Project design document form for CDM project activities

(Version 05.0)

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

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	21.8 MW Wind Power project at Jangi Vandhiya, Gujarat by Powerica Limited
Version number of the PDD	4.0
Completion date of the PDD	16/09/2014
Project participant(s)	Powerica Limited
Host Party	India
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope: Energy industries (renewable - / non-renewable sources) Methodology: ACM0002, Version: 15.0
Estimated amount of annual average GHG emission reductions	50,207 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity involves installation and operation of 11 WTGs of 2.0 MW comprising a total capacity of 22.0 MW. The project activity will utilise V100 model of WTGs supplied of Vestas. The detailed specifications for the WTGs have been presented in section A.3. All the WTGs involved in the project are planned to be commissioned at Bhachau Taluka of Kutch district of Gujarat. The project aims at providing electricity to the state of Gujarat by effective utilization of renewable resources. The electricity generated from the project activity would be supplied to NEWNE regional grid of India. Powerica Limited will be developing this project keeping in consideration of the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC). This is because the project activity qualifies as a CDM project as it would be feeding clean power to the electricity grid (North-East-West-North East or NEWNE grid, India) thereby helping in significant reduction of GHG emissions.

Existing Scenario

The regional (NEWNE) grid into which the electricity generated from the project would be fed is dominated by the carbon intensive fossil fuel based thermal power plants. The project will be utilizing wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. The generated electricity will displace equivalent electricity (generated majorly from fossil sources) that may have been supplied by the Gujarat Energy Transmission Corporation Limited (GETCO).

Baseline scenario

Since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario for the project as per the applicable baseline methodology, ACM0002, ver. 15.0 is defined as, "*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*".

Therefore, it could be considered that the both the existing scenario and baseline scenario for the project activity are same.

Estimated Emission Reduction

The project activity is expected to generate and export 51,494.8 MWh of electricity per annum to the NEWNE Grid. It is estimated that the project activity will contribute to GHG emission reduction of about 50,207tCO2e annually and 502,070tCO2e over ten years of the crediting period.

Contribution to sustainable Development

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF) has mentioned four indicators for the sustainable development. The project participant's view on the contribution of this project activity towards sustainable development is explained below:

Social well being:

- **Generating Local Employment:** The installation of wind power project in rural areas will result in generating local employment opportunities and capacity building of the local employees. The

project activity would create both direct and indirect employment throughout the life-cycle of the project activity.

- **Encouragement to entrepreneurs:** The project will provide encouragement to other entrepreneurs to invest into renewable energy sources.
- **New business Opportunity:** The project activity would provide business opportunities to the local population contributing to poverty alleviation of the local community.

Economic well being:

- **Rural Development:** The installation of wind power project will result in rural and infrastructural development in the surrounding rural areas
- **Economic Development:** The generation of wind power will result in improvising the reliability of the NEWNE Grid and thereby enhance economic development in the region.

Environment well being:

- **Reduction in the consumption of fossil fuels:** The installation of power plant generating electricity through renewable resource such as wind power, would lead to reduction in usage of fossil fuels e.g. Coal, oil, natural gas.
- **Reduction in GHG emission:** The reduction in usage of fossil fuels for electricity generation will result in reduction of the release of associated GHG emissions (CO_2 and CH_4 emissions).
- **Improvement of Air Quality:** The use of renewable energy for power generation will avoid the emission of air pollutants such as Suspended Particulate Matter (SPM), Sulphur Dioxide (SO_2) and Nitrogen Oxides (NO_x) thereby improvising the surrounding air quality
- **Conservation of Natural Resources:** Installation of wind power plant will result in conserving fast depleting natural resources such as coal, oil etc.

Technological well being:

- **Advanced Technology:** The project activity involves installation and operation of state-of-art wind turbine generators (WTGs) of Vestas make. The implementation of these new technologies will help in increasing reliability of renewable energy generation and encourage development of even better technology in the future.
- **Safe and Sound Technology:** The project activity deploys the technology, which is environmentally safe and sound, as it does not produce greenhouse gases and any toxic or radioactive waste.

Community Development:

Powerica would use, at a minimum, 2% of the revenues accrued from the sale of Certified Emission Reductions (CERs) on an annual basis for community related activities. These may include providing assistance for development of public amenities in the surrounding areas such as water distribution/sanitation facilities/building of School and Hospital/ free distribution of educational books and school uniforms/annual eye camps/health check-up centres for villagers etc.

