



**Project design document form for
small-scale CDM project activities
(Version 06.0)**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Wind Power Project by Sargam Retails Pvt. Ltd. in Gujarat, India
Version number of the PDD	03
Completion date of the PDD	27/01/2016
Project participant(s)	Sargam Retails Pvt. Ltd.
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	<p>Sectoral Scope 1: Energy Industries (renewable - /non renewable sources)</p> <p>Methodology: - AMS-I.D "Grid connected renewable electricity generation" (Version 15, EB 50, valid from 30th October, 2009)</p>
Estimated amount of annual average GHG emission reductions	16,181 tCO ₂ e / annum

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The proposed project activity is an initiative by Sargam Retails Pvt. Ltd. (SRPL), towards clean electricity generation using wind energy resources in the state of Gujarat. SRPL is engaged in Trading and Marketing Packaged Tea & Tobacco. The project activity leads to the installation of 12 Wind Energy Convertors (WECs) of installed capacity of 800 KW each with a total generating capacity of 9.6 MW. Their locations will be in Jamnagar & Rajkot districts of Gujarat state of India. The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for supply to Gujarat Electricity Distribution Authority i.e. Gujarat Electricity Transmission Corporation Limited (GETCO) and to contribute to climate change mitigation efforts. This renewable energy produced will partially contribute to the electricity provided by the Gujarat Electricity Transmission Corporation Limited (GETCO). The project will be utilizing wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely- fossil fuel) based power plants thus, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. SRPL (Sargam Retails Pvt. Ltd) will be developing this project keeping in consideration the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. The project activity is also responsible for sustainable economic growth and conservation of environment through use of wind as a renewable source. The Project activity would generate 9.6 MW of electricity with efficient utilization of the available wind energy through adoption of the latest, efficient and modern technology. The generated electricity will displace equivalent electricity (generated from fossil sources) that may have been supplied to GETCO.

Sustainable development criteria

The following criteria have been considered for demonstrating sustainable development.

- Social well being
- Economic well being
- Environmental well being
- Technological well being

The project activity contributes to the sustainable development in the following way:

Social Well-being

The proposed project activity will lead to alleviation of poverty by establishing direct and indirect employment benefits. Such benefits will, for example, be accrued out during maintenance operations of the project activity or as generation of permanent labor in the form of security services. The infrastructure in and around the project area will also improve due to project activities. This includes development of road network and improvement of electricity quality, frequency and availability.

Economic Prosperity

The project activity leads to an investment of about INR 522 million to a developing region which otherwise would not have happened in the absence of project activity. The generated electricity is fed into the NEWNE Regional Grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants). This attracts new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local 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.

Environmental Well-being

The project will utilize wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely- fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Technological Up-gradation

The project activity involves the installation of state-of-art technology. The wind turbine generators used for the project activity are of the latest technology. This project will therefore motivate other proponents in the surrounding area to put up high-efficiency techniques. Thus, it is ensured that the project activity meets all the criteria for Sustainable development.

A.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

Gujrat

A.2.3. City/Town/Community etc.

Jamnagar and Rajkot

A.2.4. Physical/Geographical location

The project activity is located in Jamnagar & Rajkot districts of Gujarat state of India.

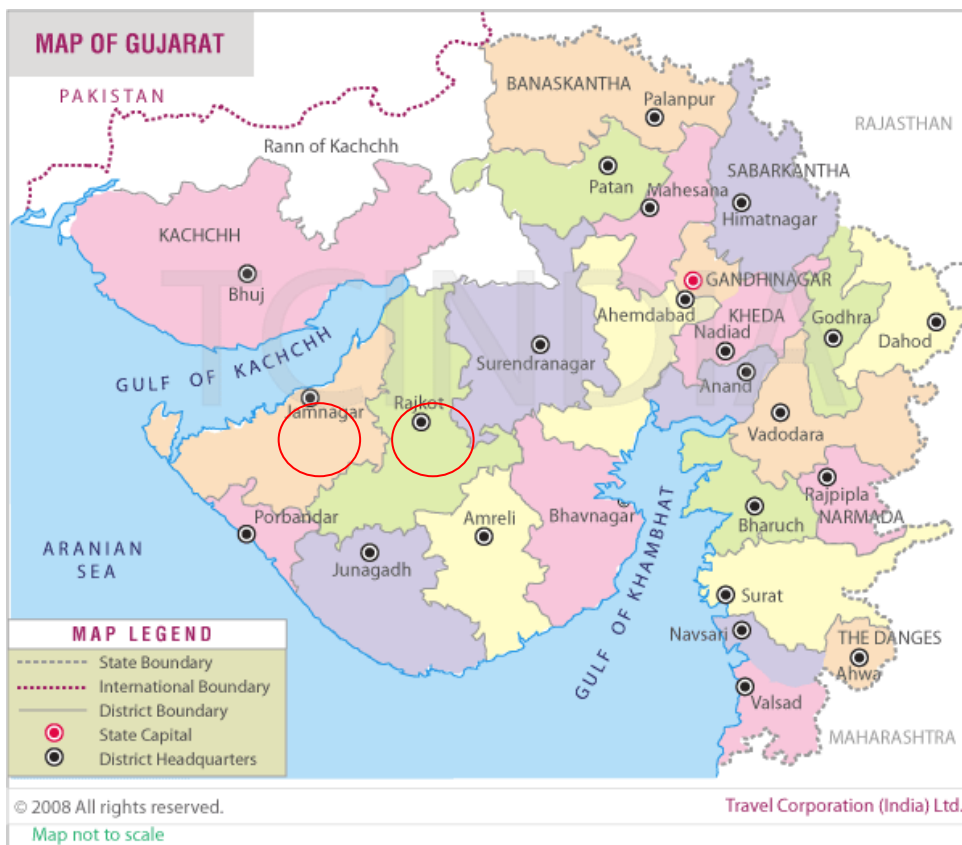
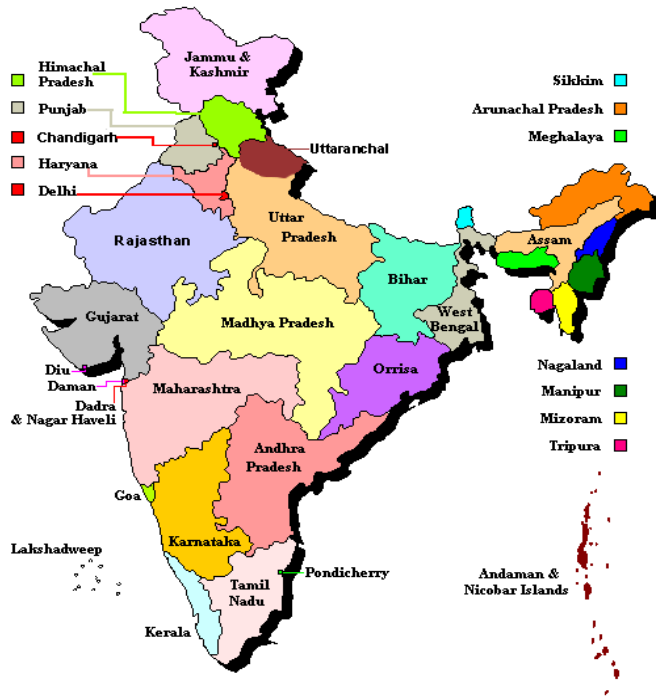
Jamnagar: Latitude: 22.0819 N, Longitude: 70.1975 E

Rajkot: Latitude: 22.2973 N, Longitude: 70.7984 E

Sr. No.	Location No.	WTG Type	Tower Height	Type of Land	Village
1	969	E-53	75 Mtr. Concrete Tower	Revenue	Juna Matravad
2	970	E-53	75 Mtr. Concrete Tower	Revenue	Juna Matravad
3	971	E-53	75 Mtr. Concrete Tower	Revenue	Khijdiya
4	972	E-53	75 Mtr. Concrete Tower	Revenue	Khijdiya
5	973	E-53	75 Mtr. Concrete Tower	Revenue	Khijdiya
6	2047	E-53	75 Mtr. Concrete Tower	Private	Mota Panchdevda
7	2082	E-53	75 Mtr. Concrete Tower	Private	Mota Panchdevda
8	2083	E-53	75 Mtr. Concrete Tower	Private	Mota Panchdevda
9	2084	E-53	75 Mtr. Concrete Tower	Private	Mota Panchdevda
10	2118	E-53	75 Mtr. Concrete Tower	Private	Chhatar
11	2119	E-53	75 Mtr. Concrete Tower	Private	Chhatar
12	2120	E-53	75 Mtr. Concrete Tower	Private	Chhatar

