



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

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**SECTION A. General description of project activity****A.1. Title of the project activity:**

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Wind based renewable energy project in Gujarat

Version 3.0

05/08/2009

A.2. Description of the project activity:

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Description of project proponent

Gujarat Paguthan Energy Corporation Private Limited (GPECL) is an independent power producer which has been setup in India following the opening up of the power sector to private investment in 1992. GPECL also has an exceptional safety and environmental record winning numerous awards and was the first power plant to initiate implementation of the Five Star Safety, Health and Environment (SHE) management system.¹

The project activity being undertaken by the project proponent envisages the utilization of kinetic energy present in wind to generate electrical power in the state of Gujarat. To do so, the project proponent is undertaking the installation of 63 Wind Electric Generators (WEGs) of individual capacity 800 kW to be supplied by Enercon India Ltd. totalling an installed capacity of 50.4 MW.

Purpose

The proposed project activity is an initiative by GPECL to export 50.4 MW of WEG generated renewable electricity to the power deficit western region grid in order to decrease power shortage, diversify the grid composition, and reduce greenhouse gas emissions thereby contributing to sustainable development. Out of the 63 WEGs planned to be implemented, one WEG would be under a wheeling and banking agreement with Gujarat Urja Vikas Nigam Limited GUVNL.

Technology

Enercon (India) Limited will be supplying the wind energy technology to GPECL. WEG is ingeniously devised to convert kinetic energy from the “air in motion” directly into electricity without using conventional sources like coal, oil or natural gas for power generation. The project activity involves the installation of gearless Enercon E-53 WEGs with synchronous generator, pitch regulation, low cut-in speed and aerodynamic braking system. The specification for the WEGs is provided in section A.4.3.

Emission Reductions from anthropogenic sources

The wind power generated from the project site will be displacing the electricity generated from thermal power stations feeding into the regional grid. Since wind power is Green House Gas (GHG) emissions free, the power generated will reduce the anthropogenic GHG emissions generated by fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas. The estimation of GHG reductions by this project is limited to carbon dioxide (CO₂) only. Thus the proposed project activity leads to an emission reduction of 1,071,730 t CO₂e over the chosen crediting period of ten years.

¹ <https://www.clpgroup.com/Asia/India/GujaratPaguthanEnergy/Pages/GujaratPaguthanEnergy.aspx>



View of the project participants on the contribution of the project activity to sustainable development
Ministry of Environment and Forests, Govt. of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects:

A > Social well being –

- The proposed project activity shall contribute to improving the social milieu of the region through the generation of employment opportunities for the local inhabitants, both during installation and operation of the project activity. The project will also be requiring development of the road and telecommunication network as the installation and operations of the project will require that. All of these factors shall be giving a significant boost to the development and social upliftment of the region.

B>Economic well-being –

- The generated electricity will be fed into the Western region grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will further provide opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development. With power supply being one of the important infrastructural requirements for industries, the improved grid situation would spur further investment in the region.
- The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units. The contribution from renewable sources of generation is still small and the project will provide a fillip to the share of clean renewable energy generation like wind power.
- Thus, the proposed project activity has a number of benefits that will be contributing to the improvement of economic well being, both at the local and national level.

C > Environmental well being –

- The project envisages the utilization of wind energy for generating electricity, which otherwise would have been generated through alternate fossil fuel based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. By doing so, the project is contributing to the mitigation of climate change resulting from increased anthropogenic emissions of GHG.
- As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.

D >Technological well being –

- The project activity is utilizing gearless synchronous generator based E-53 Enercon make WEGs for generation, which are designed for conditions specific to India. Thus the project activity is propagating the latest technology, which is comparable with best practices in the renewable wind based energy sector anywhere in the world. Hence the project leads to technological well being.

**A.3. Project participants:**

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Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity (ies) Project participants (*) (as applicable)	Kindly indicate if the party involved wishes to be considered as project participant (Yes/No)
Government of India (Host Country)	Gujarat Paguthan Energy Corporation Private Limited (Private entity)	No

A.4. Technical description of the project activity:**A.4.1. Location of the project activity:**

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A.4.1.1. Host Party(ies):

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India

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

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Gujarat

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

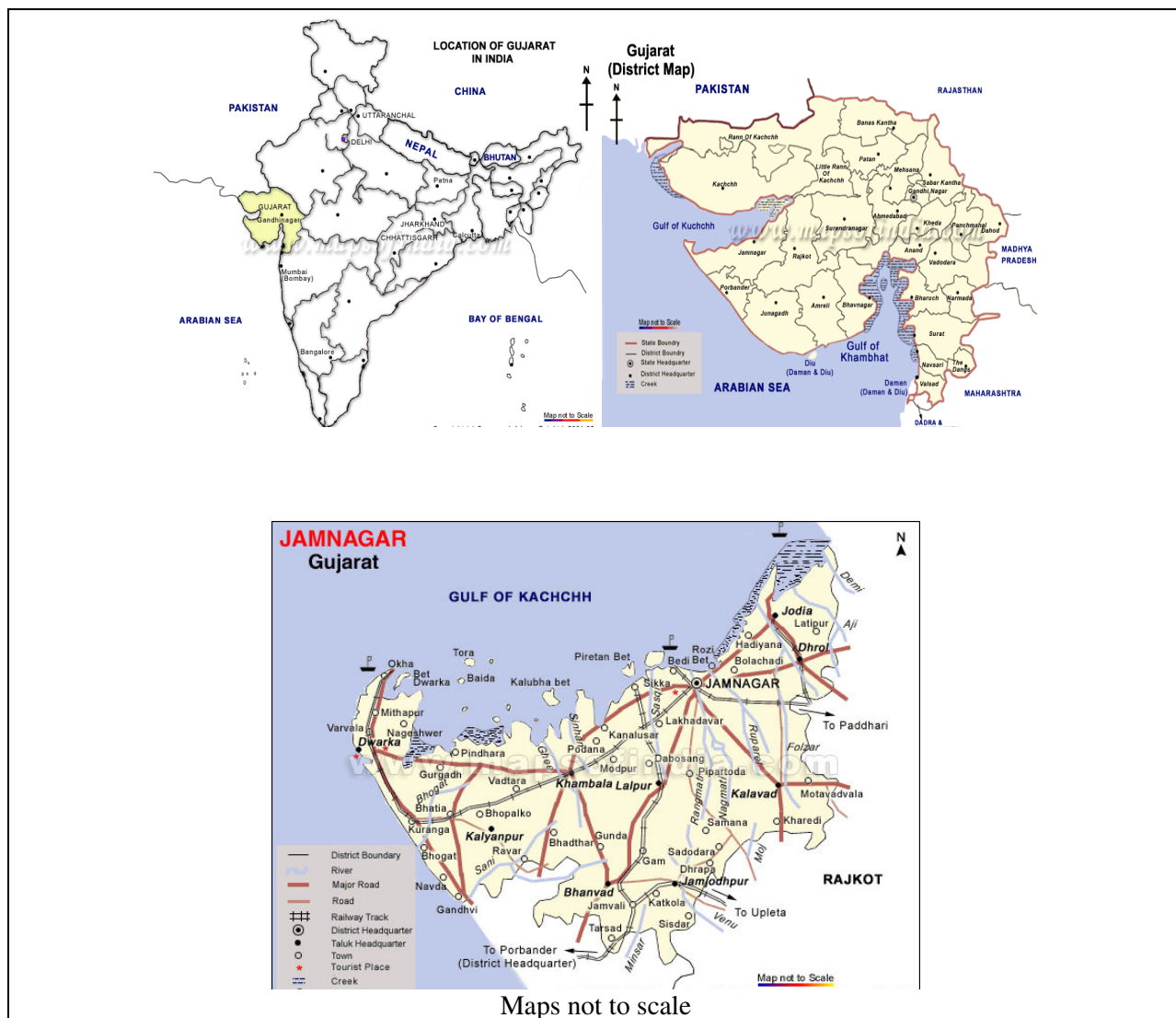
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District: Jamnagar
Taluk: Kalavad, Jamjodhpur
Site: Samana

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

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The project activity is located in the Kalavad and Jamjodhpur taluk of Jamnagar district in Gujarat. The nearest airport and railway station are at Jamnagar city which is located at a distance of approximately 60 kms from the project activity site. Please refer Appendix 1 for the coordinates of individual WEGs.



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

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The project activity is considered under “Grid-connected electricity generation from renewable sources”, with a capacity more than 15 MW. Therefore as per the scope of the project activity enlisted in the ‘list of sectoral scopes and related approved baseline and monitoring methodologies’, the project activity may principally be categorized in:

Scope Number 1

Sectoral Scope – Energy Industries (renewable/non-renewable sources).

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

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The project activity involves the installation of 63 WEGs of E-53 Enercon make. Each individual WEG has a rating of 800 kW and the technical specifications of the same are provided below:

Some of the salient features of the E-53 turbine are:

- Gearless Construction.
- Operates in Continuous Variable speed in synchronism with varying wind speeds.
- Continuous variable pitch regulation of blades.
- For blades, three independent braking and lightning protection systems.
- Synchronous generator directly connected to turbine rotor.
- Speed and power of ring generator is influenced by the pitch control and the electrical excitation.
- Specially reinforced blades – fibre glass reinforcement with epoxy resin; integrated lightening protection.