If the activity undertaken involves capital expenditure exceeding the minimum requirement of 2%, the additional expenditure made would be set off against the requirements for the subsequent years. Such expenditure would be made within one year after the realization of revenues from the sale of the CERs. Monitoring plan proposed for the expenditure is included in Annex 1 of the PDD.

A.2. Location of project activity

A.2.1. Host Party

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India

A.2.2. Region/State/Province etc.

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Western Region / State: Gujarat

A.2.3. City/Town/Community etc.

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Taluka: Bhachu
District: Kutch

A.2.4. Physical/Geographical location

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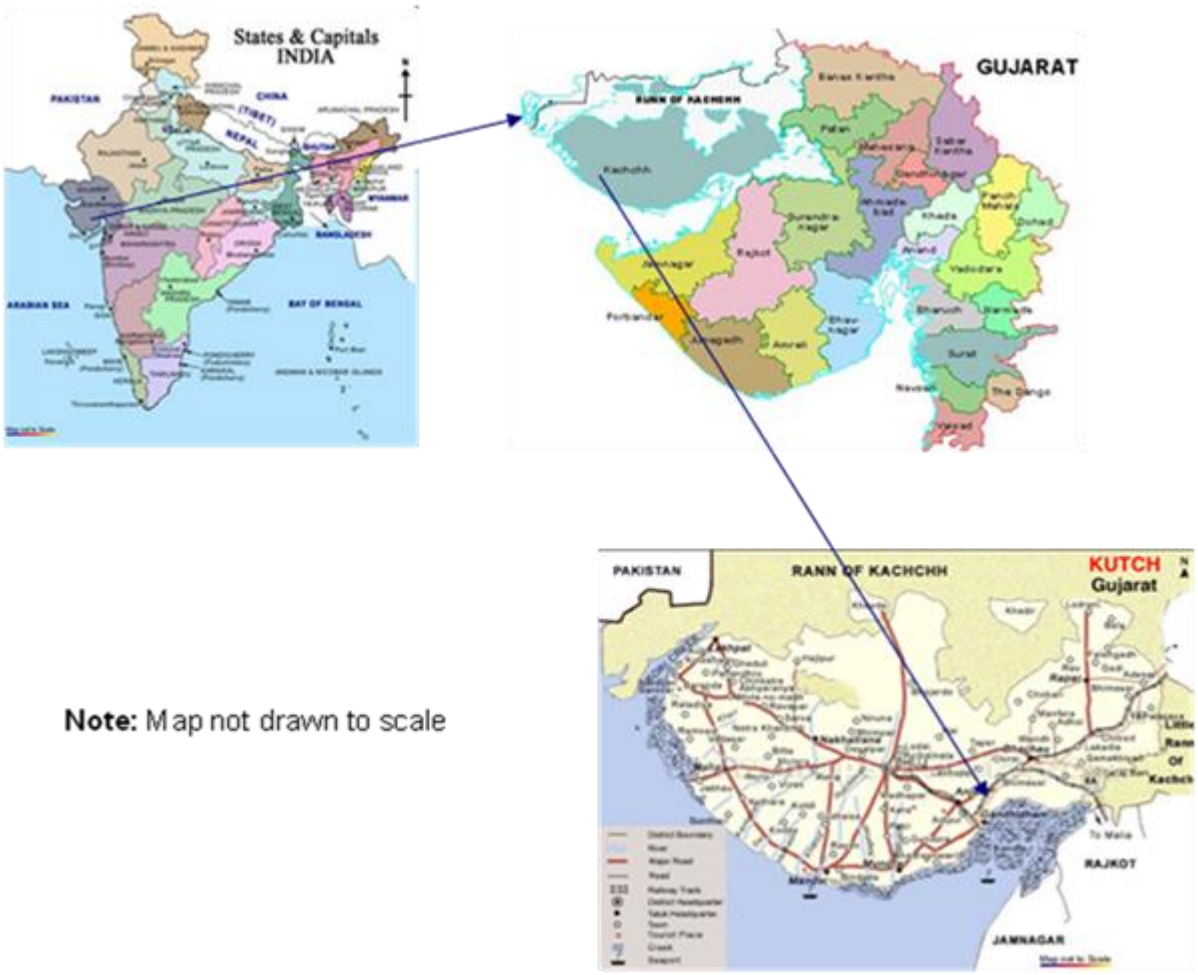