Taluka	District	Latitude (Degree, Min, Sec.)	Longitude (Degree, Min, Sec.)
Jamkandorna	Rajkot	N 21 59 57.5	E 70 18 08.1
Jamkandorna	Rajkot	N 21 59 50.3	E 70 18 08.4
Jamkandorna	Rajkot	N 21 58 53.7	E 70 18 45.1
Jamkandorna	Rajkot	N 21 58 49.2	E 70 18 51.3

Jamkandorna	Rajkot	N 21 58 42.3	E 70 18 43.1
Kalavad	Jamnagar	N 22 05 58.6	E 70 12 09.7
Kalavad	Jamnagar	N 22 06 05.8	E 70 12 57.7
Kalavad	Jamnagar	N 22 05 55.6	E 70 12 56.2
Kalavad	Jamnagar	N 22 05 46.8	E 70 12 58.8
Kalavad	Jamnagar	N 22 05 49.5	E 70 12 03.8
Kalavad	Jamnagar	N 22 06 40.1	E 70 13 34.8
Kalavad	Jamnagar	N 22 06 20.1	E 70 13 35.3



A.3. Technologies and/or measures

The project activity compiles with the applicability criteria of the small scale CDM project activity category. The capacity of the proposed project is 9.6 MW, which is less than the maximum qualifying capacity of 15 MW, the project activity has been considered as a small scale CDM project activity and UNFCCC indicative simplified modalities and procedures are applied. The project activity utilizes the wind potential for power generation and exports the generated electricity to the grid.

According to small- scale CDM modalities the project activity falls under the following category: Sectoral Scope: 1 Energy industries (renewable / non renewable sources)

Type I: Renewable Energy Projects Category D: 'Grid connected renewable electricity generation' (Version 15, EB 50, valid from 30th October, 2009¹).

As per the provisions specified, the projects that come under the purview of AMS.I.D (Version 15.0) "comprise of renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit."

Technology

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture wind's energy with two or three propeller-like blades, which are mounted on a rotor to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind as the wind blows through the blades of windmill, a pocket of low- pressure forms on the downwind side of the blade. The low-pressure pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the shaft that further spins the connected generator. The spinning of this generator produces the required electricity.

For the project activity, SRPL has placed the purchase orders to procure Wind Energy Convertors (WECs) from Enercon (India) Limited for supply of 12 nos. of E- 53. The salient features of the technology are:

PLF (Plant Load Factor) = [Guaranteed generation (Lakh kWh) x 105/Installed Capacity (MW) x 10 3x24x 365] PLF = (17 x 12) x 10 5/9.6 x 10 3 x 24 x 365 = 0.2426

Enercon made E- 53 WECs

WEC capacity	800 KW (E- 53)
Rotor diameter	52.9 m
No. of blades	3
Cut in wind speed	2.5 m/s
Cut out wind Speed	28 – 34 m/s
Power Regulation	Independent Pitch system for each blade
Hub Height	75 Meter
Gear box type	Gear less
Braking	Aerodynamic
Operating range rot. Speed	12 - 29 rpm

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)

¹ <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

India	Sargam Retails Pvt. Ltd.	No
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A.5. Public funding of project activity

There is no public funding involved in the project activity. The project activity has been developed on the basis of in-house resources of the company & loan from the bank.

A.6. Debundling for project activity

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

- With the same project participants
- In the same project category and technology
- Registered within the previous two years; and
- Whose project boundary is within 1 km of project boundary of the proposed small scale activity

The project proponent hereby confirms that there is no registered small scale project activity registered within the two years in the same project category and technology whose project boundary is within 1km of the project boundary of the proposed small scale activity. Thus the project is not a debundled component of any other large-scale project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline**B.1. Reference of methodology and standardized baseline**

The methodology followed will be "AMS I.D. Version 15.0 (Valid from 30 Oct 09 onward) Approved methodology for Small Scale Projects" under the sectoral scope "Grid connected renewable electricity generation" which is most appropriate for this Project and is listed as per the UNFCCC norms.

Project Type : I – Renewable energy project

Project category : D – Grid connected renewable electricity generation (AMS I.D. Version 15.0, EB 50 (Valid from 30th Oct 09 onward))

Methodology AMS I.D. also refers to:- Revision to the approved consolidated methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version: 10, EB 47 Scope No: 1

Sectoral Scope Energy Industries: (Renewable/non-renewable) Date: 30th October 2009.

Reference : Appendix B of simplified M&P for small scale project activities (UNFCCC, Recent norms)

B.2. Project activity eligibility

In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project category is categorized as Type- AMS I.D.: Version 15.0, Scope 1, "Grid Connected renewable electricity generation". Category ID is applicable to projects that use renewable energy technologies that supply electricity to a grid.

The CDM project is leading to reduction in the emission of GHG due to the use of renewable energy source, i.e., wind, for power generation.

Sr.	Technology/ measure	Justification
1	This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace	The project activity is the installation of windmills, which utilizes the renewable energy of wind to generate electricity connected to

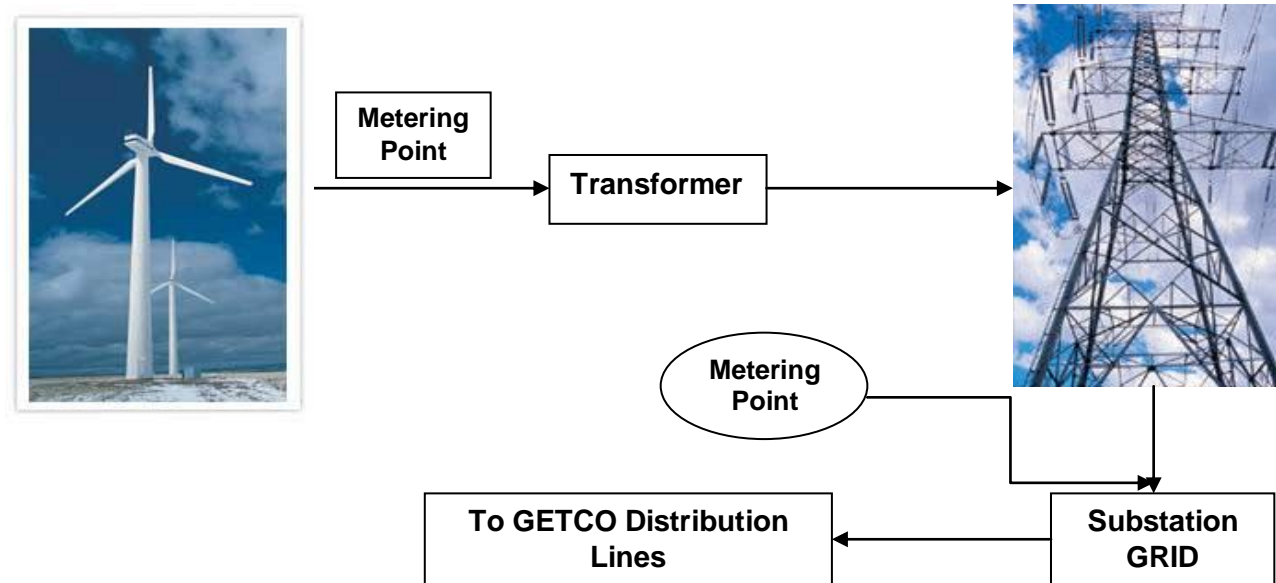
	electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit	grid.
2	If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.	The project activity involves the installation of 12 units of WECs of capacity 800 KW, which contributes to total of 9.6 MW which is less than the limiting capacity of 15 MW.
3	Combined heat and power (co-generation) systems are not eligible under this category.	The activity includes only wind mills of 9.6 MW capacities and does not include any co- generation process. Hence it satisfies the condition.
4	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The project activity is installation of 9.6 MW new windmills and not any addition to existing units. It is not applicable.
5	Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	The project activity is neither retrofit nor modify an existing facility. The proposed Project activity is installation of 9.6 MW new wind mills. Thus it is not applicable.
6	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: <ul style="list-style-type: none"> • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²; • 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/m² 	This is a wind power project. Hence not applicable.

In this project, total electricity generation capacity of all 12 windmills is 9.6 MW, which is less than the limit of 15 MW of maximum output capacity as specified in Annex-II "Simplified Modalities & Procedures for Small Scale CDM Project Activities" for Type (I) project activities: renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent) (decision 17/CP.7, paragraph 6 (c) (i)). Thus, this project reduces anthropogenic emissions by sources and its maximum output capacity is less than 15 MW. Therefore it confirms to this category thereby qualifying as a small-scale project activity.

B.3. Project boundary

As per the Appendix B of simplified modalities & procedures for small-scale CDM-project activities, the project boundary is "The project boundary encompasses the physical, geographical site of the renewable generation source."

