Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	10.5 MW wind power project in Ossiya, Rajasthan by Gujarat Fluorochemicals Limited (GFL)
Version number of the PDD	08
Completion date of the PDD	04/12/2015
Project participant(s)	Inox Renewables Limited Gujarat Fluorochemicals Limited
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Scope 1, Energy Industries (renewable/non-renewable sources) Methodology- ACM0002-"Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 13.0.0)
Estimated amount of annual average GHG emission reductions	17,790 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Gujarat Fluorochemicals Limited 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. Earlier GFL is acting as the project participant for this project activity. Inox Renewables Limited (IRL), a special purpose vehicle has received the DNA host country approval (HCA) for the said project activity and publicly available in UNFCCC website.

Description of Project Activity:

The project activity is the installation and operation of 7 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 Jodhpur to generate cleaner power and for its supply to the grid. The aggregate installed capacity 10.5 MW will generate approximately 19.285 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 19.285 GWh of electricity which 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:

⇒ **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 reduc e the emissions of green house gases (GHG) to the atmosphere by avoiding the use of fossil fuel for power generation.

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

- As wind power projects do not generate any waste, they address the problem of solid waste disposal encountered by most of the other means of 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.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

Rajasthan

A.2.3. City/Town/Community etc.

Village: Ossiya
District: Jodhpur

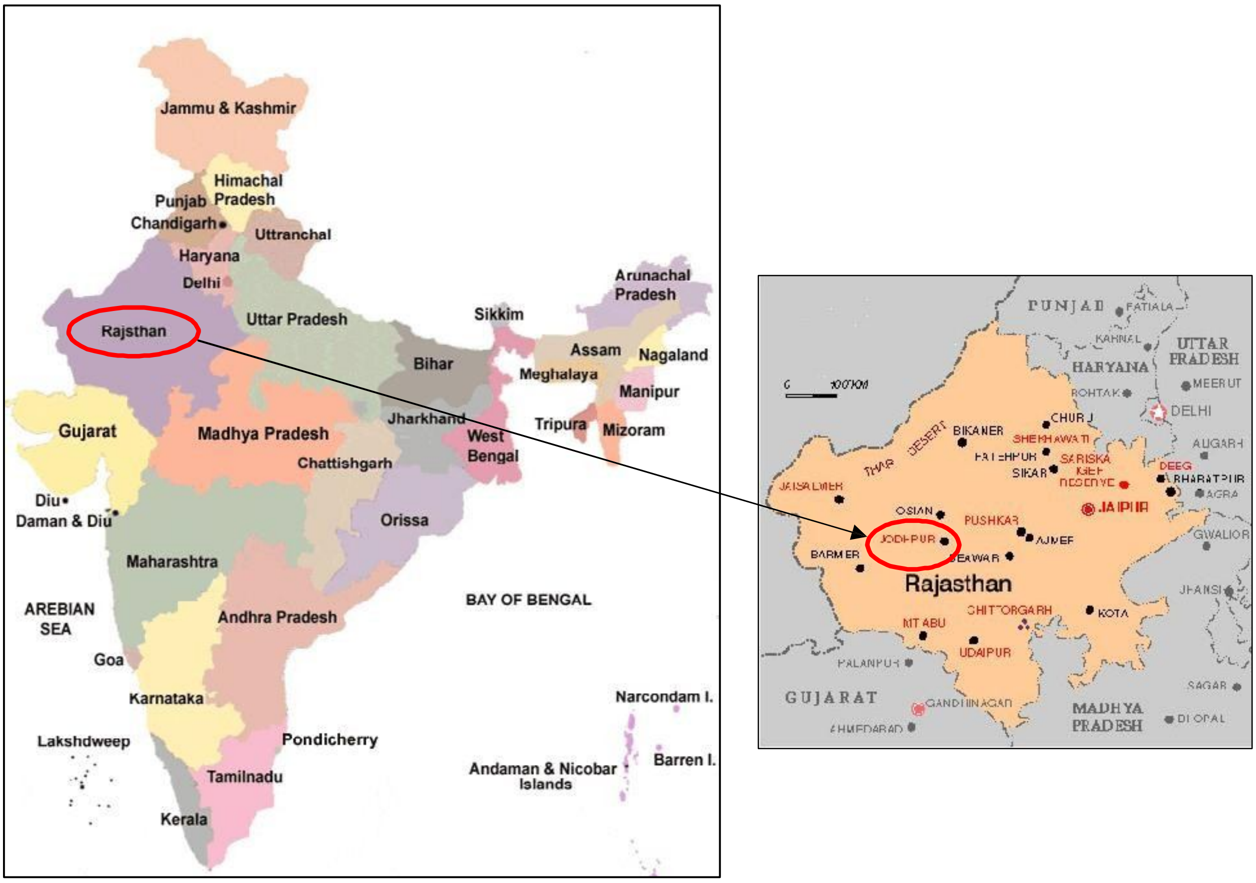
A.2.4. Physical/Geographical location

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:

Table 1: Coordinates of WTGs

S. No.	Location No.	Location	Latitude N	Longitude E
1.	P003	Ossiya	N 26 ^{o} 41’ 26.7”	E 73 ^{o} 02’ 24.3”
2.	P009	Ossiya	N 26 ^{o} 44’ 14.1”	E 73 ^{o} 02’ 44.2”
3.	P010	Ossiya	N 26 ^{o} 44’ 29.8”	E 73 ^{o} 02’ 21.5”
4.	P011	Ossiya	N 26 ^{o} 44’ 42.3”	E 73 ^{o} 02’ 14.2”
5.	P016	Ossiya	N 26 ^{o} 45’ 20.8”	E 73 ^{o} 02’ 31.1”
6.	P017	Ossiya	N 26 ^{o} 45’ 47.6”	E 73 ^{o} 02’ 44.7”
7.	P020	Ossiya	N 26 ^{o} 46’ 39.2”	E 73 ^{o} 03’ 02.4”

Figure 1: Location of Project Activity



A.3. Technologies and/or measures

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 7 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 (690/33 KV) at each WTG. The project activity will supply an annual average energy of 19.285 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. It is estimated that implementation of project activity will generate approximately 17,790 tCO_2e emission reductions per annum.