Note: Map not drawn to scale

The unique location identification of project activity is given as below:

S.I No	WTG No.	Village	Geo-coordinates (Deg, Min, Sec)	
			Latitude	Longitude
1	JW04	Jangi	N23 12 41.3	E70 34 28.8

2	JW11	Jangi	N23 13 05.5	E70 32 15.6
3	VW33	Lakhapar	N23 12 46.6	E70 38 00.0
4	VW 41	Vadhiya	N23 12 18.3	E70 35 59.7
5	VW50	Lakhdhirgadh	N23 14 52.2	E70 35 41.2
6	VW52	Godpar	N23 13 06.3	E70 36 58.4
7	VW53	Lakhdhirgadh	N23 14 49.6	E70 34 59.9
8	VW60	Lakhdhirgadh	N23 14 26.6	E70 35 07.8
9	VW68	Lakhdhirgadh	N23 15 10.3	E70 35 56.3
10	VW69	Vandhiya	N23 14 23.1	E70 36 26.9
11	VW72	Vandhiya	N23 14 24.5	E70 37 02.3

A.3. Technologies and/or measures

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The project activity is a Greenfield project for generation of electrical energy using wind which is a renewable source of energy. Thus, this project actually displaces the electricity grid which is essentially fossil-fuel based.

In wind energy generation, kinetic energy of the wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture the wind's energy with three propeller-like blades, which are mounted on a rotor, to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind. As the wind blows through the blades of the windmill, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the shaft that further spins the connected generator. The spinning of this generator produces the required electricity. Since power is generated from wind energy, no emissions are attributed to the project emissions and emissions due to fossil-fuel based grid has been displaced due to the project activity. Detailed information of gases & emission sources in baseline & project activity have discussed in Section B.3 of this document.

Emission reductions will be claimed on the net electrical energy that is supplied to grid. Details of monitoring of emission reductions and their calculation have been provided in Section B.6.1 & Section B.7.2 of this document.

The technical specification of the WTGs used in the project activity is provided as below:

TECHNICAL SPECIFICATION:	
Make	VESTAS
Model	V100
Life Time	20 Years
Operational Data	
Rated power	2,000 kW (50/60 Hz)
Cut-in wind speed	3 m/s
Rated wind speed	12 m/s
Cut-out wind speed	20 m/s
Operating temperature range standard turbine	-30˚C to 50˚C
Sound Power	
Max 105 dB (Mode 0, 10 m above ground, hub height 80 m, air density 1.225 kg/m³)	
Rotor	

Rotor diameter	100 m
Swept area	7,850 m2
Air brake full blade feathering with 3 pitch cylinders	
Electrical	
Frequency	50
Generator type 4-pole (50 Hz) doubly fed generator, slip rings	
Gearbox	
Type two planetary stages and one helical stage	
Tower	
Type	tubular steel tower
Hub heights	80 m/95 m
Nacelle Dimensions	
Height for transport	4 m
Height installed (incl. CoolerTop®)	5.4 m
Length	10.4 m
Width	3.5 m
Hub Dimensions	
Max. transport height	3.4 m
Max. transport width	4 m
Max. transport length	4.2 m
Blade Dimensions	
Length	49 m
Max. chord	3.9 m
Max. weight per unit for transportation	7.5 tonnes

Generation of power through wind turbine has no sources of emission as discussed in detail in Section B.3 of this document. The electricity generated is monitored using electrical meters which provide a measure of the actual electrical energy that would have been sourced from a fossil-fuel based grid had it not been generated using wind energy. Hence, the fossil-fuel power based grid shall form the baseline to the project activity which has been developed in Section B.4 of this document. Further to this, a detailed monitoring procedure is provided in Section B.7 of this document. Typical generation figures of the WTGs have been provided in Section B.5 of this document.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A (host)	Powerica Limited- Private entity	No

A.5. Public funding of project activity

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No public funding is involved in this project activity.