E-53 TECHNICAL DATA

Rated capacity : 800 kW

Rotor diameter : 53 m

Rotor with Pitch Control

Type : Upwind rotor with active pitch control

Direction of rotation : Clockwise

Number of blades : 3

Swept area : 2198 m²

Blade material : Fiberglass (reinforced epoxy) with integral lightning protection

Rotor speed : 12- 29 rpm

Pitch control : Continuous variable pitching mechanism

Generator : Synchronous - Type

Main Bearings : Single row cylindrical roller bearings

Braking System : 3 independent blade pitch systems with power back up supply.

Yaw Control : Active via adjustment gears, load dependent damping drives

Cut-out Wind Speed: 28-34 m/s

Tower : Concrete/steel, 72 - 74 m height

These turbines are supplied by Enercon India Ltd. and are designed for Indian wind conditions. The technology for the same is environmentally safe and sound and there is no technology transfer involved in the same.

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

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Years	Annual estimation of emission reductions in tonnes of CO ₂ e
2009-10	107,173
2010-11	107,173
2011-12	107,173
2012-13	107,173
2013-14	107,173
2014-15	107,173
2015-16	107,173
2016-17	107,173
2017-18	107,173
2018-19	107,173
Total estimated reductions (tonnes of CO ₂ e)	1,071,730
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO ₂ e)	107,173

A.4.5. Public funding of the project activity:

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There is no recourse to any public funding by GPECL in the proposed project activity. The project proponent hereby confirms that there is no diversion of Official Development Assistance (ODA) to the proposed project activity.



**SECTION B. Application of a baseline and monitoring methodology****B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:**

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Title of the baseline methodology: “Consolidated Baseline Methodology for grid-connected electricity generation from renewable sources” (Version 08).

Reference: ACM0002, Version 08 (EB 44, Sectoral Scope: 01)

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC CDM website (<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>).

The approved methodology also draws upon Version 05.2 of the “Tool for demonstration and assessment of additionality” for establishing the additionality of the said project activity.

The baseline for the said project activity is determined using the “Tool to calculate the Emission Factor of an electricity system” (Version 01.1, EB 35).

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

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The methodology being applied for the said project, ACM0002 (Version 08), is applicable to renewable power generation projects. The said project is a wind based renewable energy project and is designed to export the power generated to the grid and is thus suitable for the said methodology. This methodology has certain specific applicability criterion, which are stated and accordingly addressed below:

- *The project activity is the installation or modification/retrofit 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 utilization of wind to generate emission free electricity for the grid is the purpose of the said project activity. Hence, the project is a Greenfield power project without any modification or retrofit of existing renewable projects, thus meeting the first applicability condition of the ACM0002 methodology.

- *This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;*

The said project activity is a new Greenfield project activity being implemented by the project proponent and thus does not involve any sort of fuel switch. Hence, it is justified to state that the project activity being undertaken is a completely new project and hence meets this second applicability condition as well.

- *The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;*



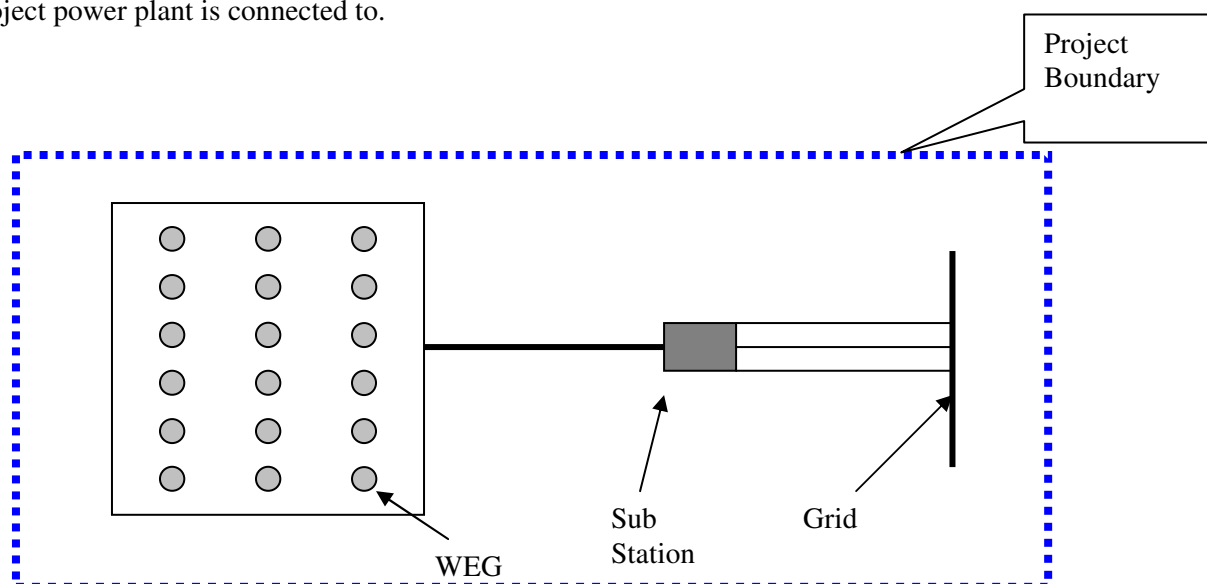
The project activity exports the generated electricity to the western region grid through a Power Purchase Agreement with Gujarat Urja Vikas Nigam Limited (GUVNL). The geographic and system boundaries of the western grid can be clearly defined and information on the characteristics of the grid is available and being documented in the PDD. Thus this applicability condition is also satisfied.

The above are the applicability criteria pertaining to wind power project stated in the ACM 0002. None of the other conditions are applicable for the said project activity and the above criterion are satisfied by the proposed project.

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

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The project boundary for the said project activity is selected in accordance with the guidance provided in the applied methodology ACM0002 (Version 8). The determination of the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to.



The wind farm (project activity) has a distinctive physical demarcated boundary. According to the methodology ACM0002 the following gases are to be considered for the boundary:

	Source	Gas	Included?	Justification / Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fired power plants that are displaced due to the project activity.	CO ₂	Yes	The project activity is aimed at displacing the grid power, and thus reducing the CO ₂ emissions resulting from the power generation.
		CH ₄	No	Minor mission source
		N ₂ O	No	Minor mission source



Project Activity	For geothermal power plants, fugitive emissions of CH ₄ and CO ₂ from non-condensable gases contained in geothermal steam.	CO ₂	No	Not applicable for wind projects
		CH ₄	No	Not applicable for wind projects
		N ₂ O	No	Not applicable for wind projects
	For geothermal power plants, CO ₂ emissions from combustion of fossil fuels required to operate the geothermal power plant.	CO ₂	No	Not applicable for wind projects
		CH ₄	No	Not applicable for wind projects
		N ₂ O	No	Not applicable for wind projects
	For hydro power plants emissions of CH ₄ from the reservoir	CO ₂	No	Not applicable for wind projects
		CH ₄	No	Not applicable for wind projects
		N ₂ O	No	Not applicable for wind projects

As the project activity is a wind power project, the baseline emissions are only the CO₂ emissions from the power plants displaced by the project activity and there are no project emissions to be considered.

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

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The said wind power project being implemented is a Greenfield project for the project proponent. Thus since the project activity does not modify or retrofit an existing electricity generation facility, the baseline scenario is defined in ACM0002 (Version 08) methodology².

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”.

² http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_323M30IDF1IH6AG3GRCJ4PKR9CKM7P



Accordingly the baseline is selected as the generation sources that are part of the grid to which the power generated by the project is fed.

Thus in the absence of the proposed CDM project activity by GPECL the electricity delivered to the grid by the project would be generated in the future by the continued operation of grid-connected power plants and by the addition of new generation sources to meet the existing and future power requirement. After evaluation of the alternatives (presented in the section B.5 below), the generating units connected to the Western grid have been chosen as the baseline scenario.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

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The project proponent has taken the decision to undertake the said project activity for the purpose of promoting renewable energy in view of the revenues from CDM accruing to it, which makes the investment worthwhile.

The additionality of the project is ascertained in line with the applicable guidance from the UNFCCC. Accordingly the decision 17/cp.7, paragraph 43 is consulted; which states a CDM project activity is additional if anthropogenic emissions of green house gases by sources are reduced below those that would have occurred in absence of registered CDM project activity.

The demonstration of the additionality of the said project activity is being carried out in accordance with the additionality tool provided by the UNFCCC i.e. “*Tool for demonstration and assessment of Additionality, Version 05.2, EB 41*” This tool provides a step-wise approach to demonstrate additionality, which is dealt with 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.

The proposed project activity envisages the installation of a wind farm consisting of 63 WEGs of Enercon E-53 make, with each WEG having a capacity of 800 kW. Thus, the project activity will have a total installed generation capacity of 50.4 MW. Thus, in view of the purpose of the project activity being to generate electrical power to be fed to the grid, the following alternatives are considered:

Alternative 1 - The proposed project activity not undertaken as a CDM project activity.

The first alternative is based on the assumption that the said project activity would have been implemented by GPECL as a renewable energy project that would export power to the grid. The only revenues accruing from the project would be from the sale of power to the grid at rates determined by the PPA between the project proponent and the grid utility, and no benefits from sale of CERs are included. This alternative would be in compliance with all the applicable legal and regulatory requirements. Hence this alternative would be considered as the baseline, but after considering the barriers to the



implementation (covered in step 2 and 3 below), it is found unsuitable for selection as the baseline for the said project activity.

Alternative 2 - No project activity and equivalent amount of energy would have been produced by the project grid electricity system through its currently running power plants and by new capacity addition to the grid i.e. Continuation of current situation.

