



**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:**

Title: Green House Gas Abatement through installation of a wind power project for export to the Grid.

Version: 04

Date: 08/12/2011

**A.2. Description of the project activity:**

India Power Corporation Limited (IPCL) was set up with the main objective of developing and setting up power projects and generation, distribution and supply of Power. The company has invested in various clean power generation schemes. The project activity of a wind based power project is one such initiative of IPCL.

The project activity involves installation of multiple wind energy based electricity generation facilities. The project proponent has installed 31 nos. wind energy based electricity generation units of 800 kW capacities each (a total of 24.8MW). The electricity generated in the project activity will be wheeled to the Western Regional Grid<sup>1</sup>.

In absence of the project activity, an equivalent amount of electricity would have been generated by the power plants connected to the Western Regional Grid.

The project activity thus displaces around 53,165 MWh (considering 2% auxiliary consumption) per annum of electricity from the Western Regional Grid by a clean renewable source. The project activity thus results in reduction of around 48380 tCO<sub>2</sub> (tons of carbon dioxide) per annum and over the ten year crediting period will result in reduction of around 483800tCO<sub>2</sub>.

**Project's Contribution to Sustainable Development**

The contribution of the project activity towards Sustainable Development of India is discussed below:-

**Environmental well being:**

- Usage of clean source (wind energy) for generation of electricity
- Reduction in GHG emissions

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<sup>1</sup> As per the recent CEA Guidelines – Users Guide Version 4 the Western Regional Grid has been made a part of the NEWNE Grid (covering former Northern, Eastern, Western and North-Eastern regions). Hence for Emission Reduction Computations the Emission Factor of this NEWNE Grid shall be taken. For the references to the project activity, however the description shall include export of power to the Western Regional Grid (which is a part of the NEWNE Grid).



- Conservation of non-renewable fuel resources (coal)
- Reduction in air borne SPM and pollutants(SO<sub>x</sub> and NO<sub>x</sub>) in ambient air
- Sustainable development of the host country-India

Economic well being:

- The implementation of the project activity has also brought about an increase in the business opportunities for contractors, suppliers and erectors at different phases of its implementation

Social well being:

- Helping in electrification of rural areas in India
  - Enhancing local employment and capacity building in the vicinity of the project, which is a rural area;
- In addition to this, the project proponent, India Power Corporation Limited, who will own the generated CERs from the CDM project activity, will contribute 2% of the revenue realised from the sale of CERs towards different society/community development programmes as per the scheme developed (please refer to Annexure-A for the same). Such expenditure will be made within one year post realization of revenues from the sale of CERs. The details of such expenditure made will be included in the monitoring report for the period following the transaction. The same can be verified by the DOE at the time of verification through the Annual Report of the Company/a certificate from the statutory auditor/a certificate from a Chartered Accountant.

Technological well being:

- The project activity involves power generation from clean technology and therefore will have minimal associated GHG emissions. This will assist in accelerating the commercialization of renewable energy technologies.

**A.3. Project participants:**

<b>Name of Party involved (*) ((Host) indicates a host Party)</b>	<b>Private and/or public entity(ies) project participants (*) (as applicable)</b>	<b>Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)</b>
India (Host)	India Power Corporation Limited	No

**A.4. Technical description of the project activity:****A.4.1. Location of the project activity:****A.4.1.1. Host Party(ies):**

India

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

Western Region/ Gujarat

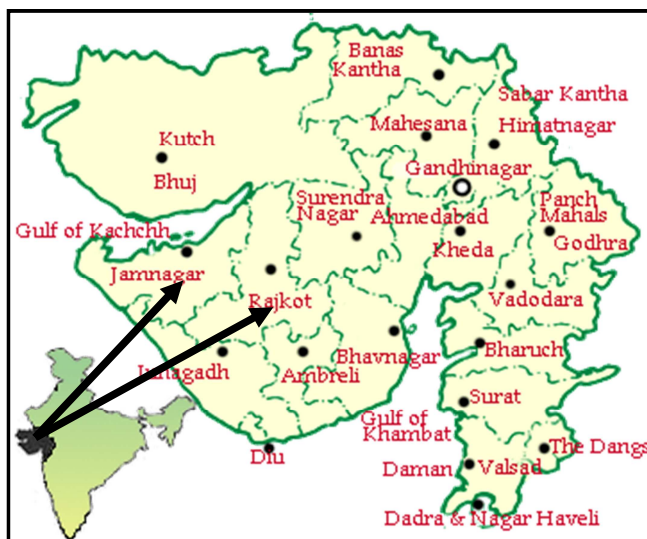
**A.4.1.3. City/Town/Community etc.:**

Haripar, Umrala and Methan villages in Jamnagar District and Vadali village in Rajkot District



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

The site is near village Sumana in district Jamnagar, Gujarat Coordinates: Latitude-22°28' North, Longitude -70°06' East). The site is located about 45 Km to the South of Jamnagar and nearly 80 Km to 100 Km from the west coast. The site is well connected by road network and the nearest railway station is Jamnagar railway station nearly 50 Km from project site. The nearest airport is the Jamnagar Airport nearly 60 Km from project site. The location of the corresponding wind turbines in different areas are listed in a table in Annexure B.



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

The project activity involves generation of electricity from a renewable energy source – wind. The electrical energy generated by the project activity replaces the energy generated from the fossil fuel based power plants connected to the Western Regional Grid. The project activity falls in Scope Number 1; Sectoral Scope - Energy industries (renewable - / non-renewable sources)<sup>2</sup>. The Approved Consolidated Methodology ACM0002/Version 12.1.0 has been adopted for the project activity. . As per the methodology guidance the baseline and monitoring methodologies are used for accreditation by Designated Operational Entities (DOE's).

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

The project activity involves setting up of 31 nos. 800 KW rated capacity (a total of 24.8MW considering all the facilities) of wind based electricity generation units. The kinetic energy of the wind blowing in the atmosphere is used to generate electricity by rotating the blades of the wind mills installed for the purpose. The mechanical energy generated by the rotation of the blades of the wind mills are used to rotate the turbines to generate electricity.

The electricity generated from the 31 nos. wind energy based electricity generation facilities (generated at 0.4KV and stepped upto 33KV) at

Villages: Methan,Umarala,Haripar at Jamnagar District

And

Village: Vadali at Rajkot District

is wheeled to the substation at Moti Paneli, Jamnagar (where it is further stepped up to 220 KV) from where it is dispatched to the Western Regional Grid.

The technical specifications of the wind energy based electricity generation units are mentioned below:

1. Turbine Model	Enercon E-48
2. Rated Power	800KW
3. Rotor diameter	48m
4. Hub height	56m (Steel Tower)
5. Turbine Type	Gearless horizontal axis wind turbine

<sup>2</sup> <http://cdm.unfccc.int/DOE/scopes.html>



	with variable rotor speed
6. Power regulation	Independent electromechanical Pitch system for each blade
7. Cut-in Wind Speed	3m/s
8. Rated Wind Speed	12m/s
9. Cut-out Wind Speed	28-34m/s
10. Extreme Wind Speed	59.5m/s
11. Rated Rotational Speed	31.5rpm
12. Operating range rotational speed	16-31.5 rpm
13. Orientation	Upwind
14. No. of blades	3
15. Blade Material	Glass Fibre reinforced Epoxy
16. Gear box type	Gear less
17. Generator type	Synchronous Generator
18. Braking	Aerodynamic
19. Output Voltage	400V
20. Yaw System	Active yawing with 4 electric Yaw drives with brake motor And friction bearing
21. Tower	56 m Steel

The project proponent thus generates a total of around 53,165 MWh annually of electrical energy from the 31 facilities for export to the Western Regional Grid.

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

<b>Years</b>	<b>Annual estimation of emission reductions in tonnes of CO<sub>2</sub> e</b>
1 January 2012-31 December 2012	48 380
1 January 2013-31 December 2013	48 380
1 January 2014-31 December 2014	48 380
1 January 2015-31 December 2015	48 380
1 January 2016-31 December 2016	48 380
1 January 2017-31 December 2017	48 380
1 January 2018-31 December 2018	48 380
1 January 2019-31 December 2019	48 380
1 January 2020-31 December 2020	48 380
1 January 2021-31 December 2021	48 380
<b>Total estimated reductions (tonnes of CO<sub>2</sub> e)</b>	<b>483 800</b>
<b>Total number of crediting years</b>	<b>10</b>
<b>Annual average over the crediting period of estimated reductions ((tonnes of CO<sub>2</sub> e)</b>	<b>48 380</b>

**A.4.5. Public funding of the project activity:**

No public funding from Annex-1 countries is available for this project activity.



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

Title: Consolidated baseline methodology for grid-connected electricity generation from renewable sources

Reference: Approved Consolidated Baseline Methodology ACM0002 / Version 12.1.0, (Sectoral Scope: 1)

*Tool for demonstration and assessment of additionality*, version 5.2 adopted at EB39 Annex 10.

*Tool to determine remaining lifetime of equipment*, version 1.

*Tool to calculate the emission factor for an electricity system*, version 2.2.0 adopted at EB 61 Annex 12.

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

As per the applicability conditions of the Approved Consolidated Baseline Methodology- ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, Version 12.1.0,

*This methodology is applicable to grid-connected renewable power generation project activities that install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant).*

The project is a green field project where no renewable energy power plant was present in the installation site before the project activity was installed.

The methodology is applicable under the following conditions:

*The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;*

The project activity as elucidated in Section A.2 of the PDD involves installation of wind based electricity generation units in Gujarat. Hence the methodology is applicable to the project activity.



*In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;*

The project activity does not involve capacity addition. The project activity involves setting up Greenfield wind energy based power generation facilities. Hence this condition is not applicable.