Turbine specification:

The project activity involves installing Horizontal Axis Suzlon make 1500 KW S-82 WTGs[2].

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.

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

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- 690V 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.

Average lifetime of equipments

The operation lifetime of the WTGs is 20 years.

Plant Load Factor

Plant load factor for the WTGs is determined to be 20.97% based on the third party PLF assessment by Power & Energy Consultants dated 06/05/09.

Monitoring equipments

The electricity exported and imported will be monitored using main energy and check meters located at 132/220 KV sub-station at Baori, Jodhpur. The WTG's are connected to one feeders, as follows:

Feeder Line 1: 1 WTG (WTG number P003)
6 WTGs (WTGs number P009, P010, P011, P016, P017, P020)

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (host)	Private entity- Inox Renewables Limited	No
Switzerland	Gujarat Fluorochemicals Limited	No

A.5. Public funding of project activity

The total project is funded through equity investment. No public funding or overseas development assistance has been used in this project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

Approved baseline and monitoring methodology applied for the project activity is:

ACM0002 Version 13.0.0 - "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 02.2.1) and "Tool for the demonstration and assessment of additionality" (Version 06.0.0) in order to calculate the emission reductions from the project activity.

B.2. Applicability of methodology and standardized baseline

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 of ACM0002 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: 0 *The project activity is implemented in an 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 $4W/m^2$; 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 project activity is not a hydro power plant. Hence this criterion is not applicable.

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 Version13.0.0 is applicable to the project activity.

B.3. Project boundary

The schematic diagram of project boundary is as follows:

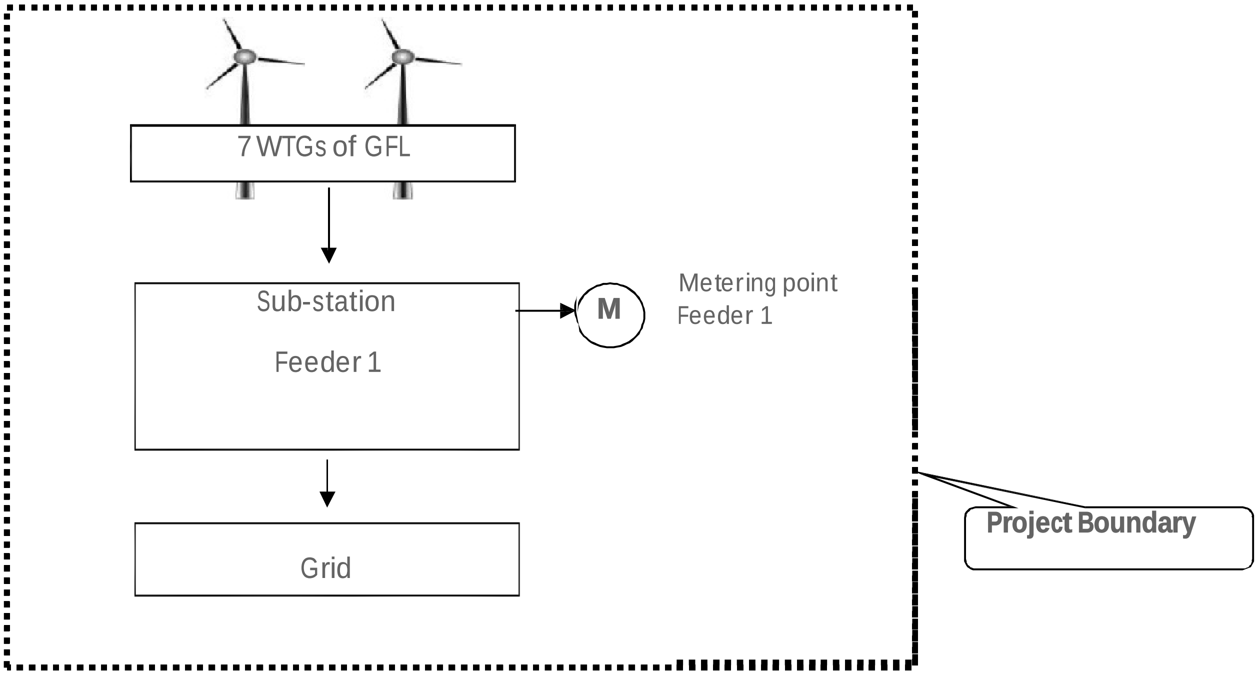


Figure 2: Project boundary

Metering points will measure both import of electricity from the grid and export of electricity to grid for feeder.

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		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity generation from fossil fuel fired 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 the wind projects under ACM0002
		N_2O	Excluded	This source is not required to be estimated for the wind projects under ACM0002
Project scenario	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. Establishment and description of 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 02.2.1. 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 which has been computed according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system", version 02.2.1. Considering the individual weightings assigned to the OM and the BM emission factors respectively, as prescribed in the 'Tool to calculate th e emission factor for an electricity system

(Version 02.2.1)', the combined margin emission factor for the NEWNE Grid has been estimated at 0.9225 tCO_2e/MWh.

