
Taxation Rates			
Corporate tax rates	33.99%	%	As per Prevailing Corporate Tax Rates in FY 2009-09 Reference: http://www.bcasonline.org/webadmin/SubTop/attachedfiles/RateofIncomeTax.htm
Service tax on operations & Maintenance	12.36%	%	As per Prevailing Service Tax Rates in FY 2008-09 http://taxclubindia.com/CHARTS/21%20USEFUL%20CHARTS%2012-13.pdf
Commissioning dates	31-March-08		As per commissioning Schedule as mentioned in offer letter of Suzlon dated 27/06.2007
No of days of operation in FY 2007-08	1	day	Calculated
CER Revenue			

CERs	33455		Calculated
CER price presumed	19.7	Euro	Reuters CER Index
Exchange rate	65	INR/Euro	http://www.x-rates.com/historical/?from=INR&amount=1.00&date=2008-09-30

Internal Rate of Return (IRR)

Project IRR	**6.91%**

It can be seen that the project IRR without CDM revenue is lower than benchmark.

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

As per the "*Guidelines on the Assessment of Investment Analysis*" Version 05, Paragraph 20 "*Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation".*

The project activity involves the sale of electricity to the grid which is the sole source of revenue for this project. This revenue is based on two parameters namely, the tariff & the power generation. Similarly the other parameter which can affect the project and constitute 20% of the total cost for this case is only the investment cost. Thus, the energy generation, tariff and capital cost parameters have been subjected to a sensitivity analysis. Additionally, the O&M Cost, although not significant, has also been included in the analysis. The parameters chosen for sensitivity analysis conform to Guidance 20 of Annex 5, EB 62. These parameters were subjected to reasonable variations as required by Guidance 1 of Annex 5, EB 62.

The results of the sensitivity analysis carried out are presented below.

Outcome of Step 2:

Table: Sensitivity analysis

Sensitivity Analysis			
Parameter	**-10%**	**0%**	**+10%**
Energy Generation	5.43%	6.91%	8.30%
Capital Cost	9.13%	6.91%	5.15%
Tariff	5.49%	6.91%	8.25%
O&M Cost	7.22%	6.91%	6.58%

As could be seen from the financial indicator given above, the project remains additional even when the critical parameters are subjected to appropriate variations.

A sensitivity analysis is undertaken to identify those parameters that are both uncertain and for which the project decision, taken through the IRR, is sensitive. The capacity utilization factor for wind turbines in the state of Rajasthan is less as compared to other states like Tamil Nadu and Karnataka having dual monsoon region. Hence, the capacity utilization factor is unlikely to increase beyond the base value. The sensitivity analysis shows that in all cases the project activity is less attractive and does not cross the benchmark.

A further analysis carried out reveals that the project IRR will equal the benchmark when

a) PLF goes up by 37.8%

b) Capital cost comes down by 21.1%

c) Tariff goes up by 39.1%

d) O& M cost comes down by 185%

The actual PLF achieved by the project till June 2011 is only 16.46%. RERC after an exhaustive study has recommended PLF of only 20% for Jodhpur district. Therefore, any PLF higher than 37.8% is unlikely.

The project has already been implemented and the investment made in the project works out to Rs. 90.762 million per WTG, which is about 6.91% less than the cost assumed in the financial indicator calculation. Therefore any further reduction in the project cost is unrealistic.

The project participant has already signed a power purchase agreement with State utility for 20 years (project lifetime) and hence, it is not possible for tariff to increase by 39.1%.

Financial indicator is not sensitive to the O&M cost at all. Even a 100% removal of the O%M cost does not render the project non-additional.

In the above background, it is stated that the project is additional and will continue to be additional even when the critical parameters are subjected to appropriate variations.

Step 4. Common practice analysis

Annex 8 of EB 69, the *Guidelines on Common Practice ver 02.0*[10] has been applied for performing the common practice analysis for the project activity. As per the same, the identification of projects and further analysis has been done in the following step wise manner:

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity

As the proposed project activity is of 19.5 MW capacity, the applicable output range for the identification of projects is 9.75 MW to 29.25 MW.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

[10] Reference: http://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid44.pdf

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

In case of the project activity, the host country, India has been considered as the geographical area for the common practice analysis. Projects applying the same measure as the project activity have been considered as wind power installations. All projects considered in the common practice analysis use wind as energy source, and generate power as output. All the available projects in the applicable output range of 9.75 MW to 29.25 MW have been considered for the analysis. The projects commissioned before 04/01/2008 (start date for the project activity) have been considered under this analysis.