*In case of hydro power plants, one of the following conditions must apply:*

- *The project activity is implemented in an existing reservoir, with no change in the volume of reservoir.*
- *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section is greater than 4 W/m<sup>2</sup>.*
- *The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m<sup>2</sup>.*

The project activity does not involve generation of electricity from hydro power sources. Hence this condition is not applicable to the project activity.

*This methodology is also not applicable to the following:*

*Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;*

The project activity involves generation of electricity in wind power plants (as explained in Section A.2) and subsequent export to the Western Regional Grid. The project activity does not involve switching from fossil fuel source in an existing power plant to renewable sources. Hence this condition is not applicable to the project activity.

*Biomass fired power plants;*

The project activity does not involve Biomass fired power plants but wind based power generation sources. Hence this condition is not applicable to the project activity.

*Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m<sup>2</sup>*

The project activity does not involve installation of Hydro Power plants but wind energy based power generation facilities. Hence this condition is not applicable to the project activity.

Since the above three conditions are not applicable to the project activity, the project activity is concurrent to the methodology.



*In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.*

The project activity does not involve retrofits/replacements, or capacity additions. Hence this condition is not applicable.

The project activity therefore is concurrent with the relevant applicability criteria stated in ACM0002/Version 12.1.0 and hence is utilized for determining the baseline and deciding upon the monitoring plan.

<b>B.3. Description of the sources and gases included in the <u>project boundary</u>:</b>
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As per the definition of project boundary of ACM0002, *“the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to”.*

The project boundary for the project activity encompasses the physical and geographical site of the project activity site at the project location specified in Section A.4.1.4. This includes the wind energy based electricity generation units at

Villages: Methan, Umarala, Haripar at Jamnagar District

And

Village: Vadali at Rajkot District.

and the substation at Moti, Paneli, Jamnagar from which the electricity is wheeled to the Western Regional Grid.

The project boundary also includes the NEWNE (Integrated Northern, eastern, western and north-eastern) Grid and the power plants connected to it.

A diagrammatic representation of the project boundary is provided below:



In accordance with the methodology the following emission sources are considered for determination of baseline and project emissions:

Table-B.1: Overview on emission sources included in or excluded from the project boundary				
	Source	Gas	Included/Excluded	Justification/ Explanation
Baseline	CO <sub>2</sub> emissions from electricity generation in grid connected fossil fuel fired power plants that are displaced due to the project activity.	CO <sub>2</sub>	Included	Main emission source.
		CH <sub>4</sub>	Excluded	Minor emission source
		N <sub>2</sub> O	Excluded	Minor emission source
Project activity	For geothermal power plants, fugitive emissions of CH <sub>4</sub> and CO <sub>2</sub> from noncondensable gases contained in geothermal steam.	CO <sub>2</sub>	Not Applicable	Not applicable since the project activity does not entail installation of a geothermal power plant. <i>(Please refer to Section A.2 of this PDD).</i>
		CH <sub>4</sub>	Not Applicable	
		N <sub>2</sub> O	Not Applicable	
	For geothermal power plants, CO <sub>2</sub> emissions from combustion of fossil fuels required to operate the geothermal	CO <sub>2</sub>	Not Applicable	Not applicable since the project activity does not entail installation of a geothermal power plant. <i>(Please refer to Section A.2 of this PDD).</i>
		CH <sub>4</sub>	Not Applicable	
		N <sub>2</sub> O	Not Applicable	



	power plant.			
	For hydro power plants, emissions of CH <sub>4</sub> from the reservoir.	CO <sub>2</sub>	Not Applicable	Not applicable since the project activity does not entail installation of a hydro power plant. <i>(Please refer to Section A.2 of this PDD).</i>
		CH <sub>4</sub>	Not Applicable	
		N <sub>2</sub> O	Not Applicable	

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

The project activity involves installation of wind based power generation facilities. The power generated is subsequently wheeled to the Western Regional Grid, which is part of the NEWNE grid.

The said wind power project being a Greenfield project and since the project activity does not modify or retrofit an existing electricity generation facility, the baseline scenario is defined in ACM0002 (Version 12.1.0) methodology.

*If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:*

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

The project activity would displace an equivalent amount of electricity that would have been drawn from the NEWNE (Integrated Northern, Eastern, Western and North-eastern) Grid generation-mix. Since the displaced electricity generation is the element that is likely to affect both the operating margin in the short run and the build margin in the long run, electricity baselines should reflect a combination of these effects. Therefore an ideal baseline approach is envisaged as the one that combines both Operating and Build Margin. In case of the project activity, a combined margin (CM) emission factor, calculated according to the procedures prescribed in the latest version of “Tool to calculate the emission



factor for an electricity system” and publicly available in the official website of Central Electricity Authority (CEA), has been used for arriving at the baseline.

The baseline emissions and the emission reductions from the project activity are estimated based on the quantum of electricity to be exported by the project activity to the NEWNE (Integrated Northern, Eastern, Western and North-eastern) Grid and the Baseline Emission Factor of the chosen grid calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors.

STEP 1. Calculate the Operating Margin Emission Factor ( $EF_{OM,y}$ )

STEP 2. Calculate the Build Margin Emission Factor ( $EF_{BM,y}$ )

STEP 3. Calculate the Combined Margin Emission Factor ( $EF_y$ )

In case of the project activity, the baseline emission factor ( $EF_y$ ), consisting of the combination of operating margin emission factor and build margin emission factor, is calculated according to the procedures prescribed in the latest version of “Tool to calculate the emission factor for an electricity system” and operation margin and build margin data publicly available in the official website of Central Electricity Authority (CEA), has been used for arriving at the baseline.

As per latest version of “Tool to calculate the emission factor for an electricity system”, the baseline emission factor  $EF_y$  is calculated as the weighted average of the Operating Margin emission factor ( $EF_{OM,y}$ ) and the Build Margin emission factor ( $EF_{BM,y}$ ):

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y}$$

$$EF_y = 0.75 \times 1.01 + 0.25 \times 0.60 = 0.91 \text{ tCO}_2/\text{MWh.}$$

where the weights  $w_{OM}$  and  $w_{BM}$ , by default, are 50% (i.e.,  $w_{OM} = w_{BM} = 0.5$ ), and  $EF_{OM,y}$  and  $EF_{BM,y}$  are calculated as described in Steps 1 and 2 above and are expressed in tCO<sub>2</sub>/MWh.

For wind and solar projects, the default weights are as follows:  $w_{OM} = 0.75$  and  $w_{BM} = 0.25$  (owing to their intermittent and non-dispatchable nature).

Details of the baseline emission factor calculations have been provided in Annex 3.

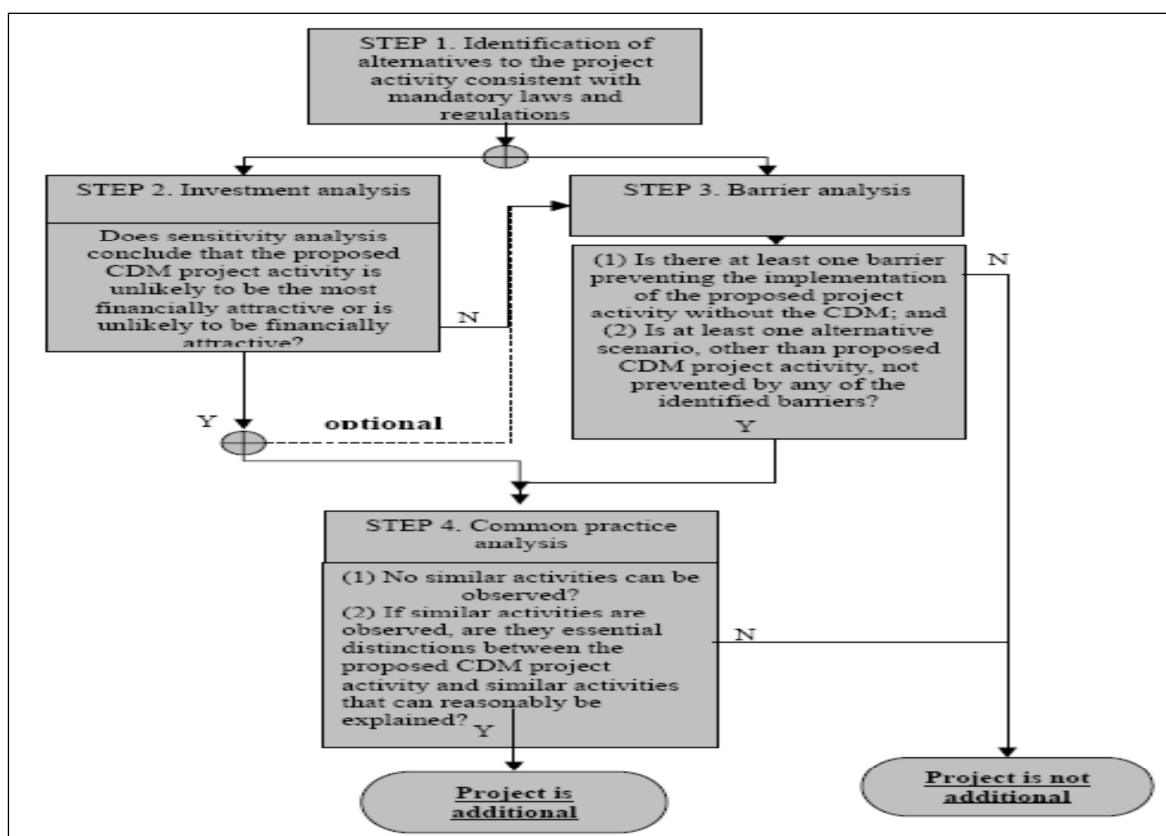


**B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):**

As per the decision 17/cp.7 para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

The methodology requires the project activity to determine its additionality based on the “Tool for the demonstration and assessment of additionality” (Version 05.2, EB 39)

The flowchart presented in next page provides a step-by-step approach to establishing additionality of the project activity





IPCL will be establishing the additionality of the project activity in the following manner:

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

In Sub-step 1a (Define alternatives to the project activity) and Sub-step 1b (Consistency with mandatory laws and regulations), IPCL is required to identify the realistic and credible alternative(s) that will provide output or services comparable with the project activity. These alternatives are required to be in compliance with all applicable legal and regulatory requirements.