B.5. Demonstration of additionality

Prior Consideration of CDM:

As per the "*Guidance on the demonstration and assessment of prior consideration of the CDM"* Version 04, for project activities with start date after 02 August 2008, it is required to demonstrate that CDM was seriously considered in the decision to implement the project activity. Accordingly, GFL had informed the UNFCCC as well as the Host Party DNA i.e. National CDM Authority (NCDMA) vide its notification dated 23rd October 2009 of their intention to seek CDM status for the project activity under the project title "10.5 MW wind power project at Jodhpur, Rajasthan, India". In accordance with Para 2 of the "*Guidance on the demonstration and assessment of prior consideration of the CDM"* Version 04, this notification was made within six months of the project activity start date described in section C.1.1. Further, the project proponent had already registered under CDM a similar wind based power project under the CDM Mechanism (Ref. 1615 - Wind power project by GFL in Gudhepanchgani). Thus, the project proponent was well aware of CDM and took it into consideration at the time of conception of the project activity.

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 May 2009. As stated in the respective board resolution, proposed project was financially unviable and project was taken up by 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 May itself.

The "*Tool for the demonstration and assessment of additionality*" Version 06.0.0, 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 7 WTGs each having a capacity of 1500 kW for generation and supply of electricity to NEWNE grid. Hence, according to baseline methodology ACM 002 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".*

Therefore, further discussion on the alternatives is not necessary. As demonstrated below the project activity faces barriers and is not feasible without CDM revenues.

Hence, project activity would not have been developed by project proponent without CDM benefits

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:

In the state of Rajasthan there is no legal and regulatory requirement that prevents above alternatives from occurring. For power generation, the Electricity Act 2003 does not restrict or empower any authority to restrict the fuel choice. The applicable environmental regulations do not restrict the use of wind energy and there is no legal requirement on the choice of a particular technology.

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).

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. Accordingly benchmark analysis has been used for additionality demonstration.

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 i n $/GJ) most suitable for the project type and decision context.

Internal Rate of Return (IRR) is one of the most commonly used financial indicators in capital budgeting. It represents the rate of growth a project is expected to generate and may be used to rank several prospective projects that a firm is considering or used to assess the returns of a prospective project against an established benchmark for investment by the firm.

The project is entirely funded by project proponent's equity and involves no debt funding. Equity IRR for a project activity needs to be adequate enough to provide a return to shareholders i.e. it has to be worthy enough from the point of view of investors. Equity IRR below the cost of capital for the proposed project activity can be considered to be financially unviable.

Hence, equity IRR has been used as financial indicator for additionality demonstration. Additionality Tool and Annex 5, EB 62 permit the use of equity IRR as financial indicator.

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. Required/expected returns on equity are appropriate benchmarks for equity IRR.' Hence, expected return on equity has been used selected as the benchmark for the project.

"Guidelines on the Assessment of Investment Analysis" EB 62, Annex 5, paragraph 15, states, "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.". In line with this guidance, the cost of equity has been determined through option (b) based on publically available data sources.

Capital Asset Pricing Model has been used to provide the required rate of return that the project needs to yield, taking into account the risk of the project type. This required return on equity represents the benchmark for the project.

As per CAPM, the cost of equity investment is the return of a risk-free security plus beta times the difference between the market return and the risk-free return.

The formula of CAPM is as follows:

$$\mathbf{R_i = R_f + \beta\,(R_m - R_f)}$$

where:

R_i	=	Rate of return on equity; Risk-
R_f	=	free rate of return;
β	=	Beta or systematic risk for this type of equity investment reflecting the volatility (risk) of the stock relative to the market;
R_m	=	Expected market returns
$R_m - R_f$	=	Market risk premium;

Risk free rate:

Risk free rates are based on yield of government bond rates (Central Government Secur ities) with term to maturity of 20-year, which is aligned to project activity lifetime of 20 years. Risk free rate considered for the project is the four month average yield of government securities of 20 year maturity period, for the period ending February 2009[3]. This was the latest risk-free rate available at the time of investment decision (May 2009).

Beta (β) Value:

The β in the CAPM equation helps to account for the systematic risk by quantifying the sensitivity of the stocks of the companies representing a particular project type/sector with the market returns. Thus, it incorporates the risk of a specific sector in the calculation of the cost of equity.

Wind power is not the core business of GFL and hence the beta factor of GFL cannot be used for the calculation of the risk premium. Also, in order to understand the standard market returns, it is essential to consider a wider range of companies.

A study of the baseline scenario, indicating that over 55% of the power generation in the country is from thermal sources[4], reinforces the fact that generation from thermal sources provides a more attractive and assured source of return as compared to investments in renewable energy sources like wind power. Hence it is assumed that such private companies with significant investments in renewable energy projects face higher risk as compared to the conventional power project and hence the

[3] http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/T27C_GSM.pdf . This approach is in conformity with the recommendation made by CRISIL in the paper submitted to CERC.

[4] http://cea.nic.in/power_sec_reports/Executive_Summary/2008_07/27-33.pdf

value of beta for such companies should also be higher. Thus, as the use of the beta value for companies with significant investment in non renewable power projects is representative of the returns generated in the baseline scenario and is also conservative, the same has been considered appropriate for the analysis.

Beta has been calculated by regressing the stock returns of listed power companies on BSE Sensex. The base year for BSE Sensex is 1979, and BSE Sensex reflects the longest available time period from date of investment decision (more than 20 years) compared to all indices listed in BSE. BSE Sensex also contains sufficient number of power sector industries. Therefore the selection of BSE Sensex for computation of market returns is appropriate and aligned with the operational lifetime of the project (20 years).