This alternative refers to the scenario wherein the capacity addition being done through the said project activity would have occurred through the expansion of the electricity grid using the existing composition, which is primarily thermal fossil fuel fired plants. In India, the power off-takes from the power plants is decided based on power plant and T&D availability and not on merit order basis, thus in absence of the wind power project, it is difficult to justify that equivalent amount of units would have been generated by coal based power plant (as a preferred substitute to the project). Hence, this alternative constitutes the “no project option” and assumes the expansion of the grid through the mixed composition. This is the most plausible scenario and is thus selected as the baseline.

Outcome of Sub-step 1a: All the credible and realistic alternatives for the project activity have been mentioned above and Alternative 2 has been selected as the appropriate baseline alternative.

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.).

The alternatives mentioned above are both in compliance with all the applicable regulatory policies and laws. Additionally, the project proponent is under no compulsion to opt for any particular technology or even a renewable mode of power generation..

Outcome of Sub-step 1b: Hence, both the alternatives above are found to comply with the mandatory legislation and regulations taking into account the enforcement of in the region or country and EB decisions on national and/or sectoral policies and regulations.

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

The project activity envisages the export of the power generated by the WEGs to the grid and the revenues from the sale would be generated in accordance to the terms and tariffs established in the PPA. Thus, simple cost analysis cannot be used as the analysis method as the sale of the units of generated electricity shall result in a revenue stream during the operations of the project.



After eliminating Option I, the use of Benchmark analysis (Option III) is the method of analysis that has been selected as the most suitable method. This method determines the attractiveness of the project activity for the investors, as well as provides a measure of the viability of the investment to generate revenues during its operation, as compared with other avenues and investment options. Hence, the Benchmark analysis method is to be employed for analysis of the said project.

Sub-step 2b (Option III): Apply benchmark analysis

The investment analysis using benchmark analysis (Option III) is determined to be the most accurate indicator of the financial attractiveness of the project. Further, this method illustrates the evaluation of the project by the project proponent at the time of investment decision.

IRR is one of the known financial indicators used by banks, financial institutions and project developers for making investment decisions. The project proponents have hence identified Equity IRR (Internal Rate of Return) as the most appropriate financial indicator for the project and carried out an investment analysis of the project activity.

The tool for the demonstration and assessment of additionality provides that *“the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach.”* In line with the Guidance on the Assessment of Investment Analysis (Version 02, Annex 45, EB 41) the project proponent has assessed Equity IRR against the corresponding appropriate benchmark.

The benchmark has been determined in accordance with para 6(a) sub step 2b of the Additionality tool i.e. *Government bond rates increased by a suitable risk premium to reflect private investment and / or project type.*

The required rate of return on equity for the project has been calculated using the Capital Asset Pricing Model (CAPM). As per CAPM, the required return on 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 Government Securities have been taken to represent the risk free return. Stock index has been used to represent the market return.

While considering a new project, CAPM can provide the required rate of return that the project needs to yield, taking into account the volatility (risk) of the stock relative to the market (Beta). This required return on equity represents the cost of equity benchmark for the project.

The formula of CAPM is as follows:

$$R_i = R_f + \beta (R_m - R_f)$$

Where:

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



$$R_m - R_f = \text{Market risk premium;}$$

Risk free rate:

The start date of the proposed project activity is 6th July 2007. At the time of start of the project the data available for the average Government bond rate was that of the year 2006-07, which was 7.89% (source: Reserve Bank of India, web-link: <http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/80303.pdf>).

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. The Beta value taken for this analysis is based on the beta values of the listed power companies engaged in similar business as the project activity at the time of investment decision estimated by regressing weekly returns on stock against local index, using 10 years of data if available otherwise the data since incorporation of the company has been used. The beta values have been taken from Bloomberg³.

Company Name	Beta
CESC	0.93
GIPC	0.79
JHPL	0.96
NLC	0.79
BF Utilities	2.79
NTPC	0.65
Tata Power	0.89
Reliance	0.85
Average Beta	1.08

The guidance on investment analysis requires the use of benchmark which represents standard market returns. These returns are assumed to reflect the risk free rate of return plus a market premium. The capital asset pricing model requires the adjustment of the market premium with the factor 'beta' which represents the volatility of a stock relative to a well diversified market portfolio.

In order to understand the standard market returns, it is essential to consider a wide range of companies. Hence an attempt to study the beta values of companies with relatively significant investment in power sector. BF Utilities was the only one company identified with mainstream wind power business, listed on the Indian bourses and actively traded with a historic beta value of 2.79 since the incorporation of the company in August 2001. Hence, the portfolio of the companies considered for the study was widened to include the companies with significant investment in the power sector including in renewable and non renewable energy.

Conventional (Thermal and Large Hydro) power projects are a more attractive investment option as compared to non conventional (renewable energy power projects) projects, primarily because of the lower risks that such project activities face as compared to renewable energy projects and in particular wind power projects. Conventional power plants supply firm power, operate on higher Plant Load Factor (PLF) and are not subject to the vagaries of nature as wind power plants. Wind power projects on the

³ Screenshots from Bloomberg terminal are being submitted as Annexure



other hand operate at much lower PLF and have much higher capital costs. Thus, from the perspective of a private investor, investments in thermal power plants are a safer option.

Hence it is assumed that such companies with significant investments in non renewable energy projects face lower risk as compared to the wind power developers. 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. The average beta has been estimated as **1.08** and the same has been chosen for further analysis.

Rm – Rf (Market Risk Premium)

The market risk premium is the return that an investor expects over and above the risk free return available in the market. The market risk premium has been estimated using historical approach. This can be defined as the historical differential return of the market and the risk-free rate. The most common method of calculating this is the difference between historical return of the stock market index and the historical return of the risk free rate. The differential can be calculated as arithmetic or geometric average. The geometric average⁴ usually is a more accurate representation of the risk premium, accordingly we have calculated market risk premium as the historical geometric mean return on the stocks (using the BSE Sensex⁵ Index since it start in 1979) minus the historical geometric mean return on government securities. This would give the incremental returns over and above the risk free rate.

Market Rate of Return (Rm)⁶

= 14.50 %

Market Risk Premium

= 14.50% - 7.89%

= 6.61%

Rate of return on equity benchmark is

Ri = Rf + β (Rm-Rf)

= 7.89% + 1.08 x 6.61%

= 15.06%

Hence the benchmark for equity IRR of the project is the rate of return on equity of companies engaged in similar business as that of the project which is calculated as 15.06%.

The additionality of the project has therefore been evaluated against a benchmark of 15.06% cost of equity

⁴ The compounded return is computed by taking the value of the investment at the start of the period (Value₀) and the value at the end (Value_N), and then computing the following:

$$\text{Geometric Average} = \left(\frac{\text{Value}_N}{\text{Value}_0} \right)^{1/N} - 1$$

⁵ <http://www.bseindia.com/histdata/hindices.asp>

⁶ Please refer excel sheet for the calculations of the same

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

The project and equity internal rate of return for the proposed project activity without CDM revenues was computed for a period of 20 years, corresponding to the lifetime of the wind farm based on the following assumptions⁷ including various benefits available to the project activity from the National and Sectoral policies for promoting renewable energy generation in India.

The assumptions used to calculate the project and equity IRR are listed below:

Financial assumptions		
Assumption	Value	Source
Debt (% of total project cost)	70.00%	As per indicative term sheet received from IDBI for financing of Samana project
Loan moratorium (years)	0	
Loan repayment (years)	12	As per IDBI indicative term sheet
Interest rate (% pa)	11.25%	As per IDBI indicative term sheet
Tax depreciation (% pa)	80%	As per relevant policy/act
Book depreciation (% pa)	5.28%	As per relevant policy/act
Corporate tax rate (%)	33.99%	As per relevant policy/act
MAT rate (%)	11.33%	As per relevant policy/act
Service tax (%)	12.36%	As per relevant policy/act

Project Cost Details (Rs Millions)		
Assumption	Value	Source
Cost of Wind Turbines - Facilitation Agreement	2,548.35	From facilitation agreement between GPECL and Enercon
Other Costs	24.37	Other costs correspond to costs of legal due diligence, technical due diligence and other costs associated with implementation of the project. The audited proofs for the same have been submitted to the validator.
Financing Costs	91.83	Financing cost consists of upfront and syndication fees payable to the bank as a percentage of debt for project along with interest during

⁷ The Investment analysis includes various benefits available to the project activity from the national and sectoral policies for promoting renewable energy generation in India such as accelerated depreciation, tax holidays etc.



		construction which are all calculated as per the IDBI loan term sheet
Total Project Cost	2,664.54	
Equity	799.36	30% of total project cost
Debt	1,865.18	70% of total project cost
Total Project Cost	2,664.54	

Revenue Related Assumptions		
Assumption	Value	Source
Capacity of the WEG (MW)	0.80	From facilitation agreement
Gross power (MWh per WEG)	2877.27	Facilitation Agreement dated 06.07.2007 (Schedule 12 - LTAE0), gross expected generation at controller is 1888.5 MWh per turbine
Net generation (MWh) (Considering net of factors Park efficiency, Machine availability, Grid availability, Density correction factor, Transmission losses from turbine due to utility, Annual Variation Factor, Other uncertainty factor)	1888.5	Factors as per the Facilitation Agreement dated 06.07.2007 (Schedule 12 - LTAE0)
Net PLF	26.95%	Calculated as per the generation given by the supplier. The same has been provided to the Lenders and considered by them for financial appraisal of the project
Wind Power Purchase tariff (Rs per unit)	3.37	As per GERC Tariff Order by GERC dtd 11 Aug 2006
Rebate for timely payment	1.10%	AS per the draft PPA to be entered into with GUVNL

Using the assumptions in the table above, the equity IRR is 9.71%, which clearly depicts the fact that the project activity is not very attractive as an investment option since the returns are much below the selected benchmark.