The identification of alternatives for power generation as well as their compliance with the current laws and regulations has been dealt in details in Section B.4 of the Project Design Document. Both the alternative (a) Electricity generation by the Grid Connected Power Plants as well as the project option (*i.e.* Wind based power generation) are in line with the current laws and regulations those are enforced in the host country-India. Therefore IPCL could have implemented either of the alternative (a) or the project activity. However implementation of the project activity without CDM revenue is not a feasible alternative for the project proponent. The same has been illustrated below through ‘Investment Analysis’.

Investment analysis:-

As per the investment analysis, the project proponent is required to determine whether the project activity is financially attractive without the revenue from the sale of Certified Emission Reductions (CERs). To conduct the investment analysis, IPCL is required to use the following sub-steps:

Sub-step 2a: Determine appropriate analysis method

The project activity involves generation of electricity and subsequent export to the Western Regional Grid. Hence the project activity has financial implications other than those related to CDM. Therefore, ‘Option-I: Simple cost analysis’ would not be an appropriate analysis method.

Out of the remaining two options ‘Option-II: Investment Comparison Analysis’ and ‘Option-III: Benchmark Analysis’ the project proponent intends to conduct ‘Benchmark Analysis’ to determine the financial attractiveness of the project activity. This is because the only alternative to the project activity is generation of electricity from grid connected power plants. Hence the medium of assessment for the project proponent would revolve around assessing the attractiveness of the project when compared to a ‘benchmark’ to decide on the justification for





investments pertinent to the installation and subsequent operation and maintenance of the project. The Internal Rate of Return (IRR) for the project activity has been considered as the financial indicator to assess the financial attractiveness of the project activity.

#### Sub-step 2b. – Option III. Apply Benchmark analysis

IPCL conducted benchmark analysis by calculating the IRR of the project activity. The project proponents have calculated the IRR for the project activity without the CDM benefits and it has been manifested that *sans* the benefits implementation of the project activity would not have been financially attractive. All relevant assumptions used for the investment analysis have been provided below:-

#### Sub-step 2c. Calculation and comparison of financial indicators

The IRR for the project activity was found to be 9.38% which was found to be much less than the benchmark of 11.25%, which was the Prime Lending Rate<sup>3</sup> of the Reserve Bank of India (RBI) during the time, the project was approved by the board of IPCL

The IRR of the project activity without CDM revenues was calculated based on the following aspects:

Assumptions for IRR Calculation		
Sl no.	Parameters	Value
1.	Project Size	24.8 MW <sup>4</sup>
2.	Auxiliary consumption	2%
3.	Total capital cost of the project	INR 1271.0 Million <sup>5</sup>
4.	Estimated generation	54250000 kWh <sup>6</sup>
5.	O&M expenses	15.674 million INR <sup>7</sup>
6.	Escalation on O & M charges	5% every year <sup>8</sup>

<sup>3</sup> <http://www.rbi.org.in/scripts/WSSView.aspx?Id=10532>

<sup>4</sup> SREICORE/IPCL/001/2006-07 – Dated 05.09.2006 – Supply of Enercon Machine

<sup>5</sup> Capital Investment: INR 12710 Lakhs – Source Document: Purchase Orders for Karnataka project:

- SREICORE/IPCL/001/2006-07 – Dated 05.09.2006 – Supply of Enercon Machine

- SREICORE/IPCL/002/2006-07 – Dated 05.09.2006 – Supply of Steel Tower

- SREICORE/IPCL/003/2006-07 – Dated 05.09.2006 – Supply of Transformer

- SREICORE/IPCL/004/2006-07 – Dated 05.09.2006 – Erection, Commissioning and Installation

- SREICORE/IPCL/005/2006-07 – Dated 05.09.2006 – Statutory Expenses and transportation charges (contains (a) Energy certification charges of Rs.248000 per year (GEDA permission; document reference no.

GEDA/IPCL/PWF/UMARALA/2006-07/7935, (b)Transmission lines O&M charges (associated payment document to GETCO submitted to the DOE,(c) Other charges of Rs. 99000 (payment document submitted to the DOE)

- SREICORE/IPCL/006/2006-07 – Dated 05.09.2006 – Civil and Electrical Works

The Depreciation is considered to be 5.28% in the Straight Line Method and 80% in WDV Method ([www.fastfacts.co.in/resources/DepCoAct.rtf](http://www.fastfacts.co.in/resources/DepCoAct.rtf) & <http://personal.vsnl.com/urunhomepage/business.htm> )

<sup>6</sup> Generation estimate as provided by Enercon (WEGWEG Supplier)

<sup>7</sup> Operation Contract between ENERCON and IPCL

<sup>8</sup> Operation Contract between ENERCON and IPCL



7.	Escalation on administrative charges	4.5% every year
8.	Electricity purchase tariff rate	INR 3.37 per kWh <sup>9</sup>
9.	Annual escalation on tariff rate	Nil
10.	Administrative Expenses	1% of capital cost
11.	Other Costs	INR 0.9 million

Other cost includes the following:

i.	Annual Electrical Inspection	INR Lacs	1.33
ii.	O&M charges for dedicated transmission Lines	INR lacs	3.62
iii.	Energy certification charges	INR lacs	2.48
iv.	Land Lease rent	INR lacs	1.59

#### Sub-step 2d.Sensitivity Analysis:-

The project activity of IPCL was found to be sensitive to the following two parameters:-

- Capital cost
- Total generation (PLF)

The sensitivity analysis was conducted for scenarios with variations in each one of the above - mentioned factors and for scenarios with variations in all the above-mentioned factors simultaneously in order to assess the financial attractiveness of the project activity under such circumstances.

S No.	Parameter	Change	IRR	Comments
1.	Change in capital cost	+10%	7.97%	The IRR of the project activity is lower than the benchmark.
		-10%	11.05%	The IRR of the project activity is lower than the benchmark. The IRR of the project activity is found to equal the benchmark if there is a 11.1% decrease in Capital Cost. The

<sup>9</sup> <http://www.gercin.org/docs/Orders/Nonconv%20orders/Year%202006/wind%20enrgy%20tariff.pdf>



				chances of that occurrence can be neglected as the actual purchase orders placed to the vendor are worth INR 1255.5 Million, which is 98.8% of the project cost envisaged at the time of approval. The breakups of the cost and relevant supporting documents have already been submitted to the validators.
2.	Change in total generation	+10%	10.89%	The IRR of the project activity is lower than the benchmark. Achieving a PLF 12.35% more than what is expected is very unlikely. The PLF as envisaged from the generation estimate provided by the WTG supplier was 24.97% <sup>10</sup> . Whereas the generation data for last six months (July 2010 – Jan 2011) show that the project has not achieved a PLF of 24.97% as envisaged in any of its location apart from for some very few numbers of WEGs in very cases. Apart

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<sup>10</sup> Generation estimate provided by Enercon dated 27 July 2006



				<p>from these the PLF estimation report<sup>11</sup> prepared, based on generation and wind data of 2004-2007, by a third party contracted by the project proponent as per the guidance on PLF, EB 48 Annexure 11 paragraph 3(b), which states that “<i>The plant load factor determined by a third party contracted by the project participants (e.g. an engineering company)</i>”, shows the PLF to be 20.30%. This estimated PLF is 18.7% lower than the envisaged PLF as taken during the financial assessment as per the generation estimate supplied by the WTG supplier. Therefore variations in IRR due to sustained increase generation is not a real case which can be considered for decision making purpose</p>
		-10%	7.61%	The IRR of the project activity is lower than the benchmark.

<sup>11</sup> IPCL\_PLF Determination Report\_TWIC.pdf



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The results of the sensitivity analysis conducted confirm that the financial internal rate of return of the project activity without CDM revenues is lower than that which would make the project financially viable for the investors

Step 4: Common practice analysis

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

The following table indicates the state wise wind power potential in India vis a vis the total capacity installed as on 2007-08<sup>12</sup>:

Sl. No.	State	Gross Potential (MW)	Installed Capacity (MW)
1.	Andhra Pradesh	8275	126.85
2.	Gujarat	9675	1254.84
3.	Karnataka	6620	1030.12
4.	Kerala	875	11.05
5.	Madhya Pradesh	5500	125.84
6.	Maharashtra	3650	1756.38
7.	Orissa	1700	-
8.	Rajasthan	5400	542.10
9.	Tamil Nadu	3050	3847.72
10.	West Bengal	450	1.75
12.	Total	45195	8696.63

The state of Gujarat has the highest gross potential for wind power generation among all other states; however the installed capacity in the state is much lesser than states such as Tamil Nadu, Maharashtra and Karnataka .This shows setting up of wind power plants is not a common practice in the state of Gujarat.

Furthermore, as on March, 2007, the total installed capacity in the state of Gujarat from all the generation sources was 10490.79 MW, when compared to a total wind power generation capacity of

<sup>12</sup> [www.windpowerindia.com/statstate.html](http://www.windpowerindia.com/statstate.html), [www.windpowerindia.com/statest.html](http://www.windpowerindia.com/statest.html)



674.36 MW<sup>13</sup>. Hence, the paltry share of 6.42% of wind power generation out of the total generation clearly points to the fact that setting up wind power projects is not a preferred option in Gujarat.