Beta values have been evaluated for a number of different vintages prior to the investment decision. The five year beta, four year beta, three year beta two year beta and one year beta has been evaluated. Of these, the minimum beta value (corresponding to the one year period prior to investment decision – March 2008 to April 2009) has been applied. The average beta of all power generation companies has been considered.

The summary of beta calculations is given below.

Table 2: Beta Calculations

	BSE	
Company Name	**Equity beta**	**Asset Beta**
BFUL	2.52	1.55
TATA Power	0.94	0.71
CESC Ltd	0.83	0.63
Neyveli lignite	1.31	1.09
GIPCL	1.33	0.90
Reliance Infra	1.67	1.22
NTPC	0.54	0.39
Torrent power	1.14	0.66
Average		0.89

The detailed benchmark calculation spreadsheet has been submitted to the DOE for validation. The CAPM is calculated as follows:

Market Rate of Return – BSE Sensex (R_m) = 17.09%

(Calculations provided in the excel sheet)

Market Risk Premium = **(R_m-R_f)** = 17.09% - 7.17% = 9.92%

Rate of return on equity or cost of equity benchmark is

$$R_e = R_f + \beta (R_m - R_f)$$
$$= 7.17\% + 0.89 \times 9.92\%$$
$$= 16.04\%$$

Thus the benchmark works out to 16.04% which has been compared with the equity IRR[5].

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

[5] In the webhosted PDD the benchmark was taken as 16.88%. Hence the benchmark is conservative.

The financial indicator, namely the equity IRR has been calculated. The technical lifetime[6] of the project i.e. 20 years has been used as the assessment period for cash flow projections based on the lifetime indicated by the equipment manufacturer which is in conformity with 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 equity IRR for project activity has been calculated based on following assumption:

Table 3: Assumptions for the project

Assumptions	Values	Units	References
Total installed Capacity	10.5	MW	Equipment Supply Agreement, dated: 08/08/09
Capacity of turbine	1.5	MW	Equipment Supply Agreement, dated: 08/08/09
Number of turbines	7	Nos	Equipment Supply Agreement, dated: 08/08/09
Price per turbine	92.5	INR million	Offer letter, dated: 16/04/2009
Cost per MW	61.67	INR million	Calculated
Total Project Cost	647.5	INR million	Calculated
Equity investment	647.5	INR million	Calculated
O&Mcost (Excluding service tax)	1.6	INR million	Offer letter, dated: 16/04/2009
Free O&M	1	Year	Offer letter, dated: 16/04/2009
O&M escalation	6%	% pa	
Insurance cost	0.22	`INR million/WTG	Calculated based on Insurance costs incurred for registered wind project at Gudepanchgani insurance premium paid on 18/02/2008
Operation Parameters			
Net PLF	20.97%	%	PLF report prepared by Power &.Energy Consultants, a third party engineering company contracted by the PP
Tariff			
Tariff (` per unit)	3.48	INR/kWh	RERC Tariff Order dated 23.01.2009 (http://allaboutrenewables.com/user/database/ Rajasthan/OTHERS/Notification_dt.23.1.09_p atr_vii_RES.pdf)
Escalation for first 12 years	0.02	INR/kWh	
Escalation beyond 12 years	0.01	INR/kWh	
Debt	0	INR million	
Book Depreciation (SLM)			
Book Depreciation	5.28	% pa	As per Companies Act Schedule XIV (http://asa-india.com/asa/Depreciation%20Rates%20Com panies%20Act.pdf)

[6] Life time certificate provided by WTG manufacturer Suzlon

Tax Depreciation (WDV)			
WTGs	80	% pa	As per Income Tax Rules Appendix I (http://www.docstoc.com/docs/87409589/Rate s-of-Depreciation-as-per-Income-Tax)
Other Plant & Machinery	15	% pa	
Civil Works	10	% pa	
Tax rate			
Corporate tax rate (%)	33.99	%	As per Income Tax Act
Commissioning schedule			
Commissioning date	30th September 2009		Commissioning certificate
Number of operational	183	Days	Calculated
Life of project	20	Years	Life time certificate from manufacturer

Internal Rate of Return (IRR)

Equity IRR	**5.62%**

It can be seen that the equity IRR without CDM revenue is lower than bench mark 16.04%. Thus, the project is additional and is not a business as usual scenario.

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 20% of the total cost for this case is only the investment cost. Thus, the energy generation, tariff, O&M cost and capital cost have been subjected to a sensitivity analysis. The parameters selected conforms to guidance 20 of Annex 5, EB 62. These parameters have been subjected to appropriate variation.