A total of **114** projects have been identified (both CDM and non-CDM) fulfilling the above conditions.

Technology	All projects in applicable cap range	Projects excluding CDM projects in applicable cap range, $N_{(all)}$	$N_{(diff)}$
Wind Power Projects	114	23	22
Total	**114**	**23**	**22**

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall.

From the projects identified in step 2, **23** projects are not registered or in process for registration / validation. Therefore:

$N_{all} = 23$

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

From the projects identified in Step 3, 22 projects are that apply technologies that are different to the technology applied in the proposed activity. Hence,

In accordance with paragraph 4c of EB 69 Annex 8, small scale projects (less than or equal to 15 MW) have been considered in N_{diff} as these projects have a different "size of installation."

Further in accordance with paragraph 4d(iv) projects operating under different "legal regulations" have been considered in N_{diff}. This includes the following types of projects:

- Projects operating under different regulatory regimes - In India, tariff for wind power projects is determined by State Regulatory Electricity Commissions, and each state issues separate tariff orders, based on local investment conditions, PLF, and other factors. Each state has a different regulatory framework and investment climate.[18]
- Project activities commissioned prior to the Electricity Act 2003 – These projects are implemented under a different investment climate and are considered different from the project activity. The development of grid interactive renewable power underwent a new phase following the Electricity Act 2003 (EA 2003), which provides for regulatory interventions for promotion of renewable energy (RE) sources, including determination of tariff for renewable energy.[19] State governments developed new renewable energy policies and/or issued new tariff regulations after the enactment of the Electricity Act 2003. For example, in Rajasthan, the "Policy for Promotion of Electricity Generation from Wind" and the "Policy for Promoting Generation of Power through Non-Conventional Energy Sources" was operational in Rajasthan prior to the Electricity Act.[20] A new wind policy was made public in April 2003 aligned with the Electricity Act, which resulted in a change in investment climate.

Therefore,

N_{diff}= *22*

Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

F= (1-22/23)

=0.043

As the factor F has been calculated to be 0.043 (less than 0.2). Therefore, the proposed project activity is not a common practice.

[18] Reference: http://mnre.gov.in/information/renewable-energy-regulatory-framework

[19] Reference: http://mnre.gov.in/information/renewable-energy-regulatory-framework

[20] Reference: http://www.rrecl.com/PolicyImage.aspx

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

There are no similar options identified as per the explanation provided in sub-step 4a.

Thus, because the similar activities cannot be observed, Sub-steps 4a and 4b are assumed to be satisfied and the proposed project activity is considered additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Project emissions

According to the chosen baseline methodology ACM0002 Version 13.0.0, for wind energy based renewable energy project activities, $PE_y = 0$.

Baseline Emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that 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:

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

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using version 2.2.1 of the "Tool to calculate the emission factor for an electricity system"

Calculation of $EG_{PJ,y}$

(a) Greenfield plants

Since the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, therefore:

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

Where:

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

Calculation of $EF_{grid,CM,y}$

In accordance with the "Tool to calculate the emission factor for an electricity system" Version 02.2.1, combined margin CO_2 emission factor for grid connected power generation is calculated stepwise as below:

Step 1: Identify the relevant electricity systems

For determining electricity emission factors, a **project electricity system** is defined by the spatial extent of power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

The Indian power system is divided into two regional grids, namely NEWNE and Southern grid. Each grid covers several states. Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid.

Each state in a regional grid meets their demand with their 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. There are also electricity transfers between regional grids, and small exchanges in the form of cross-border imports and exports (e.g. from Bhutan). Recently, the Indian regional grids have started to work in synchronous mode, i.e. at same frequency.

States connected to different regional grids

Regional grid	**NEWNE Grid**				**Southern grid**
	Northern	**Eastern**	**Western**	**North Eastern**	**Southern**
States	Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, Uttar Pradesh and Uttarakhand	Bihar, Orissa, West Bengal, Jharkhand and Sikkim	Gujarat, Madhya Pradesh, Maharashtra, Goa and Chattisgarh	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura	Andhra Pradesh, Karnataka, Kerala and Tamil Nadu
Union Territories	Delhi and Chandigarh	Andaman-Nicobar	Daman & Diu, Dadar & Nagar Haveli	-	Pondicherry, Lakshadweep

The NEWNE grid constitutes several states and union territories including Rajasthan[21]. These states under the regional grid have their own power generating stations as well as centrally shared power-generating stations. While the power generated by own generating stations is fully owned and consumed through the respective state's grid systems, the power generated by central generating stations is shared by more than one state depending on their allocated share. Presently the share from central generating stations is a small portion of their own generation.