From the analysis above, it is clear that the project activity does not meet the stipulated benchmark without the CDM revenues and is hence additional.

Sub-step 2d: Sensitivity analysis

In order to ascertain the magnitude of risk associated with the project activity a sensitivity analysis has to be carried out, by varying the parameters of the project activity. This sensitivity is carried out by varying



the parameters which have the most impact on the returns from the project. Accordingly the parameter to be considered and varied is as follows:

S. No.	Parameters	Variation	Equity IRR	Comments
Project scenario			9.71%	
1.	Net PLF of the wind farm – 26.95% in accordance with the generation provided by the Equipment supplier and that provided to the Lenders for financial appraisal.	+10 %	12.92 %	The PLF used to arrive at the estimated generation in the IRR computation is already high as it has been referred from the equipment supplier's expected generation at controller end. Additionally the prevailing wind patterns and operating conditions cannot result in 10% increase in PLF at the site as even the electricity regulatory commission order states that the maximum CUF observed in Gujarat has reached only till 25.68% at the best site. Further GERC has considered 23% PLF for tariff fixation. It is observed that even with 10% increase in PLF, the IRR is still lesser than the Benchmark.
		+5 %	11.31 %	



		-5 %	8.11 %	PLF may reduce due to change in wind patterns and any other unforeseen circumstances /vagaries in nature, resulting in very less IRR.
		-10 %	6.50 %	
2.	Variation of capital cost from Rs 2725.78	+10 %	9.61 %	Increased capital cost due to unforeseen expenses will further decrease the Equity IRR.
		+5 %	9.66 %	
		-5 %	9.75 %	Reduction in capital cost from estimated amount is however not anticipated but being shown here to comply with the guidelines.
		-10 %	9.80%	
3.	Variation in O & M cost	+10 %	9.31%	O&M cost is expected to increase in the future and this increase would further lower the IRR
		+5 %	9.51%	
		-5 %	9.90%	The O&M cost is not expected to reduce but has been



		-10 %	10.10%	subjected to sensitivity as per guidelines
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The purpose of the sensitivity analysis is to demonstrate the sensitivity of the returns from the project activity due to uncertainty in plant load factor and capital cost costs for the project. This is an assessment of the impact of variations in above parameters from the assumed/design values, and represents magnitude of the sort of effects these variations may have on the returns from the project.

- PLF is the parameter on which the project proponent has very little control since it is contingent upon the wind patterns. The project proponent has assumed a very high PLF based on the equipment supplier estimation to be most conservative when the state electricity regulatory commission in its tariff estimation has assumed only 23% PLF. Thus 10% increase in PLF for the project is very unlikely, however even with the 10% increase in PLF the equity IRR of the project activity remains much below the benchmark for the project activity.
- The Capital cost of the project is unlikely to decrease and is more or less fixed based on the purchase orders/invoices, however under any unforeseen circumstances if the project cost increases/decreases, the equity IRR of the project still remains lower than the benchmark.
- The O&M cost is expected to increase in the future, which will further lower the returns from the project. However the sensitivity analysis with a 10% reduction in O&M costs shows that the equity IRR of the project remains lesser than the benchmark.

The above sensitivity analysis shows the IRR for the project does not exceed the benchmark even after variation of generation and project cost hence establishing that the financial analysis presented above is robust to variations in critical parameters.

Thus, the sensitivity analysis further illustrates the significant amount of risks associated with the implementation of the project activity having the potential to result in additional financial burden. The above discussion is designed to highlight the risks associated with the project and the fact that the project activity being undertaken was not the most attractive investment option available to the project proponent. The above results confirm that the post tax equity IRR for the project activity remains lower than the benchmark even under circumstances which could bring about favourable or adverse variations in some of the critical factors of the project activity.

Further, the wind power project activity supplies electricity to the Gujarat state electricity utility and the tariff it gets from supply of electricity to the grid is the only source of revenue for the project activity. The applicable tariff, therefore, has direct and most significant impact on the financial viability of the project. The applicable tariff in case of the project has been set by the Gujarat Electricity Regulatory Commission in its order dated 11th August 2006 (In the matter of: Determination of price for procurement of power by the Distribution Licensees in Gujarat from Wind Energy Projects), has considered a 14% post tax equity return for determining the applicable tariff for wind power projects in Gujarat. The equity IRR of the project activity is even lower than the anticipated return on equity used by GERC from tariff determination for wind power projects in Gujarat.



Therefore, it can be justifiably concluded that the CDM revenue that the project activity would obtain through sale of the emission reductions, is very crucial to sustaining the operations of the project activity and the project proponent would not have implemented the project without CDM.

Step 4: Common practice analysis

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

As on 31/03/2007, the total installed capacity for power generation in India through all modes (coal, gas, nuclear, hydro and others) was 132329.21 MW⁸ whereas the installed capacity of wind power in India is 7114.6⁹ MW. Thus only 5.37 % of the total installed capacity in India is through wind generation sources. Given that the gross potential for wind power in India is 45195 MW, the exploitation of the technology is very low.

At the time of investment decision making for the proposed project activity, in the state of Gujarat, the total installed capacity from all generation sources was 10490.79 MW¹⁰, as compared to the installed wind power capacity of 674.36 MW. Hence the miniscule 6.42% share of wind power serves to demonstrate that wind power still lags behind other alternative modes of power generation in the state. This is despite the fact that the state has a shortfall of 8381 MU in 2006-07¹¹, indicating that wind power is not being taken up despite the urgent and significant shortfall in generation capacity.

Despite the state of Gujarat having the highest potential for generation the actual installed capacity is found to be relatively low. The gross potential for the state is estimated at 9675 MW which is more than 3 times that of Tamil Nadu. However, the installed capacity of Gujarat is found to be lesser than that of Tamil Nadu, highlighting the fact that the state is not the favoured destination for investment in wind power projects.

The prevailing practice in the state of Gujarat is the implementation of wind farms for wheeling the generated power to utilise it for captive consumption at their respective industries. This is substantiated by the Gujarat Electricity Transmission Company (GETCO) order¹² which specifies that “*Most of the wind energy produced in Gujarat is utilized for captive consumption. For example, in 2004-05, out of the approximately 248 Million Units produced by wind farms in Gujarat, only 24 Million Units were purchased by GEB and its successor entities. The balance generation was for captive consumption.*” Further, irrespective of whether the projects were for sale to grid or captive consumption, most of the investors prefer to invest in smaller sized installations with an average size of 3 MW per investor.

According to Additionality tool (Version 05.2), similar project activities are those that rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to

⁸ Annual Report 2006-07 Ministry of Power : Central Electricity Authority July 2007; Annexure 10B

⁹ <http://www.windpowerindia.com/statstate.html>

¹⁰ Annual Report 2006-07 Ministry of Power : Central Electricity Authority July 2007 ;Annexure 10B

¹¹ Annual Report 2006-07 Ministry of Power : Central Electricity Authority July 2007; Annexure 4A

¹² GETCO Tariff Order dated 6th May 2006



regulatory framework, investment climate, access to technology, access to financing etc. The project activity under consideration is a large scale project activity with installed capacity 50.4 MW.

Similar project activity has been defined as any large scale project activity with size above 15MW and set up by a project proponent within a particular time frame in the state of Gujarat primarily for the sale of power to the grid.

The projects excluded from the definition of a similar scale project and the justification for the exclusions is provided below:

1. Exclusively captive wind power projects - A captive wind project is different from the project selling its generated output to the grid in the following ways:
 - a. A captive project is essentially implemented to meet the power requirements of an industry. Thus, there is a definite need for power which has to be secured from some sources. For meeting this requirement, the investor is likely to try and secure the cheapest and most attractive source of power. The investment will be justified only if the cost of generation through captive installation is lesser than the HT tariff offered by the grid to draw power. The baseline scenario will be different for such an investor and the risk undertaken by a captive investor will be different from an investor selling power to the grid.
2. Small scale wind power project activities bundled together from a large scale CDM project have not been considered for the analysis as the scale of these projects and the scale of investment is not comparable to the project activity under consideration.
3. Project activities which are seeking additional funding – Projects which are under the CDM pipeline or seeking additional funds have to be excluded as per the guidance provided by the tool for demonstration and assessment of additionality.
4. Project activities implemented post the investment decision for the project activity i.e. post June 2007, since for common practice analysis as per the guidance, only those projects can be compared which are under operation prior to the start of the proposed project activity by GPECL.

The wind projects of similar scale commissioned in state of Gujarat at the time of investment in the project activity i.e. as on 31st March 2007 (prior to the start date of project) were analysed from the list of projects commissioned and under operation in Gujarat available in the Indian wind Power Directory 2008.