Outcome of Step 2:

Project cost and energy generation have been subjected to only 10% variation on either side as the actual project cost is only 5% less than the cost as per offer letter; the actual generation is much less than the PLF of 20.97% assumed. Hence the variation on either side is considered appropriate for these two parameters. The project is eligible for the tariff of Rs. 4.28 per kWh based on the tariff order released subsequent to the decision making; hence this tariff was not available to the PP at the time of decision making. Therefore, in the financial indicator calculation, the tariff that was prevalent at the time of decision making has been considered in conformity with Guidance 6, Annex 5, EB 62. The sensitivity analysis has been carried out considering the tariff of Rs 3.48 per kWh, available at the time of decision making. However, to demonstrate the additionality of the project even under the changed scenario,a separate analysis (IRR calculation) has been carried out by assuming applicable tariff , as applicable in the PPA, after investment decision . During the negotiation, the O&M cost was brought down to Rs. 14 lacs (from Rs 16 lacs as given in the offer letter) and therefore O&M cost has been subjected to a variation of – 10% to take care of the actual O&M cost liability of the project. The results are shown in

Parameter	Percentage change required to reach benchmark
Energy Generation goes up by	60%
Capital Cost comes down by	35%
Tariff goes up by	66%
O&M Cost comes down by	275%

Table4: Sensitivity analysis:

Sensitivity			
Parameter	**-10%**	**0%**	**10%**
Energy Generation	3.51%	5.62%	7.57%
	-10%	**0%**	**10%**
Capital Cost	7.57%	5.62%	4.09%
	-10%	**0%**	**10%**
Tariff	3.68%	5.62%	7.42%
	-10%	**0%**	**10%**
Applicable Tariff	9.17%		
	-10%	**0%**	**10%**
O&M Cost	6.13%	5.62%	5.09%

It can be observed that even when the parameters are subject to appropriate variations, the financial indicator remains below the benchmark. Therefore the project is additional.

A further analysis has been carried out to identify the percentage variation at which the financial indicator equals the benchmark and it was observed that the project would lose its additionality if

Table 5: Variation in parameters to breach benchmark

The Plant Load Factor for wind turbines in the state of Rajasthan is observed to be lower. The actual generation achieved by the project since the commencement of generation till June 2011 has been of the order of only around 19%. An increase in energy generation by 60% would result in a PLF of 33.5% which is highly unrealistic. The actual project cost is only about 5% lower than the cost assumed in the financial indicator calculation. Since, the order has already been placed and the project has commenced operation, any further reduction is ruled out. The tariff of Rs. 3.48 per kWh at the time of decision making has been considered for sensitivity analysis, It has already been demonstrated that even if the applicable tariff which is 29.3% higher than the tariff considered in the financial indicator, the project would remain additional. Currently, the tariff of Rs. 4.28 per kWh is fixed for the operating life of the project as per PPA, any increase in the tariff is unrealistic. As could be seen from the data given above, the financial indicator breaches the benchmark when O&M cost is reduced by 275% which is not possible. O&M can be by decreased by 100% if O&M is considered free.

Therefore, it is concluded that the project is additional and will continue to remain additional.

Step 4. Common practice analysis

Annex 8 of EB 69, the *Guidelines on Common Practice ver 2.0*[7] has been used 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 10.5 MW capacity, the applicable output range for the identification of projects is 5.25 MW to 15.75 MW.

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

The details of the project considered for analysis are submitted as separate excel-sheet.

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;

(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 the context of the project activities, similar projects are defined as projects which meet the following conditions:

- Project activities implemented in the host country, India (applicable geographical area for the common practice analysis)
- Project activities involving power generation using wind turbine generators (same measure as the proposed project activity)
- Project activities which use wind as an energy source
- Project activities which produce electrical power for export to the regional / national grid
- Project activities in the applicable output range of 5.25 MW to 15.75 MW
- Project activities commissioned before August 2009 (project activity start date: 08/08/2009 is earlier than the date of web-hosting of the PDD: 28/02/2011)

The number of similar projects is identified as 287 (reference Wind Power Directory 2011).

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 N_{all}.

Excluding projects which are registered CDM project activities or project activities submitted for registration / undergoing validation, the remaining number of projects is 154.

$N_{all} = 154$

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}.

In accordance with paragraph 4c of EB 69 Annex 8, large scale projects (>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.[8]
- 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.[9] 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.[10] A new wind policy was made public in April 2003 aligned with the Electricity Act, which resulted in a change in investment climate.

The number of project activities that apply different technologies from the project activity are 1

40. Therefore N_{diff} = 140

Step 5: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity

F = 1- 140/154
=0.09091

$N_{all} – N_{diff}$ =154-140
= 14

The proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all}-N_{diff} is greater than 3.

Since F is smaller than 0.2, the project activity is not a common practice.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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

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

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

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
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the version 02.2.1 of the "Tool to calculate the emission factor for an electricity system"

Calculation of $\underline{EG_{PJ,y}}$

(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 $\underline{EF_{grid,CM,y}}$

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**
	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[11]. 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 02.2.1, 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 Indian Power Sector - Version 5.0*[12] 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 interstate power transactions, which are dynamic and vary widely. Considering free flow of electricity among member states

[11] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver5.pdf

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

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.

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:

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

$EF_{grid,OMsimple,,y}$	=	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:

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

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type i consumed by power unit m in year y (Mass 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
m	=	All power units serving the grid in year y except low-cost / must-run 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 recent years for which data is available at the time of submission of the 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:

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 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 built margin emission factor should be updated based on the most recent information available on units already built at the submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the built 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
$EF_{EL,\ m,\ y}$	=	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[13].