In this project activity, the project boundary is composed of 12 WECs and the metering equipment for each generator and substation, and the grid (NEWNE grid) which is used to transmit the generated electricity:



B.4. Establishment and description of baseline scenario

The baseline methodology followed is one specified under Project category I.D in Appendix B of the Simplified M&P for small scale CDM project activities. As per the applied methodology, AMS I D, (Version 15), the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient which is to be measured in KgCO₂e/KWh. The emission coefficient is to be calculated in a transparent and conservative manner as per the procedures laid in paragraph 11 (a) or 11 (b). For the estimation of the baseline the project proponent has chosen to use paragraph 11 (a) which requires the calculation of the combined margin, consisting of the combination of the operating margin (OM) and the build margin (BM) according to the procedures laid out in the Tool to calculate the Emission Factor for an electricity system (Version 2.0, EB 50). The monitoring methodology would be based on the guidance provided in the paragraph 17 of Type I.D. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin for the NEWNE grid, the details of which are available on the following website

<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>.

Steps	Description	Equation used	Methodological choices
1.	Procedure followed for calculating emissions Baseline	$BE_y = EG_y * EF_y$	The EF_y has been calculated using operating and built margin emission factor taken from CEA published data.
2.	Procedure followed for calculating Project emissions (PE_y)	No project emissions are applicable to this small scale wind electric power project, since the electricity generation is based on Wind resources, which does not involve in combustion or generation of emissions from fossil fuels. (Para 14 of AMS ID, Version 15.0)	
3.	No leakage emissions are considered for this Project activity since no energy	No leakage emissions are considered for this Project activity since no energy	

	generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity. (L_y)	generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity. (Para 15 of AMS ID, Version 15.0)	
4.	Procedure followed for calculating Emission reduction (ER_y)	The emission reductions are calculated as per equation $ER_y = BE_y - PE_y - L_y$	

The latest version of the said tool, Version 04, has been used by the CEA for the calculation. The procedures followed, the assumptions made and the formulae applied by the CEA for the calculation of the OM and the BM is detailed below. In the absence of the project activity taken up by the Project Proponent, the renewable energy source from the wind power would not have been generated. This would have resulted in equivalent power generation from the fossil fuel based NEWNW Region Grid, India. Therefore the energy base line will be the electrical energy displaced by the wind mill installed by the project proponent in the NEWNE Grid that would have continued without implementation of project activity.

Calculation of the Baseline Emission Factor

Step 1: Identifying the relevant electric power system

A “project electricity system” is defined by 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.

A “connected electricity system” is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. The tool requires the following considerations while determining whether significant transmission constraints exist or not:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5% between the systems during 60% or more of the hours of the year.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

In the Indian context, as no well established spot markets exist, the first criterion is not applicable. Similarly, a transmission line fulfilling the second criteria is an exception in Indian Context. Hence the use of these criteria does not result in a clear grid boundary. In such a scenario, the use of a regional grid definition in case of large countries with layered dispatch systems (e.g. provincial, regional/national) is recommended. Further, it states that a provincial grid definition may in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity.

The Indian power system is divided into two grids, namely the Integrated Northern, Eastern, Western, and North-Eastern regional grid (NEWNE) and the southern Grid. Each grid covers several states. The southern grid covers four states and two Union Territories including the states of Tamil Nadu, Andhra Pradesh, Kerala and Jamnagar Gujarat comes under NEWNE grid. The rest of the states come under the NEWNE grid.

Each state in a regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely

produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional grid in which it is located. Hence for the purpose of estimation of the baseline emission factor, the NEWNE Regional grid has been chosen as the relevant electricity system.

Step 2: Selection of an Operating Margin method

The project proponent wishes to use the Simple Operating Margin (OM) method for the estimation of the baseline. The use of the Simple OM method is justified as the share of the low cost/ run resources constitute less than 50% of the total grid generation. The Ex ante option has been chosen where in a three year generation weighted average based on the most recent data would be calculated ex ante and would be fixed for the entire crediting period. Hence, the parameters for the calculation of OM do not need to be monitored and the OM does not need to be calculated during the chosen crediting period of seven years.

Step 3: Calculation of the OM according to the Simple OM method

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The data provided by the Central Electricity Authority (CEA), an official data source has been relied upon for the calculation of the OM². The same has been detailed in Annex 3. The latest version of the database, Version 4.0 (CEA website Version: 4.0 (Valid from 1st September 2008) has been used. The OM calculations is been based upon generation data, fuel consumption and the Gross Calorific value (GCV) of the fuel.

Calculation Approach

The Simple OM has been calculated using the following formula:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO_2,i,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power plant/ unit m in year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO_2,i,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)

$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)

m = All power plants / units serving the grid in year y except low-cost/ must-run power plants/units

i = All fossil fuel types combusted in power plant / unit m in year y

y = The three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (for ex ante option)

The Operating Margin thus calculated is 1.01

$$OM = 1.01 \text{ tCO}_2/\text{MWh}$$

Step 4: Identification of the cohort of power units to be included in the Build Margin

The sample group of power units m selected for calculation of the build margin consists of 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. The data pertaining to the units thus identified are detailed in the Version 4.0 [CEA website Version: 4.0 (Valid from 1st September 2008)] of the Baseline Carbon Dioxide Emissions database of the CEA³.

With regards to data vintage, the project participant wishes to use Option 1 viz., for the crediting period, calculate the build margin emission factor ex-ante based on the most recent information

² <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

³ <http://cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation.

Step 5: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

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

Where:

EF_{grid,BM,y} = Build margin CO₂ emission factor in year y (tCO₂/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} = CO₂ emission factor of power unit m in year y (tCO₂/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

The Build Margin would be calculated ex ante during the crediting period. For ex ante calculation the most recent data available has been used and the build margin thus calculated is 0.60

Therefore,

$$BM = 0.60 \text{ tCO}_2/\text{MWh}$$

Step 6: Calculation of the combined Build Margin

The combined margin will be calculated as follows:

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

Where,

EF_{grid,BM,y} = Build margin CO₂ emission factor in year y (tCO₂/MWh)

EF_{grid,OM,y} = Operating margin CO₂ emission factor in year y (tCO₂/MWh)

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

The default values to be used for Wind Power projects are

$$w_{OM} = 0.75 \quad w_{BM} = 0.25$$

Hence, the Baseline Emission Factor is calculated as below:

$$\begin{aligned} EF_{grid,CM} &= w_{OM} * OM + w_{BM} * BM \\ &= 0.75 * 1.01 + 0.25 * 0.60 \\ &= 0.906 \text{ tCO}_2/\text{MWh} \end{aligned}$$

NEWNE Grid	2005-06	2006-07	2007-08	Average
Simple operating margin	1.02	1.01	1.00	1.01
Built Margin	0.67	0.63	0.60	
Combined Margin	0.75 * 1.01 + 0.25 * 0.60 = 0.906 tCO ₂ /MWh			

The baseline calculations are taken from draft CDM baseline CO₂ emission published by Central Electricity Authority (CEA) (Version 04, dated 1st September 2008).

B.5. Demonstration of additionality

Considering the criticality of CDM funds for the viability of the project, the project proponent initiated steps to secure CDM status for the project. The board of SRPL resolved to setup the project considering CDM funds and the consultant was appointed immediately. Board of directors of SRPL on 27th January 2009 passed the resolution stated that the monetary benefits from CDM

will only make the project viable. PP raised the PO for WTGs on 11th February, 2009. Accordingly PP sent enquiry to consultant on 17th February 2009. The CDM consultant was finally appointed on 23rd March 2009. This was then followed by UNFCCC intimation on 24th March 2009. In turn UNFCCC acknowledged the receipt of intimation on 31st March 2009. The stakeholder meeting was conducted on 7th April, 2009. DOE was appointed on 28th April 2009. The project was open for global stakeholder comments during the period 12th May 2009 – 10th June 2009⁴. Thereafter, MoEF presentation was held on 26th June 2009. Following this, DOE conducted site visit on 3rd July 2009- 4th July 2009. The entire chronology of the events for securing CDM status for the project is presented below.

Events	Dated
Proposal from the Enercon	20/01/2009
Board Decision for implementation of the project	27/01/2009
P.O of WECs	11/02/2009
Enquiry with consultant	17/02/2009
Appointment of CDM Consultant	23/03/2009
UNFCCC intimation	24/03/2009
UNFCCC acknowledgement to intimation	31/03/2009
Stakeholder meeting	07/04/2009
Appointing DOE	28/04/2009
Web Hosting of the PDD	12/05/2009 – 10/06/2009
MOEF Presentation	26/06/2009
DOE visit to site	03/07/2009 – 04/07/2009

The installed capacity of the project is 9.6 MW, which is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. Further, the project activity is generation of electricity for a grid system using wind energy. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.