In the state of Gujarat the majority of projects have a small installed capacity with very few large scale projects implemented or even under implementation at the time of decision making by the project proponent. The only large scale wind farms in the area under operation at the time of investment decision taken by GPECL were:

Investor name	Size in Gujarat (MW)	Distinction/Reason for exclusion
Gujarat NRE Coke	1.25+ 26.25 = 27.5	1. The project activity has also considered CDM and is currently in the CDM pipeline: ✓ Part of 22.3 MW Bundled grid connected Wind Power based electricity generation project in Gujarat http://cdm.unfccc.int/Projects/Validation/DB/OW17ZTWQUDGVXQ



		GEO59WCBOC9C6LIR/view.html ✓ Part of 26.25 MW wind electricity generation project of Gujarat NRE Coke Limited at Jamnagar and Kachchh http://cdm.unfccc.int/Projects/Validation/DB/2WHFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html <u>Since the project activity is under CDM, it has been excluded from common practice analysis.</u>														
Gujarat Guardian Ltd.	31.6	a. The Project activity is considering carbon finance and has already received carbon benefits through the Voluntary VER route: http://www.carbonneutral.com/cnregistry/uploaded/Jamnagar%20Wind%20Power%20Projects%20PDDs.pdf 23.2 MW capacity is included under the webhosted VER PDD validated under the Voluntary Carbon standard. After deducting the project size of 23.2 MW from the total installed capacity of project proponent in Gujarat, only 8.4 MW capacity project is left which is less than 15 MW and hence cannot be compared to the GPECL project. b. Further, the project is different from the proposed wind power project by GPECL since it is an exclusively captive installation utilizing the generated output from its project for self utilization at its industry premises which is evident from the VER PDD above. c. Furthermore, the project activity has already applied for CDM benefits. <u>Due to above reasons, the project is different and it has been excluded from common practice analysis.</u>														
Patnaik Minerals Pvt. Ltd	30.2	The project is under CDM and part of Wind Power project by PMPL in Gujarat, District Jamnagar and Rajkot by M/s Patnaik Minerals Private Limited http://cdm.unfccc.int/Projects/Validation/DB/GQ56N39MLSZ9QDRL6RUF5YJSFDPD1U/view.html <u>Since the project activity is under CDM, it has been excluded from common practice analysis.</u>														
Indian Petrochemicals Co. Ltd	15.315	The project was commissioned phase-wise and got completed in March 1997, the regulatory environment then prevailing and the policies pursued were different from those existing at the time of the start of proposed project activity by GPECL. <table border="1"><thead><tr><th>Capacity (MW)</th><th>Date of Commissioning</th></tr></thead><tbody><tr><td>2.25</td><td>Sep-96</td></tr><tr><td>5.625</td><td>Mar-96</td></tr><tr><td>2.7</td><td>Mar-97</td></tr><tr><td>2.8</td><td>Mar-96</td></tr><tr><td>0.54</td><td>Mar-96</td></tr><tr><td>1.4</td><td>Mar-97</td></tr></tbody></table> The differences in regulatory environment are as below: For IPCL Project – The project was installed under the Incentive scheme for wind power	Capacity (MW)	Date of Commissioning	2.25	Sep-96	5.625	Mar-96	2.7	Mar-97	2.8	Mar-96	0.54	Mar-96	1.4	Mar-97
Capacity (MW)	Date of Commissioning															
2.25	Sep-96															
5.625	Mar-96															
2.7	Mar-97															
2.8	Mar-96															
0.54	Mar-96															
1.4	Mar-97															



		generation 1993 which was applicable for the period from January 1993 – September 2001. The salient features of the scheme are: ✓ Purchase of electricity at INR 1.75 /kWh (US\$ 0.039 /kWh) with wheeling charges of 2% of the energy generated by windmills and provision of banking for a period of 6 months. Electricity duty and demand cut to the extent of 30% of installed capacity of wind farm has been exempted along with 50% sales tax incentives. Additionally the generator was exempted from the electricity duty over the generated electricity. [Source: (a) Para (v)-(ix), pp. 2-3, Incentive Scheme for Wind Power Generation 1993, Govt. Resolution No. EDA-1092- M (I)-8(1)-E, dated 27.1.1993. (b) Para 6, page 4, Sales-tax incentive scheme for Wind Power Generation, 1993, Govt. Resolution No. EDA-1092-M (I)-8(2)-E, dated 27.1.1993] For GPECL Project – The project is in stalled under the Gujarat Electricity Regulatory Commission order dated 11th August 2006 - In the matter of Determination of price for procurement of power by the Distribution Licensees in Gujarat from Wind Energy Projects. The salient features of the order are: ✓ Purchase of electricity at INR 3.37/kWh (US \$ 0.075 /kWh) fixed for entire project lifetime of 20 years. The wheeling charges are kept constant at 4% in accordance with the previous policy including the banking period of 6 months. A brief description of the different regulatory environment is also provided on the following web-link: http://www.geda.org.in/wind/wind_power.htm Additionally, the project is a captive project as identified from the following web-link: http://sebidifar.nic.in/documents/IPCL/ar032002.pdf Page 21 of the document which clearly mentions that the electricity generated from the turbines is wheeled and utilized for internal consumption. <u>Thus this project has been excluded from the common practice analysis.</u>
Ratnamani Metals and tubes Limited	17.5	The project activity has been implemented in phases. The first phase of around 5 MW has been included under two bundled CDM project activities - 1. 22.3 MW Bundled grid connected Wind Power based electricity generation project in Gujarat and 2. 13.7 MW Bundled Grid-connected wind electricity generation in Jamnagar & Kachhh, Gujarat. 1. http://cdm.unfccc.int/UserManagement/FileStorage/X6RZB5RJQDTY6C6PF4A38DSNXH2FL4



		2. http://cdm.unfccc.int/Projects/Validation/DB/HAZNBLU455HVNR7QGA4I3R7T5JWWLT/view.html Post these bundled projects the second phase consisting of 13.25 MW has been proposed as a separate CDM project activity implemented post January 2007 - 13.25 MW Wind Power Generation by RMTL, in Kutch, Gujarat. http://cdm.unfccc.int/Projects/Validation/DB/FQOM561A0WJL6VAG2NT568TNPCLZCG/view.html <u>Thus, since the project activity is under CDM, it has been excluded from common practice analysis.</u>
SREI Infrastructure and Finance Limited	24.8	SREI Infrastructure and Finance Ltd is a Non Banking Financial Institution (NBFC) and thus the investment climate for it is different from that of GPECL. This is because the cost of capital for such institutions is much lower than those for non financial institutions (like GPECL). Hence such an institution cannot be compared with the said project activity. Further, the project intends to seek CDM revenues. Furthermore, the Annual Reports of the company for the year 2006-07 and 2007-08 specifically bear a mention of availing CDM benefits for its renewable energy projects. http://www.srei.com/srei_pdf/sreiannual/2006-07.pdf http://www.srei.com/srei_pdf/sreiannual/2007-08.pdf <u>Thus the project proponent intends to seek CDM revenues for the project and hence it has been excluded from common practice analysis.</u>
MSPL Ltd.	30	The Project is under CDM as part of the project activity - "30 MW wind power project at Surajbari, Gujarat in India" - http://cdm.unfccc.int/Projects/Validation/DB/L59OGCJY0XLZUC0W8MMB84A2T4NKNX/view.html Further, according to the PDD the purchase orders for the project were placed on 19th December 2006 and hence the project was not under operation at the start of the GPECL project activity. <u>Since the project activity is under CDM, it has been excluded from common practice analysis.</u>

It is to be noted that these projects are presently under advanced stages of the CDM process. Hence, in accordance with paragraph 1 in Sub-Step 4a of the "Tool for demonstration and assessment of additionality" Version 05.2, these projects should be excluded from the comparison of similar project activities.

Apart from these projects, all other projects are of very small size (less than 15 MW). Thus it can be said that the prevailing practice in the area is implementation of small scale wind farms, the large scale implementation if any has been made only after due consideration of CDM benefits. Furthermore, it can



be seen that all other large scale projects which have decided to implement large scale wind farms in the state have seriously considered CDM benefits.

The above analysis shows that:

- ✓ Wind power project development is insignificant when compared to the total installed generating capacity of the power sector as well as in terms of realisation of the total wind potential.
- ✓ Further it also shows that wind power project development is substantially dependent on CDM and non CDM wind energy generation is not widely observed and hence is not common practice.

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

The additionality tool states in Sub-step 4b that *“If similar activities are widely observed and commonly carried out, it calls into question the claim that the proposed project activity is financially unattractive (as contended in Step 2) or faces barriers (as contended in Step 3).”*

On the basis of the conclusions of the analysis in Sub-step 4a, it is seen that:

- ✓ Similar activities i.e. non CDM wind projects **are not widely observed**
- ✓ Further to this **non CDM wind farm projects of project size greater than 15 MW selling the generate output to state grid are not present** in the state of Gujarat.

Hence as per additionality version 5.2 tool further analysis of step 4 (b) is not required.

Serious consideration of benefits from CDM

The decision to undertake the said project has been taken only after serious consideration of revenues from CER sales as part of returns from the project. The evidences to demonstrate this fact are available in the form of various publicly available documents. An account of the same is documented below:

- The project proponent, GPECL is a wholly owned subsidiary of the CLP Group, which is one of the largest investor-owned power businesses in Asia. The CLP Group operates a vertically integrated electricity generation, transmission and distribution business in Hong Kong.
- The CLP group recognizes climate change as a global challenge and the impact of this phenomenon must be mitigated as far as possible. The group had identified an action plan to reduce emissions from power generation in a document “Our Manifesto on Air Quality & Climate Change”¹³ released in 2004, where it has defined its objective of increasing capacity through renewable modes of power generation.
- Expanding on the objectives mentioned in the above document, the goals were elaborated in the document “A Future Power from Nature” released in March 2006 which outlines the specific activities planned to be implemented. This document also documents the sort of projects (including the possibility of CDM funding) the CLP group will undertake as a part of this initiative¹⁴.
- A further reiteration of the group’s commitment to contribute to the reduction of GHG emissions and minimize the impact of its carbon-intensive operations, the group has established a target of

¹³ <https://www.clpgroup.com/Abt/Res/Pub/CLPGroup/Pages/default.aspx>

¹⁴ <https://www.clpgroup.com/Abt/Res/Pub/CLPGroup/Pages/default.aspx>



producing a part of its total generation through renewable sources. For this purpose, it issued an action plan and manifesto “CLP’s Climate Vision 2050”¹⁵ in December 2007.