Also, the prevailing practice in the state of Gujarat is the implementation of wind farms for the purpose of generation of electricity to utilize it for captive consumption at their respective industries. The above can be substantiated by the GETCO<sup>14</sup> order which clearly 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 was exported. The balance generation was for captive consumption.”

Among the wind energy based generation that involved export, the projects comparable with the project activity of IPCL was considered. The project of IPCL is a 24.8 MW wind power project where the electricity is exported. Hence, for this particular case, similar project can be defined as a large scale project activity with capacity greater than 15MW.

The types of projects which were excluded from the above category of similar projects are as follows:-

1. Exclusively captive power projects, since the main purpose of a captive power project is to meet the power requirements of a certain industry. In this case the baseline scenario would be entirely different and the risks would be different from an investor setting up power plants with the sole objective of selling power to the grid.
2. Small scale wind power projects which have been bundled together to form a large scale CDM project have been left out of the analysis, since the scale of these projects and the scale of the investment is not comparable to the concerned large scale project.
3. Also, project activities which are seeking additional funding under the heads of the CDM revenue or other VER routes have been excluded from this list keeping in lines with the definition of similar projects.
4. Project activities implemented post the investment decision for the project activity, since as per the guidelines of the common practice analysis, only those projects can be compared which are under operation at the prior to the start of the proposed project activity.

If we analyze the list of wind power projects in the state of Gujarat, we can see that the majority of the projects have a large scale projects implemented. The only large scale wind power projects in the state were:-

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<sup>13</sup> Annual Report 2006-07 Ministry of Power : Central Electricity Authority July 2007 ;Annexure 10B

<sup>14</sup> GETCO Tariff Order dated 6<sup>th</sup> May 2006



Investor name	Capacity (MW)	I. Comments
Gujarat Guardian Ltd.	31.6	<p>The project activity is considering carbon finance options and has already received carbon benefits through the voluntary emission reductions (VER) route:-</p> <p><a href="http://www.carbonneutral.com/cnregistry/uploaded/Jamnagar%20Wind%20Power%20Projects%20PDDs.pdf">http://www.carbonneutral.com/cnregistry/uploaded/Jamnagar%20Wind%20Power%20Projects%20PDDs.pdf</a></p> <p>A total of 23.2 MW capacities is included under the VER route and the remaining capacity of 8.4 MW is obviously less than 8.4 MW which is less than the mandatory size of 15 mw. Hence, the same can be left out from the domain of our analysis.</p>
Patnaik Minerals Pvt. Ltd.	30.2	<p>This particular project has applied for CDM funding, and hence has been left out of our analysis.</p> <p><a href="http://cdm.unfccc.int/Projects/Validation/DB/GQ56N39MLSZ9QDRL6RUF5YJSFDPD1U/view.html">http://cdm.unfccc.int/Projects/Validation/DB/GQ56N39MLSZ9QDRL6RUF5YJSFDPD1U/view.html</a></p>
Indian Petrochemicals Company Limited	15.315	<p>This particular project is a captive power project and the same can be identified from the following web-link:-</p> <p><a href="http://sebidifar.nic.in/documents/IPCL/ar032002.pdf">http://sebidifar.nic.in/documents/IPCL/ar032002.pdf</a></p> <p>Hence, this project has been left out from the domain of common practice analysis</p>
Gujarat NRE Coke	1.25+26.25=27.5	<p>This particular project activity has also considered CDM benefits and is currently pursuing the same as can be seen from the link :-</p> <p><a href="http://cdm.unfccc.int/Projects/Validation/DB/OW17ZTWQUDGVXQGE059WCBOC9C6L1R/view.html">http://cdm.unfccc.int/Projects/Validation/DB/OW17ZTWQUDGVXQGE059WCBOC9C6L1R/view.html</a> and</p> <p><a href="http://cdm.unfccc.int/Projects/Validation/DB/2WHFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html">http://cdm.unfccc.int/Projects/Validation/DB/2WHFROEPK85ARNQ1TVKJV4WC8ATMAB/view.html</a></p> <p>Since, the project activity is under CDM, it has been excluded from common practice analysis</p>
Ratnamani Metals and tubes Limited	17.5 MW	<p>The project activity has been implemented in two phases. The first phase of around 5 MW has been included under two bundled CDM project activities and post these bundled projects, the second phase consisting of 13.25 MW has been proposed as a separate CDM project</p>



		<p>activity implemented post January 2007, which is well after the timing of the investment decision for this particular project activity</p> <p>The concerned link is:-</p> <p><a href="http://indscanblog.com/tag/ratnamani-metals-and-tubes-ltd/">http://indscanblog.com/tag/ratnamani-metals-and-tubes-ltd/</a></p>
Hindustan Zinc Ltd.	88.8 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/UserManagement/FileStorage/UN7AJ9KYTE85H60PC3FRO4GDXI2LVM">http://cdm.unfccc.int/UserManagement/FileStorage/UN7AJ9KYTE85H60PC3FRO4GDXI2LVM</a></p>
GACL	23.75 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/UserManagement/FileStorage/AE5VZYW142306BCUXKHM8IDOS9NTLJ">http://cdm.unfccc.int/UserManagement/FileStorage/AE5VZYW142306BCUXKHM8IDOS9NTLJ</a></p>
Gujarat Paguthan Energy Corp. Ltd.	50.4 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/UserManagement/FileStorage/JNH59TDF3CO61AYG7XZWSKELR8VP2I">http://cdm.unfccc.int/UserManagement/FileStorage/JNH59TDF3CO61AYG7XZWSKELR8VP2I</a></p>
Gujarat Flurochemicals Ltd.	23.1 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/Projects/Validation/DB/QRRSZJM73N47W1JXJTC60X1ZN151C8/view.html">http://cdm.unfccc.int/Projects/Validation/DB/QRRSZJM73N47W1JXJTC60X1ZN151C8/view.html</a></p>
MSPL Group	30 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/UserManagement/FileStorage/TQ6XACL8AORS2WS6EJFK1DMCWKPT0H">http://cdm.unfccc.int/UserManagement/FileStorage/TQ6XACL8AORS2WS6EJFK1DMCWKPT0H</a></p>
SREI	24.8 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/Projects/Validation/DB/K0ZTRSQUQH8WZN76AA11ZAZW16BPNH/view.html">http://cdm.unfccc.int/Projects/Validation/DB/K0ZTRSQUQH8WZN76AA11ZAZW16BPNH/view.html</a></p>
IOCL	21 MW	<p>The concerned project activity has also applied for CDM revenues.</p> <p>The concerned link is</p> <p><a href="http://cdm.unfccc.int/UserManagement/FileStorage/1YRNA0GPF9K">http://cdm.unfccc.int/UserManagement/FileStorage/1YRNA0GPF9K</a></p>





		<a href="#">ME6XHIT23OUJZQB8SV4</a>
Nishkalp Investment & Trading	21.5 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/Projects/DB/.../X2ED94JWNJUGOK0C13ALQG6BWSQNES">http://cdm.unfccc.int/Projects/DB/.../X2ED94JWNJUGOK0C13ALQG6BWSQNES</a>
Aarvee Denims & Exports Ltd.	18 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/UserManagement/FileStorage/87A0BK6EZUR53VIFMHCQNDJO9PX4LG">http://cdm.unfccc.int/UserManagement/FileStorage/87A0BK6EZUR53VIFMHCQNDJO9PX4LG</a>
Surajbari Windfarm Development Private Ltd.	16.5 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/UserManagement/FileStorage/XV9ZK78N40SLABET6UMFJPG3OW2YHQ">http://cdm.unfccc.int/UserManagement/FileStorage/XV9ZK78N40SLABET6UMFJPG3OW2YHQ</a>
Apollo Tyres Ltd.		The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://www.cdmindia.nic.in/cdmindia/project.select.jsp?lowerLimit...">http://www.cdmindia.nic.in/cdmindia/project.select.jsp?lowerLimit...</a>
ONGC	51 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/UserManagement/FileStorage/IL7MJ2816HX5VE0PTQWBNKAGAUDZ4S">http://cdm.unfccc.int/UserManagement/FileStorage/IL7MJ2816HX5VE0PTQWBNKAGAUDZ4S</a>
CLP Wind Farms	50.4 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/UserManagement/FileStorage/XABP8WN7Q0TMYZLKE9D1I2HCR543S6">http://cdm.unfccc.int/UserManagement/FileStorage/XABP8WN7Q0TMYZLKE9D1I2HCR543S6</a>
Indian Renewable Energy Foundation	16.875 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/Projects/Validation/DB/1DSKUBDHD0AFU0HA7VDPTW2JM8CZ8E/view.html">http://cdm.unfccc.int/Projects/Validation/DB/1DSKUBDHD0AFU0HA7VDPTW2JM8CZ8E/view.html</a>
DLF Ltd.	150 MW	The concerned project activity has also applied for CDM revenues. The concerned link is <a href="http://cdm.unfccc.int/UserManagement/FileStorage/OX25BNHS6G10CG1TRTH48C0XYTDT0P">http://cdm.unfccc.int/UserManagement/FileStorage/OX25BNHS6G10CG1TRTH48C0XYTDT0P</a>



It can be seen that all the aforementioned similar projects are presently under advance stages of the CDM process. Hence, these projects should be excluded from the comparison of similar project activities.

And the rest of the projects are of very small size (<15 MW). Thus it can be inferred that the prevailing practice in the state of Gujarat is the implementation of small scale wind farms with large scale wind power projects being implemented only after taking into account CDM revenue.

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

The additionality tool states 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 or faces barriers.