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)

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

B.6.2. Data and parameters fixed ex ante

<table>
<tr><td>Data / Parameter</td><td>$EF_{grid,OM,y}$</td></tr>
<tr><td>Unit</td><td>tCO_2/MWh</td></tr>
<tr><td>Description</td><td>Operating Margin emission factor for NEWNE grid</td></tr>
<tr><td>Source of data</td><td>Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 5.0.</td></tr>
<tr><td>Value(s) applied</td><td>1.0049 tCO_2e/MWh</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>OM has been calculated as per ACM0002 with 3 years vintage data (2006-07, 2007-08 and 2008-09) and option of ex ante calculation based on Simple Operating Margin Method. It is being computed once during PDD finalization.
<table>
<tr><td colspan="2">Operating Margin Estimation for NEWNE Grid (tCO_2e/MWh)</td></tr>
<tr><td>OM, 2005-06</td><td>1.0085</td></tr>
<tr><td>OM, 2006-07</td><td>0.9999</td></tr>
<tr><td>OM, 2007-08</td><td>1.0066</td></tr>
<tr><td>Generation - Weighted Average OM ($EF_{grid, OM,y}$)</td><td>1.0049</td></tr>
</table>
</td></tr>
<tr><td>Purpose of data</td><td>To calculate operating margin</td></tr>
<tr><td>Additional comment</td><td>The value has been fixed ex-ante for the first crediting period.</td></tr>
</table>

Data / Parameter	**$EF_{grid,BM,y}$**
Unit	tCO_2/MWh
Description	Build Margin emission factor for NEWNE grid
Source of data	Referred from CO_2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 5.0.
Value(s) applied	0.6752 tCO_2e/MWh
Choice of data or Measurement methods and procedures	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.
Purpose of data	To calculate build margin
Additional comment	The value has been fixed ex-ante for the first crediting period.

Data / Parameter	**$EF_{grid,CM, y}$**
Unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor for NEWNE grid
Source of data	Estimated figure based on 75% of OM and 25% of BM values
Value(s) applied	0.9225 tCO_2e/MWh

<table>
<tr><td>Choice of data or Measurement methods and procedures</td><td>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.
<table>
<tr><th colspan="2">Combined Margin Estimation for NEWNE Grid (tCO_2e/MWh)</th></tr>
<tr><td>OM ($EF_{grid, OM,y}$)</td><td>1.0049</td></tr>
<tr><td>BM ($EF_{grid, BM, y}$)</td><td>0.6752</td></tr>
<tr><td>BM ($EF_{grid, BM, y}$)</td><td>0.9225</td></tr>
</table></td></tr>
<tr><td>Purpose of data</td><td>To calculate combined margin</td></tr>
<tr><td>Additional comment</td><td>The value has been fixed ex-ante for the first crediting period.</td></tr>
</table>

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 02.2.1 of the "Tool to calculate the emission factor for an electricity system"

BE_y = 19,285.070 MWh/annum x 0.9225 tCO_2e/MWh
= 17,790 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 = 17,790 – 0 – 0
= 17,790 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 ex ante estimates of emission reductions

Year	Baseline emissions ($t\ CO_2e$)	Project emissions ($t\ CO_2e$)	Leakage ($t\ CO_2e$)	Emission reductions ($t\ CO_2e$)
2013	17,790	0	0	17,790
2014	17,790	0	0	17,790
2015	17,790	0	0	17,790
2016	17,790	0	0	17,790
2017	17,790	0	0	17,790
2018	17,790	0	0	17,790
2019	17,790	0	0	17,790
Total	**124,530**	**0**	**0**	**124,530**
Total number of crediting years	7			
Annual average over the crediting period	17,790	0	0	17,790

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	**$EG_{facility,\ y}$**
Unit	MWh
Description	Net electricity supplied to grid
Source of data	Monthly Credit note issued by Operation and maintenance contractor (Suzlon). This is a calculated parameter
Value(s) applied	19285.070
Measurement methods and procedures	The net electricity supplied to grid is the basis for estimating emission reductions from the proposed project activity. ***Net Electricity:*** $EG_{facility,\ y} = EG_{y,\ net,\ feeder\ 1}$ The project activity consists of 7 WTGs. The power generated from these WTGs is stepped up by a step up transformer and fed into two separate 33 kV Feeder lines. Feeder Line 1: 1 WTG (WTG number P003) 6 WTGs (WTGs number P009, P010, P011, P016, P017, P020) Energy meters are located at sub-stations for the feeder, for monitoring export and import of electricity from the gird of feeder. The net electricity fed into feeder lines by WTGs part of project activity will be added together to calculate the net electricity from the project activity. This construes the electricity exported by individual power plants to the grid minus the quantity of electricity delivered to the project power plants from the grid.
Monitoring frequency	Monthy
QA/QC procedures	Net electricity supplied to the grid would be cross-checked against invoices for sale of electricity.
Purpose of data	Baseline Emission Calculations
Additional comment	Data will be kept for two years beyond each crediting period.

Data / Parameter	$EG_{y, net\ feeder\ 1,Export}$
Unit	MWh
Description	Total quantity of Electricity exported to grid by all WTGs connected to feeder1
Source of data	Monthly JMR Certificate issued by RRVPNL
Value(s) applied	This data will be used to arrive at the net electricity exported.
Measurement methods and procedures	Total electricity exported to RRVPNL will be measured at the main meter located at the sub-station and connected to the incoming feeder. This measured electricity will be the sum total electricity exported by all WTGs connected to the feeder including electricity generated from WTGs other than the project activity.
Monitoring frequency	Annual
QA/QC procedures	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 0.2s. The data will be monitored once a month. Calibration frequency: Annual
Purpose of data	Baseline Emission Calculations
Additional 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	$EG_{y, net\ feeder1,\ Import}$
Unit	MWh
Description	Total quantity of Electricity imported from grid by all WTGs connected to feeder 1
Source of data	Monthly JMR Certificate issued by RRVPNL
Value(s) applied	This data will be used to arrive at the net electricity exported.
Measurement methods and procedures	Total electricity imported to RRVPNL will be measured at the main meter located at the sub-station and connected to the incoming feeder. This measured electricity will be the sum total of electricity imported from all WTGs connected to the feeder including electricity generated from WTGs other than the project activity.
Monitoring frequency	Annual
QA/QC procedures	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 0.2s. The data will be monitored once a month. Calibration frequency: Annual.
Purpose of data	Baseline Emission Calculations
Additional 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	$EG_{y,\ WTG,\ feeder1,PA}$
Unit	MWh
Description	Total electricity fed into feeder line 1 by all WTGs of proposed project activity.
Source of data	Weekly Report with daily generation data provided by Suzlon to the PP