- Further, the group also acknowledges the fact that “substantial and sustainable investment in renewable energy depends on proper returns”¹⁶ to entail viability. In order to ensure this, CLP has duly considered carbon funding for all its renewable energy projects and has specifically stated in the referred document that “CLP hopes to develop projects with high potential of CDM credits”¹⁷. The said project activity is a part of the planned investment of CLP in renewable energy projects worldwide supported by CDM revenues as also mentioned in the document.
- In line with this global objective, CLP Group sought to invest in a large scale wind power project effectively supported by CDM revenues in India through its wholly owned subsidiary GPECL. In the meeting of the Board of Directors of the company held on 25th June 2007, the approval was granted to implement the project activity in light of the discussions with respect to the influence of CDM revenues on the returns of the project. Furthermore, the Board authorised its key personnel by means of a specific board resolution to undertake all acts and deeds related to initiating the work for registering the project as CDM project
- In order to secure internal approval for the investment required for the project, the management had made a presentation on the project before the Investment Committee (IC) on 28th June 2007. In this presentation there is a clear mention of GPECL intentions to engage consultants to get CDM funding: This is mentioned in the slide titled *CDM Approach* and states “GPECL will engage consultants to assist through the process of registration”. This appointment of consultants was done to ensure CDM funding for the project activity as the IC had expressed its apprehensions on the viability of the project in light of the low returns. Further during the meeting it was explained how the low returns from the project would be bolstered by CDM funds which would address the concerns of the IC.
- The communications with the CDM consultants started on 22nd June 2007 and finalisation of the CDM consultant after general negotiations happened on 18th August 2007. After which the PDD development started and subsequent actions to secure CDM for the proposed project activity was undertaken.

The chronology of events related to the project activity and the efforts of the project proponent to secure CDM funding for the project activity are summarized below:

S. No.	Activity	Date	Reference Document
1	Release of action plan on climate	December 3,	<i>Our Manifesto on Air Quality &</i>

¹⁵ <https://www.clpgroup.com/Abt/Res/Pub/CLPGroup/Pages/default.aspx>

¹⁶ Page 4 “A Future Power from Nature” CLP Renewables
<https://www.clpgroup.com/Abt/Res/Pub/CLPGroup/Pages/default.aspx>

¹⁷ Page 9 “A Future Power from Nature” CLP Renewables
<https://www.clpgroup.com/Abt/Res/Pub/CLPGroup/Pages/default.aspx>



	change in “Our Manifesto on Air Quality & Climate Change”	2004	<i>Climate Change</i> published by CLP
2	Publication of “A Future Power from Nature” by CLP outlining plans for specific activities to be taken forward and possibility of CDM for initiatives	March, 2006	<i>A Future Power from Nature</i> published by CLP
3	Release of Gujarat Wind Power Policy - 2007	June 13, 2007	<i>Wind Power Policy – 2007</i> published by Government of Gujarat
4	Initial discussions with CDM consultants for project activity	June 22, 2007	Email Communication
5	Resolution of GPECL Board to undertake the project activity with serious CDM consideration	June 25, 2007	Extract of GPECL Board Minutes
6	Signing of Facilitation Agreement for supply of WEG equipment	July 6, 2007	Facilitation agreement between GPECL and EIL
7	Finalization and appointment of the CDM consultant	August 18, 2007	Letter of appointment
8	Stakeholder Consultation meeting at project site	October 25, 2007	Minutes, Attendance sheet and photographs of project site
9	Publication of “CLP’s Climate Vision 2050” stating objective of renewable power generation	December 7, 2007	<i>CLP’s Climate Vision 2050</i> published by CLP
10	Invitation of validation bids from DOEs	January, 2008	Email to DOE
11	Proposal submitted by the DOE for Validation	January 14, 2008	Email with proposal from DOE
12	Revised Proposal from DOE	February 4, 2008	Email with revised proposal from DOE
13	Appointment of DOE for validation	February 8, 2008	Work order to DOE
14	Permission from Gujarat Energy Development Agency for setting up of 12.8 MW wind farm on the name of GPECPL	February 11, 2008	GEDA/GPECL/PWF/Bodi/2007-08/6037 dated February 11, 2008
15	Permission from Gujarat Energy Development Agency for setting up of 0.8 MW wind farm on the name of GPECPL	February 11, 2008	GEDA/GPECL/PWF/Narmana/2007-08/6038 dated February 11, 2008
16	Submission of PDD to DOE for validation	February 28, 2008	Email to DOE with PDD
17	Preliminary queries of the validator on the submitted PDD	March 3, 2008	Email from DOE
18	Presentation to DNA for HCA endorsement	March 17, 2008	Invitation letter from DNA
19	Web-hosting of PDD by DOE for Global Stakeholder Process	March 11, 2008 – April 9, 2008	UNFCCC website
20	Commissioning of First WEG at the	April 12, 2008	Commissioning Certificate -



	Narmana Village in Jamnagar		GEDA/PWF/GPECL/Narmana/08-09/512 dated April 17, 2008
21	Draft validation report along with a list of corrective action and clarification requests	May 7, 2008	Email from DOE
22	Permission from Gujarat Energy Development Agency for setting up of 26.4 MW wind farm on the name of GPECPL	July 3, 2008	GEDA/GPECL/PWF/Phagas/2008-09/1415 dated July 3, 2008
23	Permission from Gujarat Energy Development Agency for setting up of 4.0 MW wind farm on the name of GPECPL	November 12, 2008	GEDA/GPECL/PWF/Laloi/2008-09/3653 dated November 12, 2008
24	Permission from Gujarat Energy Development Agency for setting up of 6.4 MW wind farm on the name of GPECPL	December 19, 2008	GEDA/GPEC/PWF/Kalyanpur/2008-09/5174 dated December 19, 2008
25	Commissioning of last WEG at the Phagas Village in Jamnagar - The start of operation of the GPECL's 50.4 MW wind farm	March 12, 2009	Commissioning certificate - GEDA/PWF/GPECL/Phagas/08-09/8169 dated March 20, 2009

This chronology provides the dates related to investment decision, commissioning and events related to the actions which have been taken to achieve CDM registration. The above account clearly demonstrates the seriousness of the project proponent in terms of implementing project activities to mitigate climate change duly supported by incentives from CDM which thence make the project investments worthwhile.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission Reductions

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y$$

where the baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh).

$$BE_y = EF_y * EG_y$$

In accordance with the “Tool to calculate the emission factor for an electricity system” Version 01.1, combined margin CO_2 emission factor for grid connected power generation is calculated stepwise as below:

**Step 1. Identify the relevant electric power system**

For the purpose of determining the electricity emission factors, 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 (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 five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. 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. Currently, Northern, Eastern, Western and North-Eastern (NEWNE) Regional grids have been synchronized together to form a single grid system known as NEWNE 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).

Table: States connected to different regional grids

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

Since the CDM project would be supplying electricity to the Western regional grid (now a part of the NEWNE Grid System), it is preferable to take the regional grid as project boundary than the state boundary. It also minimizes the effect of inter state power transactions, which are dynamic and vary widely. Considering free flow of electricity among the member states and the union territory through the WRLDC, the entire Western grid is considered as a single entity for estimation of baseline.

Step 2. Select an operating margin (OM) method



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

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

As per the tool, any of the four methods can be used. For the proposed project activity, simple OM method has been chosen to calculate the operating margin emission factor ($EF_{grid, OM, y}$). However, the simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. The 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.

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

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
North	25.7%	26.1%	28.1%	26.8%	28.1%	27.1%
East	13.4%	7.5%	10.3%	10.5%	7.2%	9.0%
South	25.5%	18.3%	16.2%	21.6%	27.0%	28.3%
West	8.5%	8.2%	9.1%	8.8%	12.0%	13.9%
North-East	42.1%	45.8%	41.8%	55.4%	52.7%	44.1%
India	18.9%	16.3%	17.1%	18.0%	20.1%	20.9%

Ref: CO₂ Baseline Database for the Indian Power Sector – CEA, Version 03.

Percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) = 10.4 %

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: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period,
- or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, 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 proponents choose 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 3. 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 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 using the following formula:

$$EF_{\text{grid,OMsimple},y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{\text{CO}_2,i,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{\text{grid,OMsimple},y}$	=	Simple operating margin CO ₂ emission factor of in year y (tCO ₂ /MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{\text{CO}_2,i,y}$	=	CO ₂ emission factor of fossil fuel type i in year y (tCO ₂ /GJ)
$EG_{m,y}$	=	Net electricity generated and delivered to the grid by power unit m in year y (MWh)
m	=	All power units serving the grid in year y except low-cost / must-run power units
i	=	All fossil fuel types combusted in power plant / unit m in year y
y	=	Either 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) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

In India, the Central Electricity Authority (CEA) has provided the data for estimation of 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 4. Identify the cohort 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:

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

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



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 participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be 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 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, calculated as follows:

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

Where:

- $EF_{\text{grid, BM, } y}$ = 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)
- $EF_{\text{EL, } m, y}$ = 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

Calculations for the Build Margin emission factor $EF_{grid, BM, y}$ 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 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

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

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 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 provided the data for the estimation of 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 data for the estimation of baseline emission factor used in the calculation of baseline emissions for the proposed project activity is being referred from the same for transparency and conservativeness¹⁸.