For the purpose of determining the emission reductions achieved by the Project the "Tool to calculate the emission factor for an electricity systems" (Version 2.2.1, EB 63) states that the "*project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints*". On this basis the Central Electricity Authority, *CO_2 Baseline Database for the*

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

Indian Power Sector - Version 7.0[22] defines the project electricity systems within India in two regional grids. This is justified "*as electricity continues to be produced and consumed largely within the same region, as is evidenced by the relatively small volume of net transfers between the regions, and consequently it is appropriate to assume that the impacts of CDM project will be confined to the regional grid in which it is located*". The project is located in Rajasthan and is therefore as per the CEA's grid definitions it is within the NEWNE regional grid. Also, it is preferable to take the regional grid as project boundary than the state boundary as it minimizes effect of inter state power transactions, which are dynamic and vary widely. Considering free flow of electricity among member states and the union territory the entire NEWNE grid is considered as a single entity for estimation of baseline.

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.

The project participant has chosen Option I for the calculation of the operating and build margin emission factor i.e. off-grid power plants are not being included in the calculation.

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

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

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

For the proposed project activity, simple OM method (option a) has been chosen to calculate the operating margin emission factor ($EF_{grid, OM, y}$). However, the simple OM method 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 low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation.

Share of Low Cost / Must-Run (% of Net Generation)

Grid	2004-05	2005-06	2006-07	2007-08	2008-09
NEWNE	16.8%	18.0%	18.5%	19.0%	17.3%
South	21.6%	27.0%	28.3%	27.1%	22.8%
India	18.0%	20.1%	20.9%	21.0%	18.6%

Ref: CO_2 Baseline Database for the Indian Power Sector – CEA, Version 03 and 04 and 05.

Percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) = 17.94 %

The calculation above shows that the generation from low-cost/must-run resources constitutes less than 50% of total grid generation, hence usage of the **Simple OM method** in the project case is justified.

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

The Simple OM emission factor can be calculated using either of the two following data vintages for years(s) *y*:

- 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.

or

- 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 proceeding 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.

The project proponent chooses the *Ex ante* option for estimating the simple OM emission factor wherein as described above a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period will be undertaken.

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

The simple OM method has been selected as justified above. The simple OM emission factor is calculated based on the net electricity generation of each power unit and a CO_2 emission factor for each power unit, as follows:

$$EF_{grid,OM,simple,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,,y}$	=	Simple operating margin CO_2 emission factor of in year y (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	=	All power units serving the grid in year y except low-cost / must-run power units
y	=	The relevant year as per the data vintage chosen in step 3 i.e. the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

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

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

$$EF_{EL,m,y} = \frac{\sum_m FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$$

$EF_{EL,m,y}$	=	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 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 plant / unit m in year y
y	=	The relevant year as per the data vintage chosen in step 3 i.e. the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

Determination of $EG_{m,y}$

Since, the calculations consider only grid power plants, $EG_{m,y}$ should has been determined as per the data provided by the Central Electricity Authority (CEA) CO_2 Baseline Database for the Indian Power Sector.

In India, the Central Electricity Authority (CEA) has estimated the baseline emission factor for the power sector. This data has also been endorsed by the DNA and is the most authentic information available in the public domain. The details of same can be found on CEA website at http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm.

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

Since in India, the installed capacity and corresponding annual generation from power plants is quite high, the sample group containing 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 comprise the sample group with the larger annual generation. Thus the sample group *m* consisting of option (b) is used for the estimation of build margin.

In terms of vintage of data, project proponents 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 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 proponent wishes to choose option 1.

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:

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

Where:

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

Calculations for the Build Margin emission factor $EF_{gid, BM, y}$ is based on the most recent information available on the plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of the power plant capacity additions in the electricity system that comprise 20 % of the system generation and that have been built most recently.

Step 7: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{CO_2} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

Where:

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

The following default values should 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.