Referring to attachment A to appendix B document of “indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories” Version 6.0, project participants are required to provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements. should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s); The guidance provided herein has been used to establish project additionality. Investment analysis has been considered to justify the project additionality. Technological barrier has not been taken into consideration.

The barriers that were considered are listed below:

- (a) Investment barrier

Investment Barrier

Step 1:

The project activity involves setting up of 9.6 MW of wind power in Jamnagar & Rajkot districts of Gujarat state of India which will be supplied to GETCO. Thus, Benchmark analysis is selected to depict the investment barrier. The benchmark for the project was taken as prime lending rate (PLR) 2008 provided by Reserve Bank of India (RBI).

The project IRR was compared against PLR of 12.25% corresponding to the period (Link: <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf>).

The IRR for the project is coming around 9.61% which is below the returns expected of 12.25% for this project. However the Benchmark Prime Lending Rate for the month of December 2008 is in

⁴ <http://cdm.unfccc.int/Projects/Validation/DB/IFP9UPWMP2B2CXE4W7TKY3A5HNXOIU/view.html>

the range of 12.50%-14.00% (Link: <http://rbi.org.in/scripts/WSSView.aspx?Id=13065>) . PP has taken conservative approach in opting for the benchmark i.e. 12.25%. However PP has taken a conservative approach in taking the benchmark for the proposed wind power project at the time of financial decision which is 12.25% (prime lending rate (PLR) (Link: <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf>) provided by Reserve Bank of India (RBI) 2008.

Step 2

Wind power projects are investment intensive and hence the IRR analysis is selected for comparing the investment to the project with respect to standardized benchmarks. Total investment in this project activity is INR 522 million to install 9.6 MW capacities of WECs in Jamnagar & Rajkot districts of Gujarat state of India.

The Project proponent was completely aware of the risk involved in investing in wind power generation. Wind is totally unreliable source as its availability is on seasons. In comparison to the conventional generation methods (thermal, hydro, etc), the establishment costs are higher for WECs. To add to the situation, the PLFs obtained by WECs are very low as compared to thermal plants. The grid is dominated by thermal power i.e. 63.8%. The investment in this project is as high as INR 522 million, while the alternative would have been to invest in thermal energy having higher returns. Thus the project proponents took a risk by investing in wind power. The PLF assumed in the investment analysis for the project activity is 24.40% (based on equipment supplier's generation guarantee).

PLF (Plant Load Factor) = Guaranteed generation (Lakh Kwh) x 10^5 / Installed Capacity (MW) x 10^3 x 24 x 365.

PLF = $(17 \times 12) \times 10^5 / 9.6 \times 10^3 \times 24 \times 365 = 0.2426$.

Step 3:

The benchmark is taken as per the Reserve bank of India (RBI) Benchmark Prime lending rate (BPLR) for 2008 is in the range of 12.25 - 13.50%⁵ based on PLR (Prime lending rate). Benchmark during the period of financial decision in December 2008 was in the range of 12.50% - 14.00%. (Link : <http://rbi.org.in/scripts/WSSView.aspx?Id=13065>) However PP has taken a conservative approach in taking the benchmark for the proposed wind power project at the time of financial decision which is 12.25% (prime lending rate (PLR) (Link: <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf>) provided by Reserve Bank of India (RBI) 2008.

Step 4:

Project financial analysis:

The major assumptions for the project financial analysis are listed below:

Project Details:	Gujrat
Size of the Project(MW)	9.60 MW
Location of the Project	Site : Samana, Dist.: Jamnagar/ Rajkot, Gujarat (INDIA)
No of WTGs	12
Project Cost:	
Wind Mill, Overhead Line etc , (Rs. Lakhs)	5220.00
Land (Rs. Lakhs)	0.00
Total Cost(Rs. Lakhs)	5220.00
Recurring Cost:	

⁵ <http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf>

Operation and Maintenance Cost (Rs. Lakhs) - Per windmill (First 3 years free)	5.50
Escalation in Operation and Maintenance cost(%)	5.00%
Insurance (Fire/Burglary/Breakdown + Service Tax)	0.0028
Annual Depreciation as per companies act(%)	5.28%
Rate of Depreciation as per Income tax Act(%)	80.00%
Project Financials:	
Equity (Rs. Lakhs)	1389.56
Debt (Rs. Lakhs)	3830.44
Loan Duration (Years) including Moratorium Period	6.50
Moratorium (Months)	6
Interest(%)	11.75%
Tariff Details:	
Tariff (Rs./KWh)	
1st Year to 20th year	3.50
Tax Components:	
MAT(%)	11.33%
Corporate Tax(%) / (Tax Shield Rate)	33.99%
CDM Components:	
CER Price (in Euros)	10.00
Emission Factor	0.906
Euro-Rupee Conversion Factor	68.00
Generation:	
Generation/WTG (Lac Units) - Estimation at 100% Grid at Controller	17.00
Machine Availability Correction Factor	5%
Grid Availability Correction Factor	5%
Transmission Loss percentage from controller to metering point	3%
Generation/WTG (Lac Units) - Net billable/WTG (Lac units)	14.84
Indirect Expenses:	
Admin salary (Rs. Lakhs)	7.50
Escalation in Admin salary every year	10.00%
Processing fees for Term Loan(For year 0 only) as % of loan amount	0.10%

The major assumptions for the project financial analysis are listed below:

Project Details:	Gujrat
Size of the Project(MW)	Capacity finalized in Board Resolution dated 27 th January 2009
Location of the Project	
No of WTGs	
Project Cost:	Proposal by Enercon dated 20 th
Wind Mill, Overhead Line etc , (Rs. Lakhs)	

Land (Rs. Lakhs)	January 2009
Recurring Cost:	
Operation and Maintenance Cost (Rs. Lakhs) - Per windmill (First 3 years free)	
Escalation in Operation and Maintenance cost(%)	Proposal by Enercon dated 20 th January 2009
Insurance (Fire/Burglary/Breakdown + Service Tax)	Bajaj Allianz policy dated 22nd April 2008 for SRPL Maharashtra Wind Mill
Annual Depreciation as per companies act (%)	As per Company act (http://www.mca.gov.in/Ministry/actsbills/pdf/Companies_Act_1956_Part_2.pdf) page 77).
Rate of Depreciation as per Income tax Act (%)	Refer Point No 1
Project Financials:	
Equity (Rs. Lakhs)	
Debt (Rs. Lakhs)	
Loan Duration (Years) including Moratorium Period	
Moratorium (Months)	Bank Loan sanction Letter of 13.75 MW wind power project.
Interest (%)	
Tariff Details:	
Tariff (Rs./KWh)	Amendment to wind power policy 2007 dated 7 th Januray 2009 (RS 3.50/-)
1st Year to 20th year	
Tax Components:	
MAT(%)	Refer Point No 2
Corporate Tax(%) / (Tax Shield Rate)	Refer Point No 3
Generation:	
Generation/WTG (Lac Units) - Estimation at 100% Grid at Controller	
Machine Availability Correction Factor	
Grid Availability Correction Factor	
Transmission Loss percentage from controller to metering point	Proposal by Enercon dated 20th January 2009
Indirect Expenses:	
Admin salary (Rs. Lakhs)	Company inter office communication
Escalation in Admin salary every year	24 th January 2009
Processing fees for Term Loan(For year 0 only) as % of loan amount	Bank Loan sanction Letter of 13.75 MW wind power project.

Point 1: As per the IT Act the rate of depreciation is for a wind mill is 80%. (Refer pages 110 of V.G.Mehta's Income tax Ready Reckoner, Assessment year 2009- 10).

Point 2: (i) As per Section 115JB of IT act the minimum tax on book profit is 10%. (ii) There is a surcharge of 10% on such income tax, this sums to 11%. (iii) There is a Education Cess @ 2% of income tax and surcharge, this sums to 11.22%. (iv) Further additional surcharge (i.e. Secondary & Higher Education Cess is 1% of such aggregate amount of income tax and surcharge, this sums to 11.33%. (Refer pages 130, 31 & 35 of V.G.Mehta's Income tax Ready Reckoner, Assessment year 2009- 10).

Point 3: (i) As per IT act, for a domestic company the rate of income tax is 30% of the total income (ii) There is a surcharge @ 10% on such income tax, this sums to 33%. (iii) There is a Education

Cess @ 2% of income tax and surcharge, this sums to 33.66%. (iv) Further additional surcharge (i.e. Secondary & Higher Education Cess is 1% of such aggregate amount of income tax and surcharge, this sums to 33.99%. (Refer pages 31 & 35 of V.G. Mehta's Income tax Ready Reckoner, Assessment year 2009- 10).