On the basis of the analysis carried out in Sub-step 4a, it can be seen that:-

- (1) Similar activities i.e. non CDM wind projects are not widely observed
- (2) Further to this non CDM projects of project size greater than 15 MW selling electricity to the 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

**Chronology of the 24.8 MW wind power project:-**

<b>Chronology of Events for "Green House Gas Abatement through installation of a 24.8MW wind based power project for export to the Grid."</b>				
<b>Sl. No.</b>	<b>Classification</b>	<b>Milestone</b>	<b>Date</b>	<b>Comment</b>
1	<b>Board approval of the project</b>	The board of IPCL approves the shifting of a wind farm project from Karnataka to Gujarat	27-Oct-06	The board made the decision taking into account CDM revenue
2	<b>Purchase Orders</b>	Amendment to the Purchase Order placed for Karnataka to shift the project to Gujarat	6-Dec-06 and 13-Dec-06	Purchase Order for the Karnataka project was placed to the WTG supplier on 05 Sep 2006.
3	<b>Appointment of CDM consultant</b>	CDM consultant appointed for the wind power project	27-Feb-07	



4	<b>Commissioning</b>	Commissioning of the Wind Farm in Gujarat (total capacity commissioned is 21.6 MW)	13-Mar-07	Letter from GEDA dated 23 March 2007
5		Commissioning of the Wind Farm in Gujarat (total capacity commissioned is 3.2 MW)	27-Mar-07	
6		Communication from IPCL to their CDM consultant enquiring about the status of their CDM power project	10-Apr-07	
7	<b>PPA signed</b>	PPA signed between IPCL and Gujarat Urja Vikas Nigam Limited (GUVNL)	24-Apr-07	This PPA indicates a CDM revenue sharing clause between GUVNL and the project proponent
8	<b>Dissatisfaction with their CDM Consultant regarding their performance as CDM consultant</b>	Communication from IPCL to their CDM consultant stating that neither PIN nor PDD has not been submitted yet	23-May-07	
9		Their CDM consultant replies back that they are busy with the Karnataka CDM project, thus preventing them from devoting enough time for Gujarat CDM project of IPCL	14-Jun-07	
10	<b>Validation quote received from a validator</b>	Validator gives validation quotes for the concerned project	18-Jul-07	This highlights the promptness of the project proponent in trying to pursue CDM registration of their concerned project



11		IPCL tells their CDM consultant that their explanation for the delay was unsatisfactory and that they should provide them with a time schedule, failing which they will be forced to take strict actions against them	18-Aug-07	
12		The AVP-Business Development of IPCL submits resignation letter	1-Oct-07	
13		The Assistant Manager of IPCL writes to the COO asking him to review the work order given to their CDM consultant, since their work has not been satisfactory enough	3-Oct-07	Dissatisfaction with the performance of their CDM consultant grows
14		The AVP of IPCL resigns	15-Oct-07	
15	<b>Permission for cancellation of work order of their CDM consultant</b>	The COO of IPCL writes back saying the Board of directors were of the opinion that the work order to their CDM consultant be cancelled and new consultants be sought for the relevant CDM project	31-Oct-07	This cancellation forces IPCL to look for new consultants and start once again in their pursuit of CDM registration
16	<b>Offers from other CDM consultants</b>	CDM Service offerings from a consultant made to IPCL	6-Nov-07	
17		CDM service offer is sent from another consultant for the 24.8 MW project in Gujarat	19-Nov-07	



18		IPCL considers the competencies and credentials of various CDM Consultants and a note sheet is prepared for the Board's recommendation	27-Nov-07	
19	<b>Resignation of key members of IPCL</b>	The resignation letters of the Chief Operation Officer and the Company Secretary cum CFO were accepted in the Board Meeting. The Board also recommends further negotiations with one particular consultant, who by this time had also initiated discussions with IPCL.	28-Dec-07	The resignation of key personnel from IPCL was a major setback in the decision making process, as IPCL is a small organization and resignation of so many new people lands them in a fix and also delays the project further
20		The work order to the first CDM consultant for their CDM project in Gujarat is cancelled	29-Dec-07	
21		Draft Engagement letter sent to IPCL from that particular CDM Consultant recommended by the Board of IPCL	4-Jan-08	
22		The Assistant Manager of IPCL resigns	14-Jan-08	
23	<b>Appointments of new employees by IPCL</b>	IPCL appoints a new employee (in the position of Consultant) in their firm	24-Mar-08	



24		IPCL appoints a new employee (in the position of Manager)	7-Jul-08	Finally some people are appointed by IPCL, which once again starts off their CDM process, which had been lying dormant all this time
25		IPCL appoints a new employee (in the position of Senior Executive)	21-Jul-08	
26		IPCL appoints another new employee (in the position of Senior Vice President)	4-Aug-08	
27	<b>Appointment of a new CDM Consultant</b>	The board of IPCL discusses the offer of a CDM consultant (recommended previously by the Board of IPCL) and decides to appoint them, as drafted in the minutes of meeting	26-Aug-08	
28		IPCL appoints a new CDM consultant	27-Aug-08	Finally , a CDM Consultant is appointed
29	<b>Preparation of PIN, PDD and PCN</b>	IPCL sends a short description of its profile	17-Sep-08	
30		A draft PIN is sent to IPCL	1- Nov-08	
31		The final PIN document is sent to IPCL	4-Nov-08	
32		The final PCN and PDD sent to IPCL	29- Dec-08	
33	<b>Validator appointment</b>	Mail sent to different validators, asking for quotations for the project	31- Dec-08	



34	process	One of the validators replies back saying due to excessive workload , it is unable to take up this project at present	6-Jan-09	The denial of the concerned validator and no-response from other validators delays the start of validation for the concerned project
35		Mail sent to another validator asking for quotations for the wind power project of IPCL	14- Jan-09	
36		That particular validator declines to send quotes and no response is received from other validators	7- Feb-09	The refusal of this particular validator lands IPCL into further problems
37		Ministry Presentation for IPCL 24.8 MW wind power project	3-Mar-09	
38		Finally, one of the validators gives a Validation Proposal for the concerned wind power project (a 24.8 MW project in Gujarat)	10-Apr-09	
39		Another Validator gives validation quotes for the concerned project	11-May-09	
40		The first validator gives a final proposal after negotiations	27-May-09	A final proposal from a validator
41		Mail sent from IPCL to the first validator requesting an extension of the offer	7-Aug-09	By this time, the validity had expired and a new proposal is asked from the concerned validator



42		The validator replies back saying that their team is currently busy in other projects, so, it would take some more time for them to send IPCL a new proposal	11- Aug-09	This forces IPCL to look for other options
43		Another validator (who also had given their offer) extends the validity of their validation quote	12 Aug-09	After an extension of their validation offer, further negotiations take place between IPCL and the concerned validator
44		IPCL writes to the concerned validator regarding a certain clause in their contract	7-Sep-09	
45		The contract agreement form of the Validator is signed by IPCL and sent to the concerned validator	16-Sep-09	Finally, the Validator of the concerned project
46	<b>HCA</b>	The Host Country Approval received	29-Sep-09	
47	<b>Global Stakeholder Consultation</b>	Webhosting of the PDD for global stakeholder consultation	28-Oct-09 to 26-Nov-09	

On 27/10/2006 the Board of IPCL approved the shifting of WEGs from Karnataka to Gujarat. As per the letter dated 26 September 2006 from Enercon to the project proponent, it states that Bangalore DISCOM and Mangalore DISCOM are the two healthy DISCOMS in Karnataka (as they do not delay in making payments for power purchased). However, BESCOM and MESCOM, both, had in Toto reached the 10% cap of renewable energy and the cap would be reviewed only in September 2007. In the light of the above, the project would have been assigned to HESCOM which was not a healthy DISCOM as with the same ENERCON already had outstanding dues in excess of 300 days.





They further, informed the project participant that there had been a healthy development in Gujarat wherein GERC has announced a favorable tariff of INR 3.37/kWh for a period of 20 years as against that of INR 3.40/kWh in Karnataka for a period of only 10 years.

## B.6. Emission reductions:

### B.6.1. Explanation of methodological choices:

As per Section B.4 the baseline scenario is “Electricity generation by the Grid Connected Power Plants”. The Emission Reductions are calculated in the following manner:

#### Calculation of Emission Reductions:-

#### Project Emissions

The Project Emissions are calculated in the following manner:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where,

$PE_y$	Project emissions in year y (tCO <sub>2</sub> e/yr)
$PE_{FF,y}$	Project emissions from fossil fuel consumption in year y (tCO <sub>2</sub> /yr). The same is taken as 0 as there is no project emission from fossil fuel consumption as the project involves wind power generation.
$PE_{GP,y}$	Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO <sub>2</sub> e/yr). The same is taken as 0 as the project does not involve setting up a geothermal power plant but wind power units.
$PE_{HP,y}$	Project emissions from water reservoirs of hydro power plants in year y (tCO <sub>2</sub> e/yr). The same is taken as 0 as the project does not involve setting up a hydro power plant but wind power units.

Hence,  $PE_y = 0$ .

#### Baseline emissions



Baseline emissions include only CO<sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

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

Where,

$BE_y$	Baseline emissions in year $y$ (tCO <sub>2</sub> /yr)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year $y$ (MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO <sub>2</sub> emission factor for grid connected power generation in year $y$ calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO <sub>2</sub> /MWh)

#### Calculation of $EG_{PJ,y}$

The project activity is a greenfield plant where no renewable power plant was operated prior to the implementation of the project activity. Hence  $EG_{PJ,y}$  is determined in the following manner:

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

Where,

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

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

The baseline emission factor  $EF_{grid,CM,y}$  of the grid is calculated as the weighted average of the Operating Margin emission factor ( $EF_{OM,y}$ ) and the Build Margin emission factor ( $EF_{BM,y}$ ):

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



where the weights  $w_{OM}$  and  $w_{BM}$ , are 50% by default. For wind and solar projects, the default weights are  $w_{OM} = 0.75$  and  $w_{BM} = 0.25$  (owing to their intermittent and non-dispatchable nature).