As mentioned before, the CEA has calculated the baseline emission factors for various regional grids in India according to the formulas specified above. As this is the most authentic information available in the public domain. The baseline emission factor used in the calculation of baseline emissions for the proposed project activity is being referred from the same for transparency and conservativeness[23].

Leakage

According to ACM0002 Version 13.0.0, no leakage emissions are to be considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.

Emission Reductions

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2e/yr)

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 emission factor for NEWNE grid
Source of data used:	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 4.0.
Value applied:	1.0049 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	OM has been calculated as per ACM0002 with 3 years vintage data (2005-06, 2006-07 and 2007-08) and option of ex ante calculation based on Simple Operating Margin Method. It is being computed once during PDD finalization.
Any comment:	The value has been fixed ex-ante for the first crediting period.

Operating Margin Estimation for NEWNE Grid (tCO_2/MWh)	
OM, 2005-06	1.0085
OM, 2006-07	0.9999
OM, 2007-08	1.0066
Generation - Weighted Average OM ($EF_{grid, OM,y}$)	**1.0049**

Data / Parameter:	**$EF_{grid,BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build Margin emission factor for NEWNE grid
Source of data used:	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by

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

	Central Electricity Authority, Version 4.0.
Value applied:	0.6752 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	BM has been calculated as per ACM0002 for the year 2008-09. The build margin is calculated in this database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation and option of ex ante calculation. It is being computed once during PDD finalization.
Any comment:	The value has been fixed ex-ante for the first crediting period.

Data / Parameter:	**$EF_{grid,CM,y}$**
Data unit:	tCO_2/MWh
Description:	Combined Margin CO_2 emission factor for NEWNE grid
Source of data used:	Estimated figure based on 75% of OM and 25% of BM values
Value applied:	0.9225 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	CM has been calculated as per ACM0002 with 3 years vintage data and option of ex ante calculation based on 75% of OM and 25% of BM values approach. It is being computed once during PDD finalization.
Any comment:	The value has been fixed ex-ante for the first crediting period.

Combined Margin Estimation for NEWNE Grid (tCO_2/MWh)	
OM ($EF_{grid,OM,y}$)	1.0049
BM ($EF_{grid,BM,y}$)	0.6752
Combined Margin ($EF_{grid,CM,y}$)	0.9225

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

>>

For a given year, the emission reductions contributed by the project activity (ER_y) is calculated as follows:

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

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the version 2.2.1 of the "Tool to calculate the emission factor for an electricity system"

BE_y = 36,269.72 MWh/annum x 0.9225 tCO_2/MWh
= 33,455 tCO_2e/annum

$ER_y = BE_y - PE_y$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2e/yr)

PE_y = Project emissions in year *y* (t CO_2e/yr)

$ER_y = 33,455 – 0 – 0$
$= 33,455$ tCO_2e/annum

The emission reductions will be calculated based on actual net electricity supplied to the grid, using the baseline emission factor presented above.

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

>>

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
01/04/2013 – 31/03/2014	0	33,455	0	33,455
01/04/2014 – 31/03/2015	0	33,455	0	33,455
01/04/2015 – 31/03/2016	0	33,455	0	33,455
01/04/2016 – 3103/2017	0	33,455	0	33,455
01/04/2017 – 31/03/2018	0	33,455	0	33,455
01/04/2018 – 31/03/2019	0	33,455	0	33,455
01/04/2019 – 31/03/2020	0	33,455	0	33,455
Total (tonnes CO_2e)	**0**	**234,185**	**0**	**234,185**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	MWh
Description:	Net electricity supplied to grid
Source of data to be used:	Credit note issued by Operation and maintenance contractor (Suzlon). This is a calculated parameter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	36,269.72 MWh/year
Description of measurement methods and procedures to be	The net electricity exported is the basis for estimating emission reductions from the proposed project activity.