Step 5:

Sensitivity Analysis with & without CDM revenues are as follows:

Parameter	Sr. No.	Change % Over base value	Value (Without CDM Benefit)	Value (With CDM Benefit)	Benchmark RBI Prime Lending Rate
Change in PLF	1	10%	11.66%	14.15%	12.25% (Benchmark Prime lending Rate) RBI 2008 http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/86591.pdf)
	2	5%	10.65%	13.11%	
	3	Normal	9.61%	12.10%	
	4	-5%	8.54%	11.05%	
	5	-10%	7.54%	9.98%	
Change in Power rate	6	10%	11.66%	13.93%	
	7	5%	10.65%	13.05%	
	8	Normal	9.61%	12.10%	
	9	-5%	8.54%	11.18%	
	10	-10%	7.54%	10.19%	
O&M cost	11	10%	9.37%	11.89%	
	12	5%	9.49%	11.99%	
	13	Normal	9.61%	12.10%	
	14	-5%	9.73%	12.20%	
	15	-10%	9.85%	12.30%	
Project Cost	16	10%	7.94%	10.39%	
	17	5%	8.74%	11.23%	
	18	Normal	9.61%	12.10%	
	19	-5%	10.55%	13.04%	
	20	-10%	11.58%	14.12%	

The above table reflects the IRR with & without CDM revenues for Normal Generation Guarantee, 5 % increase in Generation, 10% increase in Generation, 5% decrease in generation & 10% decrease in generation. The sensitivity analysis was done for Generation Guarantee, Project Cost, O&M cost & Tariff rate values as it remains the important parameters impacting financials of the project. Analyzing the above sensitivity chart the IRR of the project is below the desired benchmark without CDM revenues. The IRR is attractive only after considering the CDM revenues.

Sensitivity Analysis:

i) Variation in Generation Levels (PLF)

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increased generation	11.66%	14.15%	12.25%
10% increased generation	10.65%	13.11%	
Base Case	9.61%	12.10%	
5% reduced generation	8.54%	11.05%	
10% reduced generation	7.54%	9.98%	

Each of the Enercon WTGs of 0.8 MW capacity implemented by the project proponents is expected to generate 1700.1408 MWh per annum but due to variable nature of wind it may result in lower utilization and consequently lesser generation. The following table demonstrates the sensitivity of IRR to the change in the generation levels for Sargam Retails Pvt Ltd.

ii) Variation in Tariff (Power Rate)

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increased generation	11.66%	13.93%	12.25%
10% increased generation	10.65%	13.05%	
Base Case	9.61%	12.10%	
5% reduced generation	8.54%	11.18%	
10% reduced generation	7.54%	10.19%	

On 7th January 2009 the Government of Gujarat Energy and Petrochemicals Department published "Amendments to wind power policy-2007". As per the amendment 'the electricity generated from the WTGs commissioned from 1st April 2009, may be sold to GUVNL and/ or any distribution licensee within the state at a rate of Rs 3.50 per unit of electricity for the entire period of PPA'. The project proponents will be entering into a PPA with Gujarat Energy Development Agency (GEDA) for the sale of electricity. The tariff offered by the Gujarat Energy Development Agency (GEDA) is fixed for the first twenty years of the project activity and hence is not expected to vary. As the proposed project is about to get commissioned after 1st April 2009, the tariff rate for investment analysis/ sensitivity analysis has been taken as Rs 3.50 /- per unit (kWh).

iii) Increment in Capital Cost Keeping Generation Constant (Project Cost)

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increase in Capital Cost	7.94%	10.39%	12.25%
10% increase in Capital Cost	8.74%	11.23%	
Base Case	9.61%	12.10%	
5% reduced in Capital Cost	10.55%	13.04%	
10% reduced in Capital Cost	11.58%	14.12%	

The above sensitivity analysis of the capital cost reflects that the IRR is below the benchmark even with 5% to 10% variation.

iv) Variation in O&M cost

	IRR (Without CDM)%	IRR (With CDM)%	Benchmark
5% increase in O & M Cost	9.37%	11.89%	12.25%
10% increase in O & M Cost	9.49%	11.99%	
Base Case	9.61%	12.10%	
5% reduction in O & M Cost	9.73%	12.20%	
10% reduction in O & M Cost	9.85%	12.30%	

The cost of O&M for the installation of the wind mills have been fixed as per the agreement between the Sargam Retails Pvt. Ltd. and the Technology supplier till 10th Year of the operation with 5% escalation every year. So the probability of decrease in the O & M cost is unlikely to occur.

In the Indian power sector, the common practice is investing in only medium or large scale fossil fuel fired power projects. Generation of power through a small wind project of 9.6 MW is not a common practice. This can be seen from the published statistics in respect of installations of wind projects in India in the NEWNE region as well as in the state of Gujarat⁶ vis-à-vis the total installed capacity (of power generation) as on 28.02.2009 published by Ministry of Power. The All-India⁷ installed power generation capacity in MW as on 28.02.2009 published by Ministry of Power was 147716 MW comprising of 93475 MW thermal, 36878 MW hydro, 4120 MW nuclear and 13242

⁶ http://www.cea.nic.in/power_sec_reports/Executive_Summary/2009_02/27-33.pdf (Page 2)

⁷ http://www.cea.nic.in/power_sec_reports/Executive_Summary/2009_02/8.pdf

MW of Renewable energy sources (RES) comprising solar, wind, geothermal, biomass & tidal energy. The most prominent energy generation mediums in India are solar energy, wind energy & biomass energy. (RES) share approximately is 8 % of the total in India.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

The procedure followed for estimating the emissions reductions from this project activity during the crediting period are as per the following steps which corresponds with AMS-I.D.

Steps	Description	Equation used	Methodological choices
1.	Procedure followed for calculating Baseline emissions	$BE_y = EG_y * EF_y$	The EF_y has been calculated using operating and built margin emission factor taken from CEA published data.
2.	Procedure followed for calculating Project emissions (PE_y)	No project emissions are applicable to this small scale wind electric power project, since the electricity generation is based on Wind resources, which does not involve in combustion or generation of emissions from fossil fuels. (Para 14 of AMS ID, Version 15.0)	
3.	No leakage emissions are considered for this Project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity. (L_y)	No leakage emissions are considered for this Project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity. (Para 15 of AMS ID, Version 15.0)	
4.	Procedure followed for calculating Emission reduction (ER_y)	The emission reductions are calculated as per equation $ER_y = BE_y - PE_y - L_y$	

Project emissions

No project emissions are applicable to this small scale wind electric power project, since the electricity generation is based on Wind resources, which does not involve in combustion or generation of emissions from fossil fuels. Hence, the baseline emissions will be equivalent to the emission reductions in the project activity.

Leakage:

No leakage emissions are considered for this Project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

Emission Reductions:

Since the project emissions as well as the leakage are zero, the emission reductions are equal to the baseline emissions. These are calculated based on the monitored net amount of electricity supplied to the grid, and the baseline emission factor.

$$ER_y = BE_y - PE_y - L_y$$

B.6.2. Data and parameters fixed ex ante

Data/Parameter	EF _y
Unit	tCO ₂ /Mwh
Description	Combined Margin grid emission factor
Source of data	⁸ CEA website Version :04 (Valid from 1st September 2008)
Value(s) applied	0.906
Choice of data or Measurement methods and procedures	The value applied is taken from the plant from CEA reviews. The weights used for calculating combined margin emission factor are 0.75 and 0.25 for operating margin and built margin respectively and EF _y is calculated for ex – ante.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	Data will be kept for crediting period + 2 Years. & Emission factor will be calculated as per the latest CEA version published.

Data/Parameter	EF _{OM,y}
Unit	tCO ₂ /MWh
Description	CO ₂ Operating Margin emission factor of the grid
Source of data	⁹ CEA website Version :04 (Valid from 1st September 2008)
Value(s) applied	1.01
Choice of data or Measurement methods and procedures	The value applied is taken from the plant from CEA reviews and EF _{OM} is calculated for ex – ante.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	Data will be kept for crediting period + 2 Years.

Data/Parameter	EF _{BM,y}
Unit	tCO ₂ /MWh
Description	CO ₂ Built Margin emission factor of the grid
Source of data	¹⁰ CEA website Version :04 (Valid from 1st September 2008)
Value(s) applied	0.60
Choice of data or Measurement methods and procedures	The value applied is taken from the plant from CEA reviews and EF _{BM,y} is calculated for ex- ante
Purpose of data	For the calculation of the Baseline Emission
Additional comment	Data will be kept for crediting period + 2 Years.

⁸ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

⁹ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

¹⁰ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

B.6.3. Ex ante calculation of emission reductions**Combined Margin Emission factor**

$$EF_y = 0.75 \cdot EF_{OM} + 0.25 \cdot EF_{BM}$$

Applying the values given in section B.6.2 the value of EF_y comes out to be 0.906 tCO₂/MWh.