Value(s) applied	This data will be used for apportioning the net electricity supplied by Wind turbines. Detailed apportioning methodology is described in Annex 4 of the PDD
Measurement methods and procedures	Total electricity generation at controller lever by all WTGs which are part of the project activity. $\mathbf{EG_{y,\,WTG} = \sum EG_{y,\,WTG\,i}\,(i{=}1)}$ 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.
Monitoring frequency	Annual
QA/QC procedures	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 WTG supplier. The data will be monitored once a month.
Purpose of data	Baseline Emission Calculations
Additional 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. Sampling plan

NA

B.7.3. Other elements of monitoring plan

Inox Renewables Limited (IRL) 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 net electricity exported to the grid ($EG_{facility,y}$) is the basis for estimating emission reductions from the proposed project activity. This parameter is referred from the joint meter reading certificates taken jointly by grid and IRL authorities on a monthly basis.

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.

IRL 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 WTGs 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.

IRL 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).

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

23/04/2012

Gujarat Fluorochemical Limited has determined the baseline for the project activity. The entity is a project participant listed in Annex-I where the contact information has also been provided.

Contact Information:
Mr. Deepak Asher
Director & Group Head (Corporate Financing)
Mobile: +91 98 7950 7950
E Mail ID: deepakasher@gfl.co.in,
deepak_asher@yahoo.com

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

08/08/2009

According to Paragraph 67 of the Report on 41st meeting of the Executive Board of the Clean Development Mechanism, "*the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity. This, for example, can be the date on which contracts have been signed for equipment or construction/operation services required for the project activity.*" Hence, the start date of the project activity has been considered as the date of agreement with the equipment supplier.

C.1.2. Expected operational lifetime of project activity

20 years, 0 month

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Renewable crediting period of 7 years, 0 months

C.2.2. Start date of crediting period

01/01/2013 (or the date of registration whichever is later)

C.2.3. Length of crediting period

7 year 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

As per the Ministry of Environment and Forests (MoEF), Government of India notification S.O. 3067(E)[14] dated December 1, 2009 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. Environmental impact assessment

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.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

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 published an advertisement in the newspaper on 03rd March 2010 inviting representatives of various stakeholder groups with a brief on the project informing them of the proposed meeting at 11.30 PM on 16th March 2010 at Primary School, Govindpura, Tehsil Ossiyan, District Jodhpur requesting all to attend meeting or depute representatives.

The agenda of the meeting was as follows:

- Welcome speech by the organizers
- Introduction to 'Clean Development Mechanism' by Suzlon
- Speech by representatives of all Participants
- Interactive session with the stake holders
- Vote of thanks

[14] Reference : http://moef.nic.in/downloads/rules-and-regulations/3067.pdf

The meeting was well-attended by participants consisting of representatives of neighbouring villages as well as representatives of the Suzlon group[15]. The discussion that took place was recorded in the form of the Minutes of Meeting. The list of participants with their signature was also kept for record along with photographs of the meeting.

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

E.2. Summary of comments received

The main issues raised during the stakeholder consultation meeting at the project site were about the affect of project on local environment 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 summary of the comments and queries from the stakeholders and responses from the project participant are presented below:

Mr. Naruram: Will the project help in improving the electricity supply to villagers and neighborhood areas?

PP Response: Power will be supplied to the state electricity grid. The state electricity distribution companies are responsible for supplying of power to various consumers in the state, so supply of power is in the discretion of the state.

Mr. Bhikaram: We have heard that apart from wind, power can be generated from other sources of nature – such as water, sun, etc. Why does the government not invest entirely in renewable energy projects to source all the power that it needs?

PP Response: The government has invested in renewable energy projects apart from wind. The Bharka Nangal Dam, the Hirakaud Dam over the Mahanadi River are examples of hydro power projects. The government also has long term plans for promoting renewable power. The National Solar Mission under the National Action Plan on Climate Change is focused on promoting solar power projects in the country. However, there are certain barriers such as high investment costs, and uncertain output which pose as challenges for implementation of renewable energy projects.

Mr. Mahindra Singh: Will the government plans for promoting solar power projects contribute to increase in jobs for the villagers?

PP Response: It is too early to say how the National Solar Mission will be implemented. However, in the long run, there will definitely be employment generation from large scale deployment of renewable energy.

Further, the villagers and the PP discussed the potential benefits of wind power developme nt and aligned development / CSR activities in the region. The summary of the discussion is as given below:

A medical camp is operated at regular intervals, the medicines are regularly stocked and the Doctor takes out time for every patient. Apart from this, there is also a well - equipped ambulance made available for the villagers whether they use the facilities of the dispensary or not, and to transport them quickly in case of an emergency. Facilities such as oxygen cylinders have also been made available which were not here earlier.

The Projects have brought employment opportunity at the village-level. Lot of villagers have got employment - either as security guards, drivers, etc. Apart from this, contracts for civil work have also been given to local villagers.

Other work pertaining to these projects have helped the local villagers also such as hiring of transport services, civil contracts, couriers, office automation facilities such as

[15] Complete attendance list has been submitted for validation.

photocopying/printing/fax services etc. These kinds of projects should be developed in all the villages, districts, talukas, etc.