applied:	***Net Electricity: EG $_{facility, y}$ = EG$_{y, Export}$ - EG$_{y, Import}$*** The power generated by WTG is stepped up by a step up transformer and fed into the 33 kV Feeder line. Power from WTG's of other project activities is also fed in the same 33 kV feeder line. This common feeder line culminates at the 33 kV/220 kV substation, where the joint-metering is done on monthly basis. The joint-metering is done at the 33 kV/220 kV RRVPNL substation, having shared Main meter and check meter. The metered net electricity is apportioned among the various project activities based on the electricity metered at the respective WTG locations (or reading at the WTG-Controller). A combined JMR certificate is issued by RRVP NL for all the WTGs connected to the respective substation. Apportioning of electricity for individual project activities is done by Suzlon on the basis of readings of respective WTGs controller. On the basis of this apportioning, Suzlon issues a credit note to project proponent providing following details for respective wind farms: • Net electricity exported to grid • Total electricity exported to grid • Total electricity imported from grid This construes the net electricity exported by individual power plants to the grid. Reporting Frequency: Monthly
QA/QC procedures to be applied:	Calibration of the main and check meters will be undertaken at on an annual basis. Meter of accuracy class 0.2S will be used.
Any comment:	Data will be kept for two years beyond each crediting period.

Data / Parameter:	$EG_{y, Export}$
Data unit:	MWh
Description:	Total quantity of Electricity exported to grid by all WEGs connected to feeder
Source of data to be used:	JMR Certificate issued by RRVPNL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This data will be used to arrive at the net electricity exported.
Description of measurement methods and procedures to be applied:	Total electricity exported to RRVPNL will be measured at the main meter connected to the incoming feeder. This measured electricity will be the sum total electricity exported by all WEGs connected to the feeder including electricity generated from WEGs other than the project activity. Reporting frequency: Monthly
QA/QC procedures to be applied:	Annual calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2.
Any comment:	The data will be kept for two years after the end of the crediting period or

	the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	$EG_{y, Import}$
Data unit:	MWh
Description:	Total quantity of Electricity imported from grid by all WEGs connected to feeder
Source of data to be used:	JMR Certificate issued by RRVPNL
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This data will be used to arrive at the net electricity exported.
Description of measurement methods and procedures to be applied:	Total electricity imported to RRVPNL will be measured at the main meter connected to the incoming feeder. This measured electricity will be the sum total of electricity imported from all WEGs connected to the feeder including electricity generated from WEGs other than the project activity.
QA/QC procedures to be applied:	Annual calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2. Reporting Frequency: Monthly
Any comment:	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	$EG_{y, WEG,}$
Data unit:	MWh
Description:	Total electricity fed into feeder line by all WTGs connected to the feeder
Source of data to be used:	Weekly Report with daily generation data provided by Suzlon
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This data will be used for apportioning the net electricity supplied by Wind turbines. Detailed apportioning methodology is described in Section B. 7.2 of the PDD
Description of measurement methods and procedures to be applied:	Total electricity generation at controller by all WTGs which are part of the project activity. $\mathbf{EG_{y, WEG} = \sum EG_{y, WEG\ i}\ (i=1\ to\ 14)}$ This parameter is measured using a controller available in the control panel of the WTG at the site. The LCS located at the WTG measures electricity continuously. The LCS is installed by Suzlon. The daily readings of the generation are sent to project proponent every week by Suzlon. Current transformer provides the input to LCS through a multi function relay. The current transformer is checked annually by the operation and maintenance team. Continuous monitoring of electricity with hourly measurement will be done.

QA/QC procedures to be applied:	The controller at WTG is a programmable logic controller (PLC). In case of any inconsistency or error notifying at the Controller, it will be rectified or replaced completely by the WEG supplier. Reporting Frequency: Weekly
Any comment:	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

Data / Parameter:	$EG_{y, WEG, PA}$
Data unit:	MWh
Description:	Total electricity fed into feeder line by all WTGs of proposed project activity.
Source of data to be used:	Weekly Report with daily generation data provided by Suzlon to the PP
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This data will be used for apportioning the net electricity supplied by Wind turbines. Detailed apportioning methodology is described in Section B.7.2 of the PDD
Description of measurement methods and procedures to be applied:	Total electricity generation at controller by all WTGs which are part of the project activity. $\mathbf{EG_{y, WEG} = \sum EG_{y, WEG\ i}\ (i=1\ to\ 13)}$ This parameter is measured using a controller available in the control panel of the WTG at the site. The LCS located at the WTG measures electricity continuously. The LCS is installed by Suzlon. The daily readings of the generation are sent to project proponent every week by Suzlon. Current transformer provides the input to LCS through a multi function relay. The current transformer is checked annually by the operation and maintenance team. Continuous monitoring of electricity with hourly measurement will be done.
QA/QC procedures to be applied:	The controller at WTG is a programmable logic controller (PLC). In case of any inconsistency or error notifying at the Controller, it will be rectified or replaced completely by the WEG supplier. Reporting Frequency: Weekly
Any comment:	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Description of the monitoring plan:

>>

Gujarat Fluorochemicals Limited (GFL) has well structured monitoring plan in place. It describes about the monitoring organization, parameters and variables, monitoring practices, QA and QC procedures, data storage and archiving etc.