Baseline Emission Calculation

The baseline emission is calculated as: $BE_y = EG_y \cdot EF_y$

where,

BE_y = Baseline Emissions due to displacement of electricity during the year y (in tons of CO₂)

EG_y = Net units of electricity due to substituted in the grid during the year y (in MWh)

EF_y = Emission Factor of the grid (in tCO₂/ MWh) and y is any year within the crediting period of the project activity

Net Losses @ 13% of gross generation (5% Machine availability Correction Factor, 5% Grid availability Correction Factor & Transmission Loss 3%).

9.6 MW wind power project in Gujarat, India		
SRPL (Sargam Retails Pvt Ltd)		
Installed Capacity (MW)	9.6	MW
Number of WEGs	12	
Capacity of individual WEG (MW)	0.8	MW
PLF	0.2426	
Number of days of operation	365	Days
Number of hours	8760	
Gross Generation of one WEG in an year	1700.1408	MWh
Gross Generation from 12 WEG in an year	20401.6896	MWh
Loss @ 5% (Machine availability correction factor)	19381.60512	MWh
Loss @ 5% (Grid availability correction factor)	18412.52486	MWh
Loss @ 3% (Transmission Loss)	17860.14912	MWh
Net Generation from the project	17860.14912	MWh
Baseline emission factor NEWNE grid	0.906	tCO ₂ /MWh
Emission reductions	16181	tCO₂

Particulars	Units	2009	2010	2011	2012	2013	2014	2015
Baseline emission factor	tCO ₂ /MWh	0.906	0.906	0.906	0.906	0.906	0.906	0.906
Net Generation from the project	MWh	17860	17860	17860	17860	17860	17860	17860
Baseline emissions	tCO ₂ e	16181	16181	16181	16181	16181	16181	16181
Project activity emissions	tCO ₂ e	0	0	0	0	0	0	0
Leakage	tCO ₂ e	0	0	0	0	0	0	0
Emission reductions	tCO ₂ e	16181	16181	16181	16181	16181	16181	16181

Applying the values given in section B.6.2 and B.7.1 the value of BE_y comes out to be 16181 tCO₂.

Emission reduction calculations:

$$ER_y = BE_y - PE_y = 16181 - 0 = 16181 \text{ tCO}_2\text{e}$$

Applying the values given in section B.6.2 and B.7.1 the value of ER_y comes out to be 16181 tCO₂e.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO ₂ e)	Project emissions (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions (t CO ₂ e)
2009- 2010	16,181	0	0	16,181
2010-2011	16,181	0	0	16,181
2011-2012	16,181	0	0	16,181
2012-2013	16,181	0	0	16,181
2013-2014	16,181	0	0	16,181
2014-2015	16,181	0	0	16,181
2015-2016	16,181	0	0	16,181
Total	113,269	0	0	113,269
Total number of crediting years	7			
Annual average over the crediting period	16,181	0	0	16,181

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	EGy
Unit	MWh
Description	Net Electricity supplied to grid by the project activity
Source of data	Share Certificate ¹¹ issued by GETCO/ GEDA/ SLDC (State Load Dispatch Centre)/ Authorized representative
Value(s) applied	17860 MWh/yr
Measurement methods and procedures	<p>The share certificate having the net electricity supplied to grid by the WTGs of SRPL wind farm is made on the basis of monitored electricity through meters at the sending end of the 220 kV substation and at the meters installed at the 33 kV metering yard as per PPA / updated procedure by GUVNL.</p> <p>The value will be calculated from the measured parameters as given in the "Apportioning Procedure for the project activity" section B.7.2.</p> <p>This apportioning procedure is under purview of state electricity board and PP do not have any control on it. At present, the available information to PP is only value of net electricity supplied to grid by project activity (EGy) through share certificate and it does not include monitoring values of other parameters used for apportioning procedure. .</p> <p>The accuracy class of the substation meters is 0.2s and the accuracy class of yard meters ranging between 0.2s/0.5s. Also the meter accuracy class is under purview of state electricity board and PP do not have any control on it.</p> <p>Data Type: Calculated</p> <p>Monitoring Frequency: Monthly</p>
Monitoring frequency	Monthly
QA/QC procedures	Net electricity supplied to grid indicated in share certificate will be crosschecked with the invoices raised by PP
Purpose of data	The Data/Parameter is required to calculate the baseline emission

¹¹ Share certificate contains the information about the monthly net electricity supplied to grid by the WTGs of project activity which is issued by GETCO/ GEDA/ SLDC (State Load Dispatch Centre)/ Authorized representative.

Additional comment	<p>The data will be archived electronically for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.</p> <p>In case the monitoring cycle and the billing cycle date do not match, then a conservative approach will be adopted to monitor/calculate the net electricity supplied to the grid.</p>
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B.7.2. Sampling plan

Sampling is not required for the given project activity.

B.7.3. Other elements of monitoring plan

The project activity is in accordance with approved small scale methodology AMS I.D, and therefore, can use the monitoring methodology for type I.D of 'Appendix B of the simplified M&P for small-scale CDM project activities-Version 15, - Grid connected renewable electricity generation.

This approved monitoring methodology requires monitoring of the following:

- ✓ Net Electricity supplied by the project activity to the grid

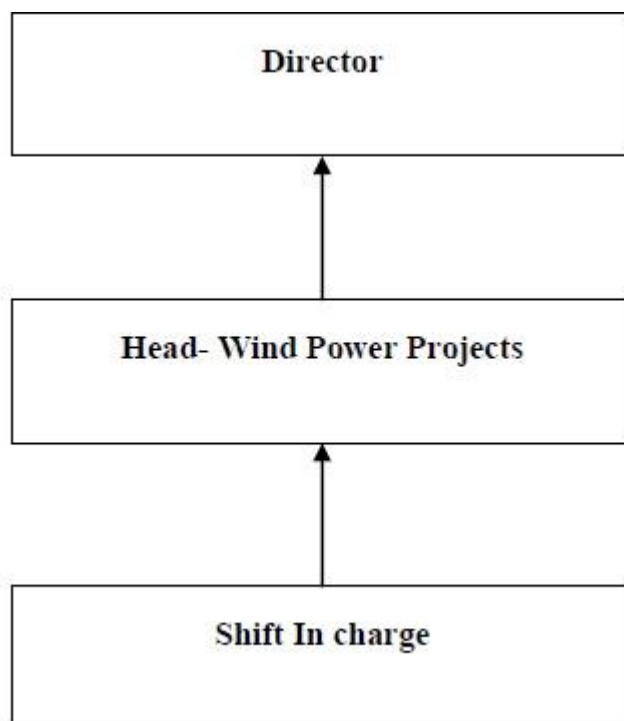
In order to monitor the mitigation of GHG due to the project activity, the Net Electricity supplied by the project activity to the grid needs to be monitored. The net energy supplied by the project activity to the grid multiplied by grid emission factor for regional grid, would result in the baseline emission for the project activity.

Since the emission factor (combined margin) of the grid is fixed for the crediting period, the monitoring of grid emission factor is not required.

The Project is operated and managed by M/s. Enercon (India) Limited/ Its Group Companies/Contractor specifically appointed by Enercon. The operational and management structure implemented by the project participant in order to monitor emission reductions has been provided below.

Net electricity supplied by the project activity to grid is the most important parameter required for the financial reporting and sustainability of the project and monitored with due care by both the parties (O&M Contractor (PP's representative and representative of GETCO/ GEDA/ SLDC/ Authorized representative).

The authority and management as monitoring, reporting lies with formulated a proper and of the performance generation of been outlined as



responsibility of project well as registration, measurement and SRPL and it has Project Team to ensure continuous monitoring of turbines and power. The same has follows:

Roles and responsibilities:

Director: In the project management structure Director is responsible for the overall project performance. The Director will review the monthly net electricity supplied and annual emission reduction calculations.

Operation and maintenance of wind generators will be done by Enercon India Limited/Its Group Companies/Contractor specifically appointed by Enercon.

Head- Wind Power Projects: Head Wind Power Project is assisting to director for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He will report to Director for any abnormality.

Shift In-charge: Shift in charge is responsible for recording the electricity meter reading in the GETCO meter. He will be the person of Enercon India Limited/Its Group Companies/Contractor specifically appointed by Enercon.

Record Handling: OEM contractors (i.e Enercon India Limited/Its Group Companies/Contractor specifically appointed by Enercon) are responsible for daily records with all the related parameters. The relevant records are submitted to Head- Wind Power Projects on monthly basis. The Head-Wind Power project has final responsibility for record keeping.

The O&M personnel are qualified engineers and are trained by Enercon India Limited for operating and ensuring best performance of the WTGs. The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the PPA (power purchase agreement) with GUVNL.