Project activity emissions

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

Leakage

According to ACM0002, 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, fuel handling (extraction, processing, and transport), and land inundation (for hydroelectric projects). Project participants do not need to consider these emission sources as leakage in applying this methodology. Project activities using ACM0002 shall not claim any credit for the project on account of reducing these emissions below the level of the baseline scenario. Thus the leakage emissions are nil.

¹⁸ <http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm>

**B.6.2. Data and parameters that are available at validation:***(Copy this table for each data and parameter)*

Data / Parameter:	EF_{OM,v}
Data unit:	tCO ₂ /MWh
Description:	Operating Margin emission factor for western regional grid
Source of data used:	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 3.0.
Value applied:	1.0032
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is calculated in accordance with the Tool to calculate the emission factor for an electricity system (Version 01.1) with 3years vintage data (2004-05, 2005-06 and 2006-07) on Net Generation provided by CEA with an option of ex ante calculation based on Simple Operating Margin Method. Computed once during PDD finalization.
Any comment:	The data will be archived for two years beyond the crediting period.

Data / Parameter:	EF_{BM,v}
Data unit:	tCO ₂ /MWh
Description:	Build Margin emission factor for western regional grid
Source of data used:	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 3.0.
Value applied:	0.5938
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is calculated in accordance with the Tool to calculate the emission factor for an electricity system (Version 01.1) with data for the year 2006-07 provided by CEA. The build margin is calculated 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. Computed once during PDD finalization.
Any comment:	The data will be archived for two years beyond the crediting period.

Data / Parameter:	EF_y
Data unit:	tCO ₂ /MWh
Description:	Combined Margin CO ₂ emission factor for western regional grid
Source of data used:	Estimated figure based on 75% of OM and 25% of BM values
Value applied:	0.9008 tCO ₂ /MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	It is calculated it as per Tool to calculate the emission factor for an electricity system (Version 01.1) with 3years vintage data and option of ex ante calculation based on 75% of OM and 25% of BM values approach. Computed once during PDD finalization.
Any comment:	The data will be archived for two years beyond the crediting period.

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

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Calculation of Baseline Emission Factor:

In accordance with the CEA CO₂ Baseline Database for the Indian Power Sector – Version 03, the emission factor is calculated as follows:

	2004-05	2005-06	2006-07	Source
Simple Operating Margin Emission Factor (tCO ₂ /MWh)	1.0129	1.0039	0.9936	CEA Database, Version 3.0
Net Generation in OM (GWh)	155,731	154,918	159,681	CEA Database, Version 3.0
Net electricity import from ER, NR and NER (GWh)	605	13,541	10,669	CEA Database, Version 3.0
Net generation incl imports (GWh)	156,336	168,458	170,350	Calculated
Weighted Generation Simple Operating Margin Emission Factor (tCO₂/MWh)	1.0032			Calculated
Build Margin Emission Factor (tCO₂/MWh)	0.5938			CEA Database, Version 3.0
W _{OM}	0.75			Tool to calculate Emission Factor for an Electricity System
W _{BM}	0.25			Tool to calculate Emission Factor for an Electricity System
Combined Margin Emission Factor (tCO ₂ /MWh) $EF_y = W_{OM} EF_{OM,y} + W_{BM} EF_{BM,y}$ $= (0.75 \times 1.0032) + (0.25 \times 0.5938)$ $= 0.7524 + 0.1484$ $= \mathbf{0.9008 \text{ tCO}_2/\text{MWh}}$	0.9008			Calculated

Illustrated below are the ex-ante calculations for the estimation of annual emission reductions:

Number of WEGs		63
Capacity of individual WEG (MW)		0.8
Net Generation of individual WEG		1888.5 MWh
Net PLF (%) – Provided to the Lenders		26.95 %
Net Generation from the project (EG _y)		118975.6 MWh
Baseline emission factor Western region grid (EF _y)		0.9008 tCO ₂ /MWh
Baseline Emissions		



$BE_y = EF_y \times EG_y$ $BE_y = 0.9008 \times 118975.6$		107,173 tCO ₂ /MWh
Project Emissions (PE _y)		0
Leakage Emissions (L _y)		0
Emission Reduction (ER _y) $ER_y = BE_y - PE_y - L_y$		107,173 tCO ₂ /MWh

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

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Year	Estimation of Project activity emissions (tonnes of CO ₂ e)	Estimation of Baseline emissions (tonnes of CO ₂ e)	Estimation of Leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
2009-10	0	107,173	0	107,173
2010-11	0	107,173	0	107,173
2011-12	0	107,173	0	107,173
2012-13	0	107,173	0	107,173
2013-14	0	107,173	0	107,173
2014-15	0	107,173	0	107,173
2015-16	0	107,173	0	107,173
2016-17	0	107,173	0	107,173
2017-18	0	107,173	0	107,173
2018-19	0	107,173	0	107,173
Total (tonnes of CO₂e)	0	1,071,730	0	1,071,730

B.7. Application of the monitoring methodology and description of the monitoring plan:**B.7.1 Data and parameters monitored:***(Copy this table for each data and parameter)*

Data / Parameter:	EG _y
Data unit:	MWh/yr
Description:	Net Electricity supplied to Western Grid
Source of data to be used:	Share certificate issued by GEDA
Value of data applied	118,975.6 MWh/yr



for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The WEGs of a single customer (GPECL in this case) in a particular location are connected to a Vacuum Circuit Breaker metering yard (VCB) which in turn connects to a feeder that ultimately leads to the bulk main GETCO meter of accuracy class 0.2s, at the substation maintained by Enercon India Limited. Net electricity generated by GPECL wind farm will be monitored and reported by GEDA in its share certificate on the basis of the metering done at the bulk main meter connected to the incoming feeder of GETCO and the meters installed at the VCB metering yard. Data monitoring for electricity exported and electricity imported takes place at the VCB metering yard and GETCO meter at the substation. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the VCB end. There are three meters at the GETCO sub-station each of accuracy class 0.2s and one dedicated meter for GPECL at each VCB metering yard (total 9 meters) of accuracy class ranging between 0.2s/0.5s. The emission reduction calculations are done on the basis of the net electricity supplied as mentioned in the share certificate issued by GEDA on monthly basis.
QA/QC procedures to be applied:	Annual calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately.
Any comment:	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.

B.7.2. Description of the monitoring plan:

>>

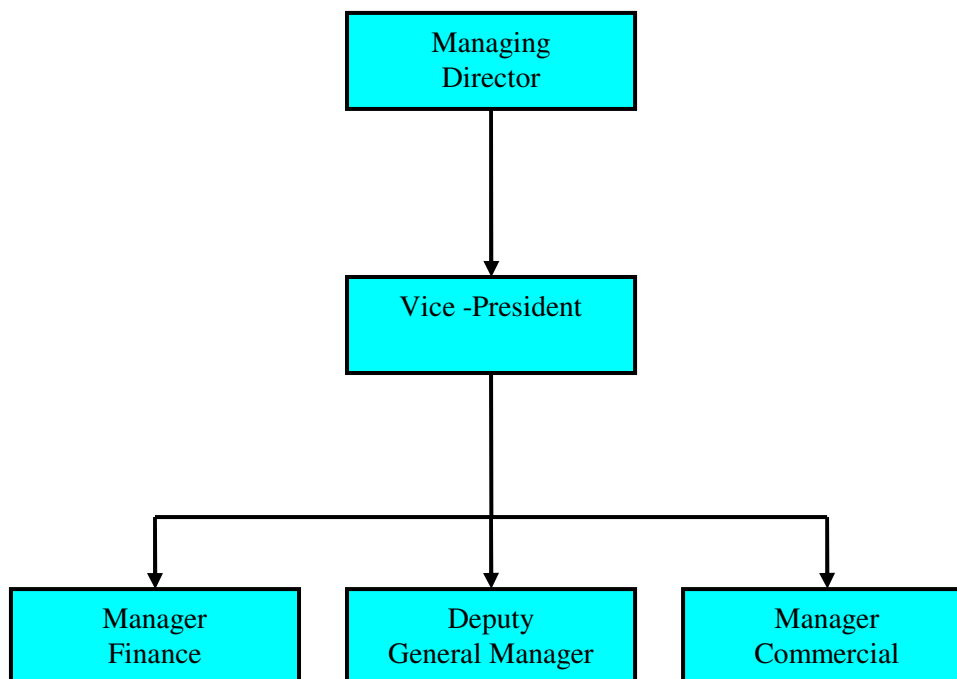
The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 (version 08) - **“Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”**.

To ensure trouble free operations and efficient generations through all the wind turbines, GPECL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a period of 10 years, which is extendable at renegotiated terms. The contractor EIL, under the O&M contract with GPECL would be responsible for the operation and maintenance of the project activity for the entire crediting period. The data measurement and recording procedures will be as per quality management system - ISO 9001:2000.

The authority and responsibility of project management as well as registration, monitoring, measurement and reporting of data lies with the project proponent. GPECL has formulated a Project Team to ensure



proper and continuous monitoring of the performance of turbines and generation of power. The structure of the operation and management structure implemented by the project proponent for the purpose of the project activity is illustrated below:



The O&M personnel will be qualified engineers and will be trained at the WEG manufacturing facility of Enercon India Limited at Daman for operating and ensuring best performance of the WEGs.

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).

The emission reduction calculations will be done on the basis of net electricity supplied to the grid after subtracting the losses incurred due to transmission from the WEG to the GETCO feeder. The joint meter readings will serve as the most authentic data source for the same.

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

>>

Date of completing the final draft of this baseline section (DD/MM/YYYY):

15/11/2008

Name of person/entity determining the baseline:

Gujarat Paguthan Energy Corporation 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.