E.3. Report on consideration of comments received

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. 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.

SECTION F. Approval and authorization

The host country (India) approval was received and is uploaded on the link http://cdm.unfccc.int/Projects/DB/RWTUV1350294460.35/view.

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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Inox Renewables Limited (IRL)
Street/P.O. Box	Old Padra Road
Building	2nd Floor, ABS Tower
City	Vadodara
State/Region	Gujarat
Postcode	390007
Country	India
Telephone	+91 265 619 8111
Fax	+91 265 231 0312
E-mail	deepakasher@gfl.co.in
Website	www.inoxrenewables.com
Contact person	-
Title	Director & Group Head (Corporate Financing)
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

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Gujarat Fluorochemicals Limited
Street/P.O. Box	Old Padra Road
Building	2^{nd} Floor, ABS Tower
City	Vadodara
State/Region	Gujarat
Postcode	390007
Country	India
Telephone	+91 265 619 8111
Fax	+91 265 231 0312,
E-mail	deepakasher@gfl.co.in
Website	www.gfl.co.in
Contact person	-
Title	Director & Group Head (Corporate Financing)
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

Appendix 2. Affirmation regarding public funding

There is no public funding involve in this project.

Appendix 3. Applicability of methodology and standardized baseline

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	465,36
2007-08	0.9999	496,11
2008-09	1.0066	509,77
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**

Appendix 4. Further background information on ex ante calculation of emission reductions

The ex-ante calculation of emission reduction has been explained in section B.6.3.

Appendix 5. Further background information on monitoring plan

Apportioning procedure would be applied as follows:

The electricity exported and imported from each feeder would be apportioned based on the ratio of electricity generation from project activity WTGs and electricity generation from all WTGs connected to the respective feeder as shown in the example below:

$EG_{y,\ net,\ feeder1,} = EG_{y,\ net\ feeder\ 1,Export} - EG_{y,\ net\ feeder1,\ Import}$

Apportioned electricity export, feeder 1 = $(EG_{y,\ WTG,\ feeder1,PA} / EG_{y,\ WTG,\ feeder1}) * EG_{y,\ net\ feeder\ 1,Export}$

Apportioned electricity import, feeder 1 = $(EG_{y,\ WTG,\ feeder1,PA} / EG_{y,\ WTG,\ feeder1}) * EG_{y,\ net\ feeder\ 1,Import}$

Apportioned net **electricity** supplied to gird, feeder 1 **=**

$(EG_{y,\ WTG,\ feeder1,PA} / EG_{y,\ WTG,\ feeder1}) * (EG_{y,\ net\ feeder\ 1,Export} - EG_{y,\ net\ feeder\ 1,Import})$

Assuming that electricity generated from WTGs at feeder 1 for a particular month is as follows:

WTG	Project Activity	Electricity Generated (MWh)
$EG_{y,\ WTG1}$	Yes	100
$EG_{y,\ WTG2}$	No	110
$EG_{y,\ WTG3}$	No	105
$EG_{y,\ WTG4}$	No	95
$EG_{y,\ WTG5}$	No	90
$EG_{y,\ WTG6}$	No	100
$EG_{y,\ WTG7}$	No	100
$EG_{y,\ WTG8}$	No	100
$EG_{y,\ WTG9}$	No	110
$EG_{y,\ WTG10}$	No	110
$EG_{y,\ WTG11}$	No	90
$EG_{y,\ WTG12}$	No	100
$EG_{y,\ WTG13}$	No	90
$EG_{y,\ WTG14}$	No	100
Total WTG Generation		1400

EG $_{y,\ net,\ feeder1,}$ (Net export from feeder)	1350
EG $_{y,\ net\ feeder\ 1,Export}$ (Export from feeder)	1360
EG $_{y,\ net\ feeder1,\ Import}$ (Import to feeder)	10

Apportioned net electricity supplied by project activity from feeder 1 = (100 / 1400) * (*1360-10)* = (100/1400) * 1350 = 96.4 MWh

Appendix 6. Summary of post registration changes

The permanent change to the registered monitoring plan has been identified. A new sub-station (33/132kV) has been commissioned at Basni, Dhanwara and the substation at Baori is now 132/220 kV. This has been done to reduce losses and it is not in control of the project participant. Earlier monitoring was been carried out on 2 feeders at Baori substation (33/220 kV) and there were 4 meters (1 main and 1 check meter on each feeder). However metering is now been carried out on 1 feeder at Baori substation (132/220 kV). As all the wind mills are connected to 1 feeder only. This is the post registration change and changes fall under the changes listed in para 5A of Appendix 1 of the project standard i.e Change in practice of the Monitoring Equipment not within the control of Project Participants. Accordingly Monitoring parameters have been revised, there were 11 monitoring parameters and there were 5 parameters for each feeder and now since monitoring is been done on 1 feeder, the monitoring parameters have reduced. This is as per the monitoring been carried out at the site.

In the registered PDD there was a parameter EGy, WTG feeder 1 and EGy WTG feeder 2 which was LCS controller data for all WTG"S connected to the respective feeder which included WTG's of project activity and WTG's of other investors who are not part of this project. Suzlon was requested to provide this data on vide e-mail dated 16/09/2015 and they have informed that due to confidentiality policy they cannot share data of other investors. Accordingly this parameter has been removed and it does not affect emission reduction calculations as the emission reductions are calculated based on EG net provided in Break of Net Export sheet provided by Suzlon. The LCS data of WTG's of this project is available and the same has been included.

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Document information

Version	Date	Description
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document