Description of calibration of WTG Controller: The controller used for the WTG is SCS Controller is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current / voltage is converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed / stored. Woodward relay is having no display and needs special protocol to view energy readings as this relay is communicating digital signal through special communication protocol. Moreover, turbine cannot run without this relay hence it cannot be removed for calibration, hence, it is not possible to calibrate¹².

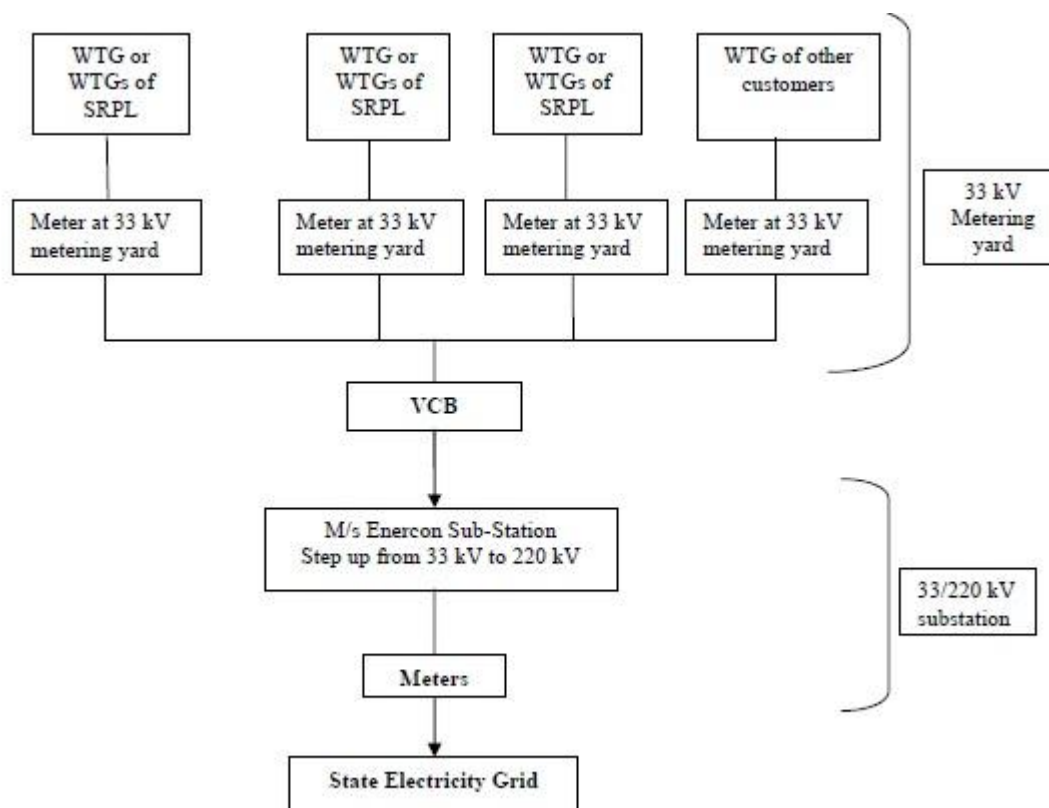
Records: Enercon India Limited/Its Group Companies/Contractor specifically appointed by Enercon will maintain an accurate record at the project site of:

¹² As per letter provided by the technology supplier the inbuilt control panel meters cannot be calibrated.

- i. Daily generation reading
- ii. Any unusual conditions found during operation/inspections
- iii. All the records will be preserved for 2 years beyond the crediting period.

The billing will be on monthly basis. Enercon/ SRPL shall raise invoice and submit to GUVNL for payment based on share certificate provided by GETCO/GEDA /SLDC (State Load Dispatch Centre)/Authorized representative.

The electrical layout and monitoring points of the WTGs is as follows:



The above diagram indicates that there are three groups of the WTGs of the project activity for which three meters are provided at the corresponding 33 kV metering yard. Similarly for a group of WTGs of non PP's at a particular site, there are corresponding meters installed at 33 kV metering yard¹³. All the WTGs of (PP + non PP) are connected to the Enercon substation.

The list of meter's corresponding to the project activity WTGs have been provided below:

Location Number of WTGs of project activity	Meter Serial Number installed at the corresponding 33 kV metering yard	Meters at 33/220 kV substation
2082, 2083, 2084, 2118, 2119, 2120	KAB 10784	GJ-0732-A GJ-0731-A
969, 970, 971, 972, 973	09141585	
2047	KAB 10788	

Please note that the above meters may change being under control of state electricity board.

The GETCO authorities shall arrive at the site every month and record the readings of meters (PP + non PP) placed at the 220 kV Sub-Station and as well as at the 33 kV metering yard. Keeping in

¹³ Depending on the capacity of the wind farm and considering the future expansion of the wind farm, additional WTGs and corresponding yard meters can be installed, which is beyond the control of the PP.

view, the net electricity supplied to Grid for every particular customer will be computed on **GETCO/ GEDA/ SLDC (State Load Dispatch Centre) /Authorized representative Report**.

Head- Wind Power Projects/ Director will be keeping the daily/ monthly data generated from all the WTGs provided by Enercon and **GETCO/ GEDA/ SLDC (State Load Dispatch Centre) /Authorized representative**.

Apportioning Procedure for the project activity:

The below apportioning procedure is a sample procedure and can change/vary being under control of state electricity board. PP do not have any control on this procedure. At present PP only gets value of monitoring parameter net electricity supplied to grid by project activity through share certificate, hence the other parameters used for apportioning purpose are not included in section B.7.1 of PDD.

Net Electricity supplied to grid by the project activity (EG_y) = $(EG_{WTG,y} / EG_{Total\ WTG,y}) \times EG_{y,Total}$

Where

$EG_{WTG,y}$: Net Electricity supplied by the WTGs of SRPL recorded at 33 kV metering yard.

$EG_{Total\ WTG,y}$: Net Electricity supplied by all the WTGs (project activity and non-project activities) connected to 33/220 kV sub-station recorded at 33 kV metering yard.

$EG_{y,Total}$: Net Electricity supplied to grid by project as well as non-project activities recorded at the 33/220 kV sub-station.

Internal audits & Performance review

The records are regularly audited and checked by the SRPL Representative based upon the daily power generation reports and share certificates (**GETCO/ GEDA/ SLDC (State Load Dispatch Centre) /Authorized representative**). The SRPL Representative shall do the internal audit on yearly basis and will crosscheck the emissions reductions estimated in PDD with respect to actual emissions reduction. For any deviation from the actual emission reduction values and reported values corrective action will be suggested by SRPL Representative to calculate the conservative emission reduction. All corrective actions will be recorded and maintained.

Data Adjustments and Uncertainties

In case of monitoring meter failure or errors, the GETCO officials would immediately replace the meter with a calibrated meter. The meter installed at the 220 kV and 33 kV point are calibrated once in three years. The calibration frequency of meters is under purview of state electricity board and may extend than stipulated period. PP do not have any control on the calibration frequency of meters, thus no any error factor will be applied due to delay in calibration of meters. In case of any failure in the meter installed at 33 kV metering yard the electricity generation data of the WTG controller will be used. In case of any failure of the meters at the 220 kV sub-station the electricity supplied data of the reference meters at 220 kV sub-station will be used.

The GETCO/ GEDA (Gujarat Electricity generation Authority) /SLDC (State Load Dispatch Centre)/ **Authorized representative** Report is forwarded to Executive Engineer of GETCO and is certified thereof. Copies of this document are forwarded to the Load Dispatch Center of Gujarat Electricity Distribution Authority (GETCO) and SRPL. The monthly Net Electricity supplied shall be obtained from the share certificate and the same shall be used in monitoring report and during verification. Head - Wind power projects of M/s. SRPL will be responsible for keeping the copies of share certificate sent to Sargam Retails Pvt. Ltd. from GETCO/GEDA/SLDC/Authorized representative.

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

1st Phase before site visit by DOE (02/04/2009).

Date of completion: Phase II (02/12/2009) based on the corrections applied to DOE findings. Sargam Retails Pvt Ltd (SRPL) has determined the baseline for the project activity. The entity is a Project Proponent listed in Annex-I where the contact information has also been provided.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

11/02/2009 (Date of Purchase order)

C.1.2. Expected operational lifetime of project activity

20 Years 00 Months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

The project proponent intends to apply for a Renewable Crediting Period.

C.2.2. Start date of crediting period

01/08/2010

(If the registration of the project is before or after 01/08/2010, the date of registration would be considered as the start date for the first crediting period. The project participants will not commence the crediting period prior to the date of registration).

C.2.3. Length of crediting period

07 Years 00 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

According to Indian regulation, the implementation of the wind park does not require an environmental impact assessment. The Ministry of Environment and Forests (MoEF), Government of India notification dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) 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) states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. Wind parks are not included in this list and thus an EIA is not required. The project activity has no significant impact on the environment. However, certain foreseen impacts due to the project activity are discussed below: Also, in the redefined EIA notification i.e. S.O. 1533¹⁴, dated 14th September 2006, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted.