The Group Head Corporate Finance has assigned the responsibility of monitoring and recording to a team. The team will be responsible for recording, monitoring and preparing necessary document as per guidelines. There is a backup plan for the recorded data. The recording of data will be done by site In-charge.

GFL has undertaken an operation and maintenance agreement with the supplier of the wind turbines i.e. Suzlon Energy Limited. The agreement is for a period of 8 years at first and will be renewed after every 5 years. The performance of the mills, safety in operation and scheduled /breakdown maintenances are organized and monitored by the contractor. So the authority and responsibility of O&M lies with the contractor.

The monitoring personnel receive intensive training at the Suzlon Manufacturing facility, conducted by Suzlon themselves or an external agency, before being appointed at the site to look after the operations.

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

As per the agreement, a monthly operating status report would be prepared and submitted to GFL. All the relevant data & reports for maintaining accuracy in future monitoring and reporting of GHGs emission reduction is with GFL, which follows Quality Management System (QMS) procedure as per ISO 9001 and is ISO certified organization.

GFL has appointed a full time project in-charge to manage the overall project activities after commissioning. The project in-charge supervises the functioning of the Wind farm in close coordination with the official technical personnel of Suzlon Energy Limited (SEL).

Quality control and Quality Assurance procedures:

Main meters and check meters are installed for monitoring the energy exported. The main and check meters shall be calibrated for accuracy once in a year with reference to a portable standard meter. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2s accuracy class. The data registered by the main meter alone will be adopted for the purpose of calculation as long as the error in the main meter is within permissible limits. If during the annual calibration, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the limits, the main meter reading shall be considered as usual. However, the check meter shall be calibrated immediately. If the main meter is found to be beyond the permissible limits of error, but corresponding check meter is within limits, then the check meter reading shall be adopted for that period. The main meter shall be calibrated immediately.

Data Monitoring

The joint-metering is done at the feeder, used to export power at the 33 kV/220 kV RRVPNL substation, having shared Main meter and check meter.

The net electricity exported is the basis for estimating emission reductions from the proposed project activity.

Net Electricity: $EG_{facility,\,y} = EG_{y,\,Export} - EG_{y,\,Import}$

The power generated by WTG is stepped up by a step up transformer and fed into the 33 kV Feeder line. Power from WTG's of other project activities is also fed in the same 33 kV feeder line. This common feeder line culminates at the 33 kV/220 kV substation, where the joint-metering is done on monthly basis.

The joint-metering is done at the 33 kV/220 kV RRVPNL substation, having shared Main meter and check meter. The metered net electricity is apportioned among the various project activities based on the electricity metered at the respective WTG locations (or reading at the WTG-Controller).

A combined JMR certificate is issued by RRVPNL for all the WTGs connected to the respective substation. Apportioning of electricity for individual project activities is done by Suzlon on the basis of readings of respective WTGs controller. On the basis of this apportioning, Suzlon issues a credit note to project proponent providing following details for respective wind farms:

- Net electricity exported to grid
- Total electricity exported to grid
- Total electricity imported from grid

This construes the net electricity exported by individual power plants to the grid.

Apportioning procedure

An example of the apportioning procedure is provided below[24]:

Parameter	Figure	Unit
Gross electricity generated by all WEG connected to feeder (14 number) ($EG_{y, WEG}$)	2,768,454	kWh
Gross electricity generated by all WEGs in project activity (13 number) ($EG_{y, WEG,PA}$)	2,545,471	kWh
Share of project activity's WEGs in gross generation = 2545471/2768454	91.95	%
Net electricity exported by feeder at substation ($EG_{y, Export}$)	2,660,040	kWh
Net electricity imported by feeder at substation ($EG_{y, import}$)	14,760	kWh
Share of project activity's WEGs in net export = 2660040*91.95%	2,445,789	kWh
Share of project activity's WEGs in net import = 14760*91.95%	13,571	kWh
Net export by project activity's WEGs ($EG_{facility, y}$) = 2445789-13571	**2,432,218**	**kWh**

Thus, the apportioned net export by each project activity is provided in the monthly credit note issued by Suzlon and the same is used for estimation of emission reductions.