The Central Electricity Authority, Ministry of Power, Government of India publishes database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. CO<sub>2</sub> Baseline Database for the Indian Power Sector User Guide provides information about the Operating Margin and Build Margin Emission Factors of all the regional electricity grids in India<sup>15</sup>. The Operating Margin and Build Margin data published in the latest version of the CEA database has been chosen for calculating the Baseline Emission Factor.

Please refer to Annex 3 for further details on Baseline Information.

### **Leakage**

As per the methodology no leakage emissions are considered.

### **Emission reductions**

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where,

$ER_y$	Emission reductions in year y (t CO <sub>2</sub> e/yr)
$BE_y$	Baseline emissions in year y (t CO <sub>2</sub> /yr)
$PE_y$	Project emissions in year y (t CO <sub>2</sub> e/yr)

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



<b>Data / Parameter:</b>	$EF_{grid,CM,y}$
Data unit:	tCO <sub>2</sub> / MWh
Description:	Combined margin CO <sub>2</sub> emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”.
Source of data used:	CO <sub>2</sub> Baseline Database Version 04, (Combined Margin Emission Factor for NEWNE Grid) published by Central Electric Authority (CEA), India
Value applied:	0.91
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information available from authorized government agencies – National standard value has been calculated by Central Electricity Authority (CEA) as per guidelines of ACM0002 methodology. This ensures its reliability
Any comment:	Please refer Annex 3 of PDD for details.

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

The ex-ante computation of baseline emissions for the project activity is done below:-

$$ER_y = BE_y - PE_y - L_y$$

Since, both  $PE_y$  and  $L_y$  are 0,

Baseline emissions for the project are:

$$BE_y = EG_y * EF_{grid,CM,y}$$

Where,



$EG_y = \text{Gross generation} \times 98\%$  (considering 2% auxiliary consumption)

$EG_y = 53\,250 \text{ MWh} \times 98\%$  (considering 2% auxiliary consumption)

$= 53\,165 \text{ MWh}$

$EF_{\text{grid, CM, y}} = 0.91 \text{ tCO}_2\text{e/MWh}$  (NEWNE grid)

### **Baseline Emission**

$BE_y = (53\,165 \times 0.91)$

$= 48\,380 \text{ tCO}_2\text{e/year}$

### **Project emission**

As the wind power project do not use any fossil fuel, hence the project emission of the project activity are zero.

$PE_y = 0$

### **Leakage:**

There is no leakage from the project activity

$LE_y = 0$

### **Emission reduction per year**

$ER_y = 48\,380 - 0 - 0$

$= 48\,380 \text{ tCO}_2$

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

<b>Years</b>	<b>Estimation of project activity Emissions (tonnes of CO<sub>2e</sub>)</b>	<b>Estimation of baseline Emissions (tonnes of CO<sub>2e</sub>)</b>	<b>Estimation of leakage (tonnes of CO<sub>2e</sub>)</b>	<b>Estimation of overall emission reductions in (tonnes of CO<sub>2e</sub>)</b>
1 January 2012-31 December 2012	0	48 380	0	48 380
1 January 2013-31 December 2013	0	48 380	0	48 380
1 January 2014-31 December 2014	0	48 380	0	48 380
1 January 2015-31 December 2015	0	48 380	0	48 380
1 January 2016-31 December 2016	0	48 380	0	48 380
1 January 2017-31 December 2017	0	48 380	0	48 380
1 January 2018-31 December 2018	0	48 380	0	48 380
1 January 2019-31 December 2019	0	48 380	0	48 380
1 January 2020-31 December 2020	0	48 380	0	48 380
1 January 2021-31 December 2021	0	48 380	0	48 380
<b>Total (tonnes of CO<sub>2</sub> e)</b>	<b>0</b>	<b>483 800</b>	<b>0</b>	<b>483 800</b>

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

Title: “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources”

Reference: Approved consolidated monitoring methodology ACM0002/Version 12.1.0

Sectoral Scope 1

**B.7.1 Data and parameters monitored:**

<b>Data / Parameter:</b>	$EG_{facility,y}$
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid (net export)
Source of data to be used:	Power Export Bills.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	53165 2% transmission losses are assumed between the WEG controller meter and the HT yard/substation meter.
Description of measurement methods and procedures to be applied:	Six energy meters fitted with three feeders (1 main and 1 check meters with each feeder) at the Moti Paneli Substation serving as the export meter shall be used for the meter readings. GUVNL will be apportioning the exported power based on the ratio found out by considering data from the individual WEG energy meter vis-à-vis data from all WEGs energy meter. Each WEG is equipped with an integrated electronic meter known as LCS meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through communication cables. The generation data of individual WEG can be monitored as a real-time entity at CMS managed by ENERCON. This data for each individual WEG will be recorded electronically. Please refer Annex 4 for details on apportioning process.
QA/QC procedures to be applied:	Meter reading is noted both electronically and on paper. Meter is owned and calibrated by GUVNL. The LCS meters cannot be calibrated. In case there is any mismatch in the energy values recorded by the LCS meter and the



	energy values calculated by the inverting system/programmable logic; the machine will stop working and generate the error report.
Any comment:	This data will be used for determining the power fed to the grid and hence the emission reductions. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

<b>Data / Parameter:</b>	$EG_{CLUSTER,i,j}$
Data unit:	MWh
Description:	Net Electricity exported (Export-Import) by cluster meters, j, of the project proponent connected to feeder, i
Source of data to be used:	Generation report provided by Enercon
Value of data applied for the purpose of calculating expected emission reductions in section B.5	This data will not be used directly for calculating emission reduction.
Description of measurement methods and procedures to be applied:	These meters are used to record the energy production for a cluster of WEGs of the project proponent. Meter reading is noted both electronically and on paper.
QA/QC procedures to be applied:	These meters are installed on behalf of GEDA after approval by GEDA. These meters shall be calibrated once in three years.
Any comment:	This data will be used for apportioning the net electricity supplied to the grid by all the WEGs connected to a particular feeder between all promoters. The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

#### B.7.2. Description of the monitoring plan:





The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 Version 12.1.0

**“Consolidated monitoring methodology for grid-connected electricity generation from renewable sources”.**

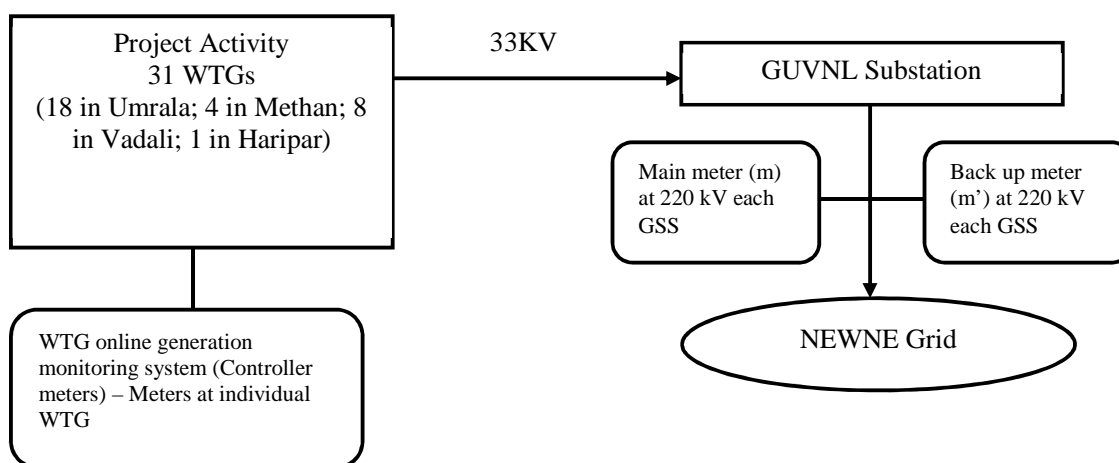
The methodology requires monitoring of the following parameters:

- Electricity generation from the proposed project activity; Data needed to recalculate the operating margin emission factor, if needed, based on the choice of the method to determine the operating margin (OM), consistent with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM0002);

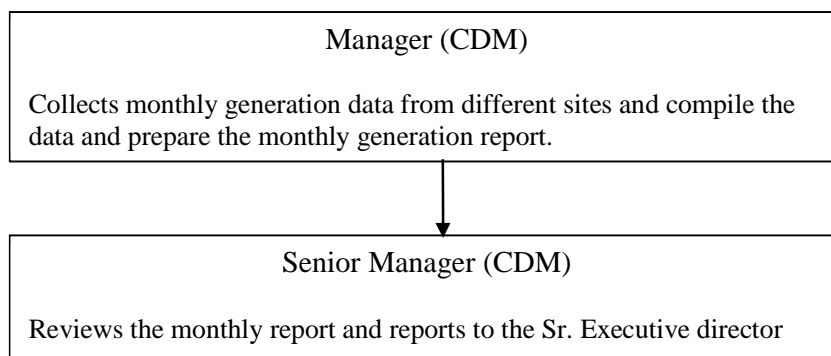
- Data needed to recalculate the build margin emission factor, if needed, consistent with “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (ACM0002);

The Project is operated by ENERCON (O&M contractor for the project activity) and managed by the PP. The operational and maintenance contract for the project is with ENERCON. ENERCON is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. ENERCON follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The detailed monitoring plan for the project activity is given in annex 4.



**Monitoring roles and responsibilities.**



### Calibration Procedure

Calibration of all the meters will be undertaken at an interval of three years and faulty meters will be duly replaced immediately. The data will be cross checked with sales receipts. Calibration will be carried out by state electricity utility as per the schedule followed by the state electricity utility.

### Archiving of Data

Field data will be stored on computer electronically and archived at Project site. Monthly monitoring report will be made available at both the Project site and IPCL's administrative office electronically. All data will be kept up to 2 years after the end of crediting periods or the last issuance of CERs, which occur later.