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

B.1. Reference of methodology and standardized baseline

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Title: Grid-connected electricity generation from renewable sources[1]
Reference: ACM0002
Version 15.0

The methodology also refers to the latest approved versions of:

- Tool for the demonstration and assessment of additionality, Version 07.0.0 [2]
- Combined tool to identify the baseline scenario and demonstrate additionality, Version 05.0.0[3]
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, Version 02[4]
- Tool to calculate the emission factor for an electricity system, Version 04.0 [5]

B.2. Applicability of methodology and standardized baseline

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Sr. No.	Applicability Conditions as per ACM0002, Version 15.0	Applicability to this Project Activity
1.	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 This methodology is applicable to grid-connected renewable energy power generation project activities that: (a)Install a Greenfield power plant; (b)Involve a capacity addition to (an) existing plant(s); (c)Involve a retrofit of (an) existing operating plants/units; (d)Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	The project activity is the installation of 22 MW wind energy based power plant in Gujarat which is a Greenfield power plant.

[1] http://cdm.unfccc.int/UserManagement/FileStorage/A04BWNRKLUEP6O1QX75YVTH28JDICZ

[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v5.0.0.pdf

[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

Sr. No.	Applicability Conditions as per ACM0002, Version 15.0	Applicability to this Project Activity
2.	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 methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit 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, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	This is a Greenfield wind energy project; therefore, neither of the two conditions is applicable for this project.
3.	In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2; or (d) The project activity is an integrated hydro power	This is not a hydro power project. Hence, this applicability criterion is irrelevant.

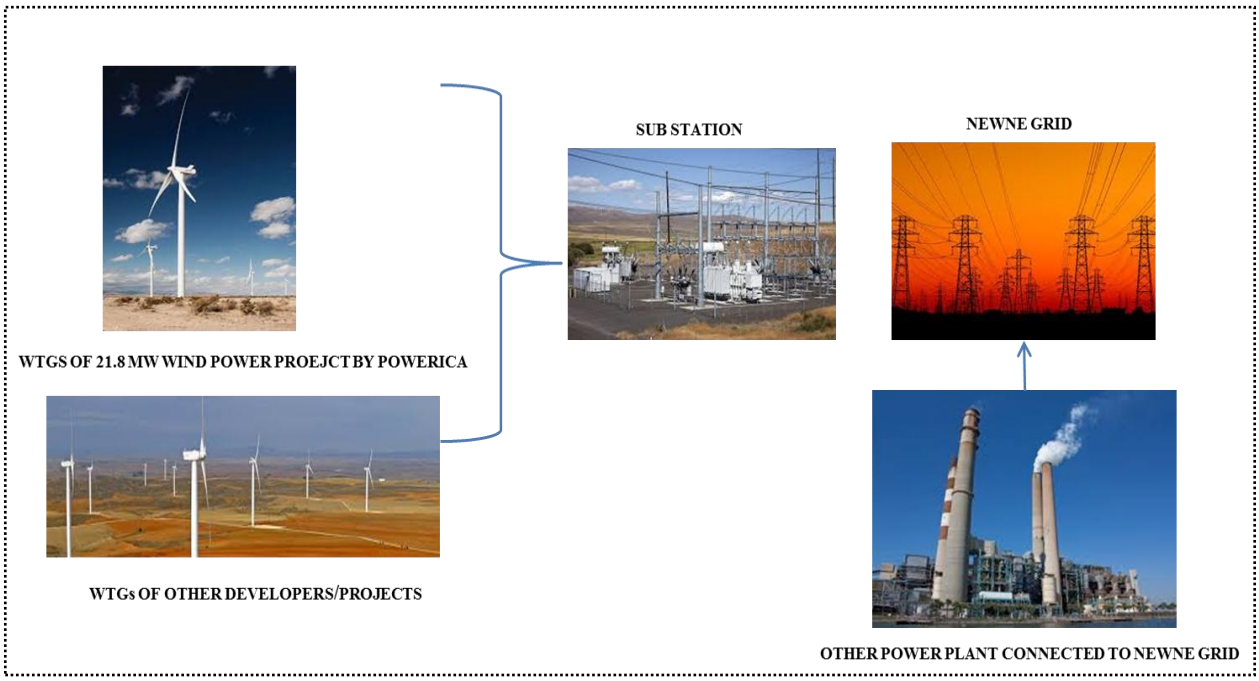
Sr. No.	Applicability Conditions as per ACM0002, Version 15.0	Applicability to this Project Activity
	project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
4	In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	This is not a hydro power project. Hence, this applicability criterion is irrelevant.
5.	The methodology is not applicable to: (a) 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; (b) Biomass fired power plants/units.	The wind-mills are being newly installed at the project sites. Hence, there is no fuel-switch from fossil fuel to renewable energy source in the proposed project activity.
6.	In the case of retrofits, rehabilitations, replacements,	The project is a green field

Sr. No.	Applicability Conditions as per ACM0002, Version 15.0	Applicability to this Project Activity
	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, that is 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".	project and not the kind of retrofit, replacement or capacity additions; thus this criterion is not applicable.