The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. However due weightage has been given to environmental aspects.

During construction

Impact on air

¹⁴ Page No: 10, S. O. 1533, Ministry of Environment & Forests (MoEF), Govt. of India, <http://envfor.nic.in/legis/eia/so1533.pdf>

Movement of construction material during construction will have some impact on the air. As the transportation is quite less for the project activity, the impacts will be negligible.

Impact on water

Not much water discharge takes place during construction. However, proper sanitary arrangements will be provided by project proponents.

Impact on Land use

The land on which the project activity takes place is largely unproductive. Prior to the project activity, most of the land had no beneficial use. The project proponents had bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people is involved in the course of the project activity.

The magnitude of the impacts during the construction phase is negligible and exists for a temporary period of time till the end of construction phase. Therefore, it would not affect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible.

Operation and Maintenance Phase

Enercon maintains highest level of safety standards. Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air

Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Impact on water

There is absolutely no effluent discharge during operation of wind turbine generators.

Impact on ecology

There are no known migratory birds/endangered species in the region of project activity. Therefore no harm on the ecological environment is envisaged.

Socio-Economic Impacts

There is no inconvenience to the local community due to the transmission lines. The project activity helps up-liftment of skilled and unskilled manpower in the region. The project will be providing employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainable development of the region.

Conclusion

The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any major adverse impacts on environment during its construction or operational phase. The human interest parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary units coming up.

As discussed above, the project activity would not have any adverse impacts. The project activity does not fall under purview of the Environment 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

The stakeholders identified for the project activity were as under:

- 1) Gram Sarpanch
- 2) Contractors
- 3) Enercon employees
- 4) Local villagers
- 5) President (Sarpanch)
- 6) Members of Panchayat
- 7) Farmers

The identified stakeholders were invited by sending one to one invitation letters. The stakeholder consultation meeting was held on 7th April, 2009 at Jamnagar (Gujarat), India. The minutes of the meeting will be provided to the DOE during validation.

E.2. Summary of comments received

The local people are direct beneficiaries of the project. The construction and continuous operation of the mill constitutes local manpower. The project does not require any major displacement of any local population. Also, the installation of transmission lines would not create any inconvenience to the local population. In summing up, the project activity has received complete support from the local populace. The Government of India, through Ministry of New and Renewable Energy (MNRE), has been promoting energy conservation, demand side management and renewable energy projects including wind, small hydro and bio-mass power.

The Ministry of Environment & Forests is the Designated National Authority in India. The Government of India, through Ministry of Environment and Forests (MoEF) is encouraging project participants to take up such environment-friendly initiatives.

E.3. Report on consideration of comments received

SRPL has taken care of all the conditions stipulated in the relevant clearances and no adverse comment has been raised. In summing up, the project has not received any negative or discouraging feedback from the stakeholders concerned. All the stakeholders have appreciated and encouraged the project proponent for taking up this project activity.

In view of various direct and indirect benefits (social, economical, and environmental), all the stakeholders have supported the project activity. The documents supporting the stakeholder consultation will be submitted to the DOE.

SECTION F. Approval and authorization

The host country approval having reference number 4/10/2009-CCC dated 01/02/2010 is submitted to DOE during registration of project activity.

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

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Sargam Retails Pvt. Ltd.
Street/P.O. Box	Indira Gandhi Marg,
Building	Malpani House
City	Sangamner
State/Region	Maharashtra
Postcode	422605
Country	India
Telephone	+91 2425 225011
Fax	+91 2425 225003
E-mail	prafulla@malpani.com
Website	www.malpani.com
Contact person	Mr. Prafulla Premchand Khinvasara
Title	Head- Wind Power Projects
Salutation	Mr.
Last name	Khinvasara
Middle name	Premchand
First name	Prafulla
Department	Wind Power Projects
Mobile	+91 9822322145
Direct fax	+91 2425 225003
Direct tel.	+91 2425 225011 (Extension 215)
Personal e-mail	prafulla@malpani.com

Appendix 2. Affirmation regarding public funding

No public funding for this project activity including any funding from ANNEX 1 countries. Thus project participant hereby confirms that no diversion of Official Development Assistance is caused due to the project activity.

Appendix 3. Applicability of methodology and standardized baseline

Credit Period	Installed Capacity (MW)	Plant Load Factor %	NEWNE Grid Emission Factor (tCO ₂ /MWh)	Emission reduction tCO ₂ e
2009	9.6	24.26	0.906	16181
2010	9.6	24.26	0.906	16181
2011	9.6	24.26	0.906	16181
2012	9.6	24.26	0.906	16181
2013	9.6	24.26	0.906	16181
2014	9.6	24.26	0.906	16181
2015	9.6	24.26	0.906	16181
Total CERs				113269

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin for the NEWNE grid, the details of which are available on the following website
<http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>.

The procedures and formulas used for estimation of the baseline factor and the assumptions made have also been detained in there.

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

Please refer Section B.6.1 of the PDD.

Appendix 5. Further background information on monitoring plan

The monitoring information has already been provided in section B.7 above.

Appendix 6. Summary of post registration changes

1. The monitoring plan (section B.7.1 of this PDD) is revised to exclude the below non-available parameters

- E_{Gy,Total} - Net Electricity supplied to grid by all the WTGs (project as well as non-project activities) recorded at the 33/220 kV sub-station
- E_{WTG,y} - Net Electricity supplied by the WTGs of SRPL recorded at 33 kV metering yard
- E_{Total WTG,y} - Net Electricity supplied by all the WTGs (project activity and non-projectactivities) connected to 33/220 kV sub-station recorded at 33 kV metering yard

At present, PP do not have value of these three parameters and monitoring of these parameters are under purview of state electricity board. PP do not have any control on it. Hence above parameters are excluded from monitoring plan. Only available parameter E_{Gy} i.e net electricity supplied to grid by project activity is kept as monitoring parameter.

2. The meter accuracy class and meter calibration frequency is under purview of state electricity board, hence the change in meter accuracy class or change in calibration frequency may occur as compared with registered PDD. The change in description is made in PDD accordingly.

Annex I (Abbreviation)

ABT	Availability Based Tariff
ACM	Approved Consolidated Baseline Methodology
BE	Baseline Emissions
BM	Build Margin
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
CM	Combined Margin
DISCOM	Distribution Company
EF	Emission Factor
EIA	Environment Impact Assessment
EIL	Enercon India Limited
EPC	Engineering, Procurement, Construction
ER	Emission Reductions
GEB	Gujarat Electricity Board
GEDA	Gujarat Energy Development Agency
GERC	Gujarat Electricity Regulatory Commission
GETCO	Gujarat Electricity Transmission Company
GHG	Green House Gas
GUVNL	Gujarat Urja Vikas Nigam Limited
HT	High Transmission
IRR	Internal rate of Return
ISGS	Inter state Generation Stations
KV	Kilo Volts
KW	Kilowatt
Ltd.	Limited
MAT	Minimum Alternative tax
MoEF	Ministry of Environment and Forest
MW	Megawatt
NOC	No Objection Certificate
ODA	Official Development Assistance
OM	Operating Margin
PDD	Project Design Document
PE	Project activity Emissions
PLF	Plant Load Factor
PPA	Power Purchase Agreement
Pvt	Private
QA	Quality Assurance
QC	Quality Control
RES	Renewable Energy Sources
RPC	Regional Power Committees
RPM	Rotations per minute
SLDC	State Load Dispatch Centers
SRPL	Sargam Retail Pvt Ltd
T&D	Transmission and Distribution
tCO ₂ e	Tonns of Carbon Dioxide equivalent
UNFCCC	United Nation Framework Convention on Climate Change
WREB	Western Region Electricity Board
WEC	Wind Energy Convertors

Document information

Version	Date	Description
06.0	9 March 2015	Revisions to: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the project design document form for small-scale CDM project activities (these instructions supersede the "Guidelines for completing the project design document form for small-scale CDM project activities" (Version 01.1)); • 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 Error! Reference source not found.; • Change the reference number from <i>F-CDM-SSC-PDD</i> to <i>CDM-SSC-PDD-FORM</i>; • Editorial improvement.
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	13 March 2012	EB 66, Annex 9 Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities"
03.0	15 December 2006	EB 28, Annex 34 <ul style="list-style-type: none"> • The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02.0	08 July 2005	EB 20, Annex 14 <ul style="list-style-type: none"> • The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at http://cdm.unfccc.int/Reference/Documents.
01.0	21 January 2003	EB 07, Annex 05 Initial adoption.

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Document Type: Form
Business Function: Registration
Keywords: project design document, SSC project activities