### Training & Implementation

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the WEGs, it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that ENERCON's service staffs is capable of handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

**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 selection: 23/02/2011

Name of person/entity determining the baseline: Experts and Consultants of IPCL

**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:**

05/09/2006 (Date of First Purchase Order for the project to be executed in Karnataka which was later amended for the shift to Gujarat. Hence, this date is considered as the first serious action/ initiative for the project activity.)

The first purchase order for the project activity was given to Enercon on 05/09/2006 for implementation of the project activity in Karnataka. However, on 26/09/2006 Enercon suggested the project proponent to shift their project activity from Karnataka to Gujarat as Mangalore DISCOM (distribution company) and Bangalore DISCOM were the only healthy DISCOMs in Karnataka (as they do not delay in making payments for power purchased) and both of them had in Toto reached the 10% cap of renewable energy and hence, were not available to the project activity. Based on the above, the board of IPCL on 27/10/2006 approved the project activity to be shifted to Gujarat. Subsequently, the purchase orders as above were amended on 06/12/2006 and 13/12/2006 by the project proponent. Therefore, for the project activity the start of the project activity is before the board approval date.

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

20 y 0 m

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

Fixed crediting period

**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:**

01/01/2012 or date of submission for registration to the UNFCCC whichever is later

**C.2.2.2. Length:**

10 y 0 m

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

As per the Environmental Impact Assessment (EIA) Notification, Ministry of Environment and Forests, Government of India, New Delhi, the 27th January, 1994 ( and incorporating further amendments), the project does not require submission of an EIA study report<sup>16</sup>.

The project activity does not involve any major construction activity. It primarily requires the installation of the Wind Electric Generators, interfacing the generators with the Grid by setting up HT transmission lines and installation of other accessories. Movement of materials for erection produced some dust pollution, but the impacts can be considered to be negligible and do not have any significant impact on the environment.

However, there are no negative impacts on air, water; soil quality and ambience are envisaged due to the project activity.

**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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<sup>16</sup> <http://envfor.nic.in/divisions/iass/notif/eia.htm>



The project activity is a renewable energy generation instalment in the region. The impact assessment, as explained above, clearly establishes that the project activity will have no major negative impact on the baseline environment. However the project proponent, as a statutory requirement, will comply with all the standards as prescribed by the Gujarat Pollution Control Board.

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

IPCL identifies the following local stakeholders to be associated with the project activities, directly or indirectly:-

- Elected bodies of representatives involved in the administration of the local area (village Panchayats)
- Finance providers (SREI) for the project activity
- Equipment manufacturers (Enercon) and entities involved in maintenance and operation of the project activity

In order to facilitate proper communication between the project proponent and the identified stakeholders, the identified stakeholders were intimated about the project activity and their comments on the same have been sought for. All the stakeholders were sent notices on 04.12.06 asking for their comments regarding the concerned project activity of India Power Corporation Limited. Meeting was held on 27 December 2006.

**E.2. Summary of the comments received:**

The comments received from the various stakeholders have been compiled below:

Sl. No.	Name of Stakeholders	Mode of Communication	Feedback
1	Village Panchayats	A written communication has been sent to the Village Panchayats inviting their comments on the project activity.	The Village Panchayat has acknowledged that the project activity would provide employment opportunities to the local people.
2.	SREI	A written communication has been	The finance providers for the project activity have acknowledged that the project activity will result



Sl. No.	Name of Stakeholders	Mode of Communication	Feedback
		sent to SREI inviting their comments on the project activity.	in reduction of GHG emissions and would thus address the cause of global warming.
3	Enercon	A written communication has been sent to Enercon inviting their comments on the project activity.	Enercon has acknowledged that the project activity will result in reduction of fossil fuel based electricity generation at the grid's end and will thereby also reduce emission of GHGs and help in abatement of global warming.

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

As a part of the stakeholder consultation process, India Power Corporation Limited has consulted both government and non-government parties. The project activity has received only positive feedback from all the stakeholders as explained above. All the comments received have been considered while preparation of the CDM Project Design Document.

Furthermore, as per the requirement of UNFCCC, the Project Design Document will be web-hosted on the DOE's (Designated Operational Entity) website for a period of one month for global stakeholder consultation. The comments received by the Validator during the period of global stakeholder consultation will be properly addressed as a part of the CDM process.



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

Organization:	India Power Corporation Limited
Street/P.O.Box:	Plot No. X 1,2 & 3, Block – EP, Sector V, Salt Lake City
Building:	
City:	Kolkata
State/Region:	West Bengal
Postcode/ZIP:	700091
Country:	India
Telephone:	+ 91 33 2357 4308/09/10
FAX:	+ 91 33 2357 6541
E-Mail:	
URL:	<a href="http://www.ipclindia.com/">http://www.ipclindia.com/</a>
Represented by:	
Title:	Manager (Renewable Energy and CDM Projects)
Salutation:	Mr.
Last name:	Chattopadhyay
Middle name:	
First name:	Debasis
Department:	
Mobile:	+919836063774
Direct FAX:	
Direct tel:	
Personal e-mail:	debasis.chattopadhyay@ipcl-india.com



**Annex 2**

**INFORMATION REGARDING PUBLIC FUNDING**

No public funding from any of the Annex 1 countries is available for the project. Further it is clarified the project proponent has not availed any financial assistance from central government.

**Annex 3****BASELINE INFORMATION**

The Baseline Emissions have been calculated in the following manner:-

Computation of Baseline Emission Factor for Eastern Regional Grid					
Computation of Operating Margin Emission Factor for Eastern Regional Grid					
Parameters	Unit	2005-2006	2006-2007	2007-2008	Remarks/ Source
Simple Operating Margin Emission Factor, $EF_{OM, Simple, y}$	tCO <sub>2</sub> /MWh	1.02	1.01	1.00	Baseline Carbon Dioxide Emission Database/ Version 4.0 dated September 2008 available at <a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a>
Operating Margin Emission Factor, $EF_{OM, y}$	tCO <sub>2</sub> /MWh	1.01			3-years' average
Build Margin Emission Factor, $EF_{BM, y}$	tCO <sub>2</sub> /MWh	0.60			Baseline Carbon Dioxide Emission Database/ Version 4.0 dated September 2008 available at <a href="http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm">http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm</a>
Combined Margin Emission Factor	tCO <sub>2</sub> /MWh	0.91			

Computation of emission reductions				
Parameter	Parameter	Unit	Value	Comments/Assumptions
Computation of baseline emissions				
Determination of EG <sub>y</sub>				
Total electricity generation of the project	EG <sub>tot, y</sub>	MWh	54250	Estimation document by Enercon
Auxilliary Consumption	EG <sub>sux, y</sub>	MWh	1085	Considering 2% auxiliary consumption
Net electricity exported to the grid	EG <sub>y</sub>	MWh	53165	Calculated
Calculation of emission reductions				
CO <sub>2</sub> Baseline Emission factor of the western grid	EF <sub>y</sub>	tCO <sub>2</sub> /MWh	0.91	Calculated
Baseline Emissions	BE <sub>y</sub>	tCO <sub>2</sub>	48247	Calculated
Project emissions	PE <sub>y</sub>	tCO <sub>2</sub>	0	Calculated
Emission Reductions	ER <sub>y</sub>	tCO <sub>2</sub>	48247	Calculated



## Annex 4

### MONITORING INFORMATION

#### **Metering**

- The electricity supplied to the grid will be metered at the substation of the utility. Representatives of Discom and ENERCON will jointly take the main reading and sign the meter reading. Simultaneously, the joint meter reading at backup metering system will also be taken by representatives of Discom and ENERCON.
- The IPCL wind power Project at Gujarat has a three metering points:
  - a. LCS (Local Control System) meter installed by the WEG supplier known as WEG controller.
  - b. Cluster meter is installed on behalf of GEDA after calibration and approved by GEDA. This meter is used to record the readings of a cluster of WEGs belonging to a particular customer or single WEG.
  - c. Meters installed at the WEG substation known as substation meter (Main and Check meters). These meters are owned by the state electricity utility which records both export and import meter readings.
- The electricity metered at the substation meter is proportionally divided among the customers connected to the meter on the basis of the pro rata readings taken from the cluster meters. There is a transmission loss between the cluster meters and the substation.
- The meters will be jointly inspected / tested once in a year. The main and the backup metering systems are sealed in presence of representatives of ENERCON and state electricity utility. Joint inspection and testing will also be carried out as and when difference in monthly meter readings exceeds the sum of maximum error as per accuracy class of main and back up meters.

#### **Metering Equipment and Metering Arrangement Information**

- The meters are two-way meter and measure the electricity import and export and give the net electricity.



- In case the meters are found to operate outside the permissible limits, the meters will be either replaced immediately or calibrated. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred.
- If main as well as back up metering system becomes defective, the details of the malfunctioning along with date and time and snaps shot parameters along with load survey will be retrieved from the main meter. The exact nature of the malfunctioning will be determined after analyzing the data so retrieved and the consumption recorded by the main meter will be adjusted accordingly.
- The LCS meters do not require calibration.
- Monthly generation report is prepared based on the meter readings taken at the main and the backup meter. Joint meter reading is signed by the representative of the ENERCON and the GUVNL. In case of any error observed in the meter readings of the individual WEGs and import export meter, the operators will inform the project participant and which will be subsequently informed to the GUVNL persons.
- The cluster meter, main meter and the check meter at the substation will be calibrated once in three years.
- The main and check meters are tri-vector meter of accuracy class of 0.2s.
- In the event that the date of registration is in the middle of the month, while the statement showing energy generated/break up of net export units is issued on monthly basis. The apportioning will be carried out based on LCS data for CER estimation.
- The uncertainty of the data is considered to be low as the monitoring equipment(s) are of reputed make. In case any of the meter is found faulty, then it is calibrated and correction is applied to the data.
- Electricity generation data from the wind farms can also be cross checked with the sales receipts of electricity to the respective electricity companies. PP will keep a record of the payment received from sale of electricity to the electricity companies.