**SECTION C. Duration of the project activity / crediting period.****C.1. Duration of the project activity:****C.1.1. Starting date of the project activity:**

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06/07/2007

The definition of start date was clarified by the CDM EB in its 41st meeting, according to which, ‘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’.

Accordingly, the start date for the project above represents the date of signing of the facilitation agreement between GPECL and the WEG supplier. This facilitation agreement covered the purchase and installation of the WEGs to be installed as part of the project and hence represents the commitment of expenditures by the project participant.

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

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20 years, 0 months

C.2. Choice of the crediting period and related information:**C.2.1. Renewable crediting period:****C.2.1.1. Starting date of the first crediting period:**

>>

Not Applicable

C.2.1.2. Length of the first crediting period:

>>

Not Applicable

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

>>

01/12/2009 or date of registration of project, whichever may be occurring later

C.2.2.2. Length:

>>

10 years, 0 months

**SECTION D. Environmental impacts**

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

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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.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

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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. Stakeholders' comments**

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

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The project activity being undertaken envisages the installation of a wind farm of 50.4 MW installed capacity. The stakeholders are defined as the public, including individuals, groups or communities, affected, or likely to be affected, by the proposed CDM project activity. The local stakeholders identified for the proposed project activity are as follows:

1. Local villagers and representatives of village governing body
The varied sections of the local population, village panchayat & local elected body of representatives administering the local area are a true representative of the local population in a democracy like India. Hence, their consents / permissions to set the project are necessary. GPECL had organised a stakeholder consultation meeting with them to inform them on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity.
2. Gujarat Energy Development Agency (GEDA)
GEDA is the principal agency in Gujarat responsible for development of renewable energy sources in the state. GPECL will be obtaining permission from GEDA for setting up the wind power project. GEDA is also responsible for transfer of wind farm from Enercon to GPECL and at a later stage will be providing the commissioning certificate when all the WEGs are commissioned.
3. Supplier of WEG
Enercon India Ltd. is the supplier of WEGs and is also responsible for the operation and maintenance of the GPECL project activity.

Local villagers and representatives of village governing body from all the villages in and around the project activity were invited personally by GPECL with the help of representatives of Enercon on 1st October 2007 for the meeting to be held on 25th October 2007.

E.2. Summary of the comments received:

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In accordance with the procedural requirements for the CDM process, the project proponent organized a stakeholder meeting. Besides being a requirement for the CDM process, the meeting provided the project proponent a forum to clarify any queries or misgivings the local inhabitants in the region may have about the project. The meeting for the wind power project at Samana site, Gujarat was held in Jamnagar on Thursday, the 25th of October 2007. The meeting was well attended, with a turnout of around forty stakeholders, including Representatives from Gram Panchayat (mostly village heads - Sarpanches), Local residents, and representatives of Equipment suppliers. The meeting was initiated by a representative of the project proponent giving a brief on the project activity. This was followed by an introduction to climate change and its local as well as global effects. The relation of anthropogenic GHG emissions and climate change was also addressed and the contribution of the said project activity in mitigating these threats was explained.



In an open house session that followed the speeches, two of the Sarpanchs came forward on behalf of all the villagers and other Sarpanchs to thank GPECL and offered continuous support in the development of the project.

The issues and concerns raised by the stake holders and the clarifications provided by GPECL and Enercon India Limited are summarized below:

- Is GPECL going to implement any new technology in Samana?
- What kind of employment opportunities does this project offer to the local villagers?
- Village roads near to the wind farm are getting damaged due to heavy vehicles and what is the corrective action planned?

On the whole, the stakeholders were appreciative of the project being undertaken and were in agreement the beneficial effects of the said project activity. There were no adverse comments received and the above mentioned queries were addressed by the project participant.

These queries were duly acknowledged by the project proponent and the representatives of GPECL present appreciated the questions by the stakeholders. The answers given in response to these queries are presented below:

Queries raised by Participants	Clarifications by GPECL & Enercon
Is GPECL going to implement any new technology in Samana?	GPECL clarified that they have bought WEGs from Enercon India Limited and are implementing a 100 MW wind farm project. The stakeholders were confused if GPECL was implementing some other project. They were clarified on the same.
What kind of employment opportunities does this project offer to the local villagers?	Local villagers are given preference for the manpower requirement of construction work as well as requirements during the operational life of the project.
Village roads near to the wind farm are getting damaged due to heavy vehicles and what is the corrective action planned?	Maintenance of roads at periodic intervals will be done by Enercon

The stakeholders present were satisfied with these responses and were appreciative of the efforts by the project proponent in undertaking the said project.

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

>>

There were no adverse comments received from the stakeholders and the net beneficial effects of the project activity were acknowledged by the stakeholders present.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

Organization:	Gujarat Paguthan Energy Corporation Private Limited
Street/P.O.Box:	6 th Floor,
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State/Region:	Gujarat
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FAX:	+ 91 79 2658 3254
E-Mail:	Rajiv.mishra@clpindia.in
URL:	www.clpgroup.com
Represented by:	Mr. Rajiv Ranjan Mishra
Title:	Managing Director
Salutation:	Mr.
Last name:	Mishra
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding involved in the proposed project activity. The total investment in the wind farm has been accrued from internal sources.



Annex 3

BASELINE INFORMATION

The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has provided the data for the estimation of the Combined Margin emission factor for the Western 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 detailed in there.



Annex 4

MONITORING INFORMATION

The monitoring plan has been already explained in section B.7.2.

**Appendix 1**

The coordinates of individual WEGs are stated below:

WEG Location Number	Latitude	Longitude
1	N22° 05' 16.1"	E70° 21' 35.5"
2	N22° 05' 20.0"	E70° 21' 26.4"
3	N22° 05' 18.0"	E70° 21' 17.1"
4	N22° 05' 06.7"	E70° 21' 12.4"
5	N22° 05' 30.0"	E70° 21' 11.6"
6	N22° 05' 37.7"	E70° 21' 06.1"
7	N22° 06' 19.1"	E70° 20' 23.5"
8	N22° 06' 20.3"	E70° 20' 13.4"
9	N22° 06' 37.0"	E70° 20' 16.5"
10	N22° 06' 26.4"	E70° 20' 30.1"
11	N22° 06' 34.2"	E70° 20' 42.0"
12	N22° 06' 42.3"	E70° 20' 37.1"
13	N22° 06' 46.6"	E70° 20' 33.1"
14	N22° 06' 52.2"	E70° 20' 33.1"
15	N22° 06' 58.5"	E70° 20' 28.9"
16	N22° 07' 04.2"	E70° 20' 22.9"
17	N22° 07' 11.4"	E70° 19' 59.4"
18	N22° 07' 06.1"	E70° 19' 46.5"
19	N22° 06' 37.0"	E70° 19' 25.9"
20	N22° 06' 37.0"	E70° 19' 10.2"
21	N22° 06' 30.7"	E70° 19' 09.8"
22	N22° 06' 24.5"	E70° 19' 05.9"
23	N22° 05' 38.8"	E70° 18' 47.9"
24	N22° 05' 42.0"	E70° 18' 42.7"
25	N22° 05' 48.1"	E70° 18' 39.4"
26	N22° 05' 56.6"	E70° 18' 38.9"
65	N22° 08' 49.8"	E70° 14' 30.2"
66	N22° 08' 56.1"	E70° 14' 25.6"
67	N22° 09' 02.6"	E70° 14' 24.8"
68	N22° 09' 10.3"	E70° 14' 33.7"
69	N22° 09' 16.5"	E70° 14' 33.6"
70	N22° 09' 22.5"	E70° 14' 38.6"
252	N22° 04' 07.2"	E70° 08' 56.0"
998	N22° 02' 31.7"	E70° 10' 09.4"
999	N22° 02' 24.5"	E70° 10' 16.6"
1000	N22° 02' 15.8"	E70° 10' 17.9"
1001	N22° 02' 07.9"	E70° 09' 47.2"
1002	N22° 02' 14.5"	E70° 09' 47.4"
1003	N22° 02' 20.7"	E70° 09' 46.6"
1004	N22° 02' 26.3"	E70° 09' 47.7"



1006	N22° 02' 41.2"	E70° 09' 43.9"
1007	N22° 01' 56.9"	E70° 09' 13.1"
1008	N22° 02' 03.7"	E70° 09' 14.0"
1009	N22° 02' 11.9"	E70° 09' 16.0"
1010	N22° 02' 18.1"	E70° 09' 16.0"
1011	N22° 02' 24.2"	E70° 09' 15.9"
1012	N22° 02' 30.1"	E70° 09' 18.6"
1013	N22° 02' 36.7"	E70° 09' 20.5"
1014	N22° 02' 43.4"	E70° 09' 24.4"
1017	N22° 03' 07.0"	E70° 09' 20.7"
1018	N22° 03' 22.5"	E70° 08' 55.7"
1020	N22° 03' 59.7"	E70° 08' 58.1"
1023	N22° 03' 38.8"	E70° 08' 44.9"
1024	N22° 03' 30.5"	E70° 08' 37.3"
1025	N22° 03' 25.2"	E70° 08' 40.8"
1026	N22° 03' 18.4"	E70° 08' 39.5"
549	N22° 04' 06.1"	E70° 05' 24.9"
550	N22° 04' 11.9"	E70° 05' 21.1"
551	N22° 04' 20.5"	E70° 05' 20.9"
552	N22° 04' 26.9"	E70° 05' 18.6"
536	N22° 04' 50.1"	E70° 05' 50.6"
553	N22° 04' 33.8"	E70° 05' 17.8"
1038	N22° 01' 45.9"	E70° 05' 42.6"