The credit notes are issued to GFL by Suzlon (O&M service provider) on monthly basis.

Frequency of meter reading

The meter reading at RRVPNL substation is recorded on monthly basis.

Data archiving

Data will be archived electronically. The data would be archived two years after crediting period or last issuance whichever is later.

Calibration of Meters

The meter located at the substation will be calibrated once in a year. The calibration of the meters will be done as per procedures of RRVPNL.

Apportioning of electricity: In case date of registration doesn't match with the billing cycle

The monitoring period for the project activity may start from a date that does not coincide with the billing cycle covered in the respective JMR Certificate. For instance the monitoring period may start on the 20th

[24] The corresponding documentation for the figures used in the example has been provided to the DOE

of the month whereas the JMR Certificate may report the data from the first of the month to the first of the next month. In such a scenario, the net electricity supplied from the start of the monitoring period to the first date of the next month (the apportioning period) would be determined as follows:

Apportioned Net Electricity Supplied	=	Apportioning Ratio	x	Net Electricity Supplied as per JMR Certificate

The apportioning ratio would be determined as the ratio of (A) electricity generation at the WTG for the apportioning period to (B) the electricity generation at the WTG for the entire period covered under the JMR certificate. This procedure would only have to be followed for the first and last month of the monitoring period if the start and end dates do not coincide with the date of the joint meter readings of the energy meters.

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

>>

Date of completion of the application of the baseline study *(DD/MM/YYYY)*: 16/02/2010

Name of person/entity determining the baseline: Gujarat Fluorochemicals Limited

The entity is a project participant, contact information has been provided in Annex-I

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:

>>

04 January 2008 (the date of agreement with supplier has been taken as start date of the project activity)

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

>>

20 years, 0 month

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

Renewable crediting period of 7 years, 0 months

C.2.1. Renewable crediting period:

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

>>

01/04/2013

C.2.1.2. Length of the first crediting period:

>>

7 year 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

Not Applicable

C.2.2.2. Length:

>>

Not Applicable

SECTION D. Environmental impacts

>>

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

>>

As per the Ministry of Environment and Forests (MoEF), Government of India notification S.O. 1533[25] dated September 14, 2006 regarding Environment Impact Assessment studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of Environment and Forests), the project activity is not required to conduct an Environment Impact Assessment. The required clearance was obtained from the authorities as recommended by the procedures followed by the host government.

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:

>>

As discussed above, the project activity would not have any adverse environmental impacts. The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. Hence EIA is not required to be undertaken by the host party.

[25] Reference : http://envfor.nic.in/legis/eia/so1533.pdf

SECTION E. Stakeholders' comments

>>

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

>>

Gujarat Fluorochemicals Limited identified local communities, NGOs, state government and governmental agencies, employees, contractors and consultants/ advisors as the most important stakeholders that would be affected by the project activity. Accordingly, GFL displayed a notice to representatives of various stakeholder groups with a brief on the project informing them of the proposed meeting at 12.30 PM on 9th March 2008 at Village Begadia, Tehsil Ossiya, District Jodhpur requesting all to attend meeting or depute representatives. The notice was displayed at the gram panchayat office and posted at public places of Village Begadia from 11/02/2008 to 09/03/2008. The public notice was accessible to all village residents and gram panchayat officials.

There were about 12 participants including 9 residents of Village Begadia, Ossiya, and three representatives of the project participant (including O&M contractor and consultant).

This stakeholder meeting involved

a) Welcome address to the representatives by Mr. Shashikant Verma.
b) Election of Chairperson for the meeting by the villagers & representatives from amongst themselves.
c) Introduction of project by Mr Phool Chand, from CantorCO2e on request from Chair.
d) Open house discussion on the merits of the projects with permission of Chair.
e) Summation of the concerns expressed by the stakeholder groups & commitments to address the concerns made by Mr Amarjeet Singh, Chairperson at Ossiya.
f) Preparation & circulation of draft minutes of meeting & signing of MoM.