**Electricity share allocation procedure:**

Joint meter reading will be taken jointly by the State Electricity Board (SEB) and Enercon once in a month. The SEB will issue a monthly Share Certificate of the total net electricity generated by the

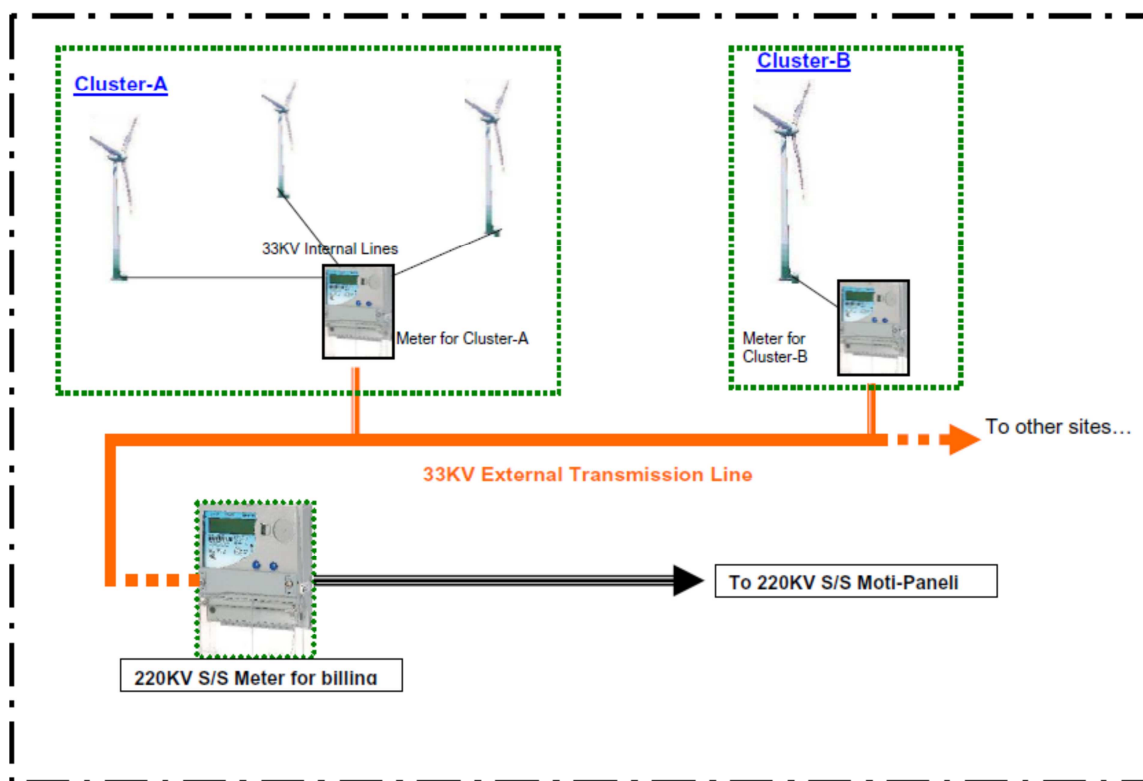


project proponent based on the Joint meter reading. The share certificate will be used as evidence for net electricity exported.

At the Enercon (sending) substations, there are various feeders (s/s meters) to which the WEGs of the project proponent are connected through the cluster meters. WEGs of other promoters through their cluster meters are also connected to the same feeders as that of the project proponent, having a common metering facility at that feeder. Therefore, net electricity supplied to the SEB by all the WEGs connected to a particular feeder has to be apportioned between all promoters on the basis of net electricity export readings by individual cluster meter connected to that particular feeder, so as to account for contribution of individual promoters of WEGs. Apportioning of the net electricity supplied to the SEB by all the WEGs connected to the feeder between all promoters is done by SEB.

The apportioning of electricity generated by the entire wind farm is entirely under the jurisdiction of the state electricity board.

**Below is a schematic diagram showing meters involved during apportioning of electricity:**



- Controller readings – shall mean the energy reading of individual WEG



- Cluster Meter – shall mean the energy meter used to record the energy production for a cluster of WEGs or single WEG. This is being installed on behalf of GEDA after calibrating and approved by GEDA.
- S/S meter – shall mean the meter installed in Substation for recording of energy at the 220KV side.

Preparing generation share certificate:

- i. Site technician will collect the generation readings from the WEGs every day and will prepare the daily generation report.
- ii. Through these collective reports of everyday, monthly generation figures are available.
- iii. Cluster meter readings are also taken daily on the same time the controller readings are taken to get the exact generation recording of these meter.
- iv. On the billing day decided by GEDA, the reading of the S/S meter is taken at the same time of daily WEG readings.
- v. By calculating in the pro-rata basis, the generated units are being allocated to individual customers according to the generated units.

Electricity measurement initiates with recording of electricity generation at the LCS of respective WEGs which measures the generation of electricity from the particular WEG. Simultaneously, export and import readings are also recorded. At the time of Joint Meter Reading (JMR), the generation readings from the cluster meters connected to a particular feeder are measured.

Parallel to the above process, Main meter readings for the above feeder are also measured (export & import) and recorded at the sending substation of the windfarm in the presence of representative of SEB and Enercon.

The description of apportioning electricity generated by the project proponent has been included only to bring clarity to the apportioning procedure. However, the same is not part of the monitoring plan of the of the project activity.

Annexure-A

Action Plan for expenditure incurred through 2% of CER revenues									
Financial Year (A)	Activity (B)	Issued CERs (C)	CER Price (D)	Total CDM Amount (E=CxD)	Expenditure in Current year (F)	Expenditure Carried forward (G)	Net Expenditure for Current Year (H=F -G)	Expenditure as % of CDM amount for current year (I=H/E)	Reference Documentation (J)
Year 1	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.	48380 approx.	Say X	48380 × X	(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	Such expenditure will be made within one year after the realization of revenues from the sale of CERs. The details of such expenditure made will be included in the monitoring report for the
	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells				(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	





	etc. Adequate roads, 2 wells/ toilets per year.				Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	period following the transaction.
Year 2	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutchra roof to RCC roof.	48380 approx.	Say X	48380 × X	(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	The same can be verified by the DOE at the time of verification through the Annual Report of the Company/a certificate from the statutory auditor/a certificate from a Chartered Accountant.
	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.				(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 3	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 4	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 5	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 6	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 7	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 8	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	



	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 9	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	





	(1) Infrastructural up-gradation of local primary schools and secondary schools. Say, 2 schools per year in converting the kutcha roof to RCC roof.				(1) 483.80 × X	0	(1) 483.80 × X	(1) 1%	
Year 10	(2) Other activities in consultation with village panchayats and the community. Say, construction of roads, toilets & wells etc. Adequate roads, 2 wells/ toilets per year.	48380 approx.	Say X	48380 × X	(2) 483.80 × X	0	(2) 483.80 × X	(2) 1%	
					Total - 964.94 × X		Total - 964.94 × X	Total - 2 %	

The above numbers are indicative. Actual is will defined on the realization of revenue from sale of CERs

**Annexure B**

Village	District	Loc. No.	Latitude			Longitude		
			Deg.	Minutes	Seconds	Deg.	Minutes	Seconds
Umrالا	Jamnagar	115	22	1	53.20	70	17	28.08
Umrالا	Jamnagar	116	22	1	47.22	70	17	24.69
Umrالا	Jamnagar	117	22	1	41.10	70	17	28.07
Umrالا	Jamnagar	118	22	1	34.51	70	17	29.73
Umrالا	Jamnagar	119	22	1	29.97	70	17	38.28
Umrالا	Jamnagar	120	22	1	11.09	70	17	37.39
Umrالا	Jamnagar	121	22	1	4.76	70	17	36.61
Umrالا	Jamnagar	122	22	0	58.45	70	17	43.15
Umrالا	Jamnagar	123	22	0	50.01	70	17	20.36
Umrالا	Jamnagar	124	22	0	55.54	70	17	15.75
Umrالا	Jamnagar	125	22	1	1.27	70	17	13.25
Umrالا	Jamnagar	126	22	1	7.80	70	17	13.58
Umrالا	Jamnagar	127	22	1	30.93	70	17	11.93
Umrالا	Jamnagar	128	22	1	39.65	70	17	11.62
Umrالا	Jamnagar	129	22	1	46.35	70	17	9.23
Umrالا	Jamnagar	130	22	1	51.06	70	17	4.99
Umrالا	Jamnagar	131	22	1	55.59	70	16	59.01
Umrالا	Jamnagar	132	22	1	59.81	70	16	56.68
Methan	Jamnagar	152	22	0	51.17	70	14	22.48
Methan	Jamnagar	153	22	1	0.23	70	14	28.00
Methan	Jamnagar	154	22	1	5.56	70	14	24.71
Methan	Jamnagar	155	22	1	12.36	70	14	21.60
Vadali	Rajkot	515	21	59	7.73	70	15	37.21
Vadali	Rajkot	516	21	59	12.96	70	15	27.61
Vadali	Rajkot	517	21	59	19.32	70	15	56.09
Vadali	Rajkot	518	21	59	24.40	70	15	58.77
Vadali	Rajkot	519	21	59	34.80	70	15	57.17
Vadali	Rajkot	520	21	59	40.19	70	15	52.33
Vadali	Rajkot	521	21	59	45.69	70	15	44.92
Vadali	Rajkot	523	21	59	59.85	70	15	48.68
Haripar	Jamnagar	524	22	0	6.32	70	15	47.36

Longitude and Latitude of the Wind Turbine Generators