The agenda of the meeting was fixed as follows:

- Welcome
- Description of the project details
- Queries and responses from the proponent and the stakeholders
- Vote of thanks

The summary of the meeting was recorded - copy of which will be made available to Designated Operating Entity during validation process. The list of participants with their signature is kept for record and photographs of the event were also taken.

After the presentation, chairman invited the stakeholders to raise their queries.

E.2. Summary of the comments received:

>>

The main issues raised during the stakeholder consultation meeting at the project site were about the affect of project on local environment (Rain pattern) and benefits to the farmers due to the establishment of the project activity. The participants sought clarifications on Kyoto Protocol and Clean Development Mechanism processes. Overall there was agreement that the proposed project is a beneficial project

A brief summary of the queries raised by the local stakeholders are presented below:

Q.1: Mr. Amarjeet Singh asked how the villagers will be benefited by project activity?
Q.2: Mr. Megh Singh asked the details of CDM?

Q.3: Mr. Chandan Singh asked, does the installation of wind mill affect the environment?
Q.4: Mr. Ganpat Singh, asked whether rain patterns shall get affected by installation of the wind turbine generators.

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

>>

The stakeholders were given clarification on the issues raised as above to their satisfaction by providing relevant evidence of the project claims. A summary of responses provided in the meeting is presented below:

Ans.1: *With examples it was explained to them that villagers have been recruited during construction and for security of wind mills. More people will be employed during operation and maintenance of wind mills.*

Ans.2: *The purpose and process of CDM was briefly explained to the participant*

Ans.3: *No. The project activity will lead to mitigate the global warming effect caused by green house gases by zero emission based power generation.*

Ans.4:.*The rain patterns are not affected by installation of the wind power project.*

Local resident appreciated the project activity as it has generated source of employment and revenue for them during installation of wind mills. Overall there was unanimous agreement that the project activity was a good initiative undertaken by the Project proponents which contributes, to the sustainable development of the area and world. None of the concerns expressed by the stakeholders required an action to be taken by the GFL during the project operation and at any other stage.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Gujarat Fluorochemicals Limited
Street/P.O.Box:	Old Padra Road
Building:	2nd Floor, ABS Towers
City:	Vadodara
State/Region:	Gujarat
Postcode/ZIP:	390 007
Country:	India
Telephone:	+91 265 233 0057, 619 8111
FAX:	+91 265 231 0312,
E-Mail:	deepakasher@gfl.co.in
URL:	www.gfl.co.in
Represented by:	
Title:	Director & Group Head (Corporate Finance)
Salutation:	Mr.
Last name:	Asher
Middle name:	-
First name:	Deepak
Department:	-
Mobile:	+91 98 7950 7950
Direct FAX:	+91 265 231 0312
Direct tel:	+91 265 619 8101
Personal e-mail:	deepakasher@gfl.co.in, deepak_asher@yahoo.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding involve in this project activity.

Annex 3

BASELINE INFORMATION

Selection of Grid boundary

In the approved consolidated methodology ACM0002, the following guideline is given for the selection of grid. *"Where DNA guidance is not available, in large countries with layered dispatch systems (e.g. state/provincial/regional /national) the regional grid definition should be used. A state/provincial grid definition may indeed in many cases be too narrow given significant electricity trade among states/provinces that might be affected, directly or indirectly, by a CDM project activity"*.

As stated earlier, the electrical transmission system in India is divided into two regions namely NEWNE Region and Southern Region. The NEWNE regional grid covers many states including Rajasthan where the project activity is located. Therefore NEWNE grid region is selected as grid boundary to estimate the baseline emission factor.

Baseline Emission Factor (Combined Margin)
The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, provides the data for calculation of the Combined Margin emission factor for the NEWNE grid, the details of which (as explained in the PDD, section B.6.1) are available at the following website.
http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Combined Margin Estimation for NEWNE Grid (tCO_2/MWh)		
Year	**Operating Margin (tCO_2/MWh)**	**Net Generation (GWh)**
2006-07	1.0085	465,361
2007-08	0.9999	496,119
2008-09	1.0066	509,776
Generation Weighted Average Operating Margin ($EF_{grid, OM,y}$)		1.0049 tCO_2/MWh
Build Margin 2008-09 ($EF_{grid, BM, y}$)		0.6752 tCO_2/MWh
Combined Margin ($EF_{grid, CM, y}$)		**0.9225 tCO_2/MWh**

Annex 4

MONITORING INFORMATION

As described in Section B.7.2.

- - - - -