B.3. Project boundary

As per the **Approved consolidated baseline and monitoring methodology ACM0002**, the project boundary is "*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*."

Therefore, the project boundary for the proposed project activity is illustrated as below;



Project Boundary

As per the approved methodology, ACM0002, Version 15.0, following gases and emission sources has been included in the project boundary.

Source		GHGs	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

Project	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam.	CO_2	No	The present project activity is a Greenfield wind power project. Hence, not relevant
		CH_4	No	
		N_2O	No	
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	The present project activity is a Greenfield wind power project. Hence, not relevant
		CH_4	No	
		N_2O	No	
	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	The present project activity is a Greenfield wind power project. Hence, not relevant
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

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Identification of the baseline scenario

The project activity is the installation of a new wind power plant. This project is not a modification/ retrofit of any existing electricity generation facility. Hence, in accordance to the approved methodology ACM0002, Version 15.0, the baseline scenario for new installation facility is described as:

"*Electricity delivered to the grid by the project 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."*

Determination of emission factor figures have been calculated and provided in section B.6.1 of this PDD.

B.5. Demonstration of additionality

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The date on which Powerica Limited signed the supply agreement with Vestas Wind Technology India Private Limited (Vestas) i.e. 31/12/2013 is considered as the start date of the project activity. The project start date is before the webhosting of PDD for GSC and after 02/08/2008. Therefore, the project falls under 'new project activity'. As required the Project participant has informed UNFCCC and DNA on 08/10/2013, even before the start date of the project (31/12/2013). Hence, the project is in conformity section 6.3 of clean development mechanism project standard, version 05.0.

The proposed CDM project generates power using wind energy which is a renewable, zero emission source of energy. Baseline scenario for the project is based on Large-scale Consolidated Methodology, ACM0002, Version 15.0. The methodology requires the project proponent to determine the additionality based on "Tool for the demonstration and assessment of additionality", Version 7.0.

As per the tool, additionality of the project is demonstrated as below;

Step 0: First-of-its-kind project activity:

The proposed project is a wind based renewable energy project planned to be installed in the Gujarat state of India which has commissioned 3174.58 MW[6] of wind power project (as of 31/03/2013). Thus, the proposed project is not first-of-its-kind. Proceed to Step 1.

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

Sub-step 1a: Identification of alternatives to the project activity:

The applied methodology, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002, version 15.0 prescribes baseline scenario as 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" (Version 4).

Hence, the realistic and credible alternatives to the project activity are:

a) The proposed project activity not undertaken as a CDM project activity.
b) The continuation of the current situation, i.e. the equivalent amount of power generated under the project activity would be generated in existing and new grid-connected power plants in the electricity system

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

Both the alternatives conform to all the applicable laws and regulations in India as below:

- Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

Proceed to step 2 i.e. investment analysis.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

[6] https://en.wikipedia.org/wiki/Wind_power_in_India

As per "Tool for the demonstration and assessment of additionality" (version 07.0.0), for financial analysis of the project, the following three options are available:

1. Option I: Simple Cost Analysis
2. Option II: Investment Comparison Analysis
3. Option III: Benchmark Analysis

The project proponent proposes to generate revenue by selling electricity to state electricity board. Hence a simple cost analysis is not applicable in the present situation.

As per Para 19 of "Guidelines on the Assessment of Investment Analysis, Version 05, EB 62, Annex 5", 'a benchmark approach is suited to the circumstances where the baseline doesn't require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest'.

Since, identified baseline for the proposed project activity is the continuation of current practice (i.e. equivalent amount of energy would be generated by grid electricity system through its currently operating power plants and by new capacity addition) which is outside the direct control of the project proponent, benchmark analysis (option III) is selected as the most appropriate method for financial analysis of the proposed project activity.

Sub-step 2b: Apply benchmark analysis

The equity Internal Rate of Return (Equity IRR) has been chosen as the financial indicator for the investment analysis. Tool for the demonstration and assessment of additionality, version 07.0.0 permits the use of financial indicator, viz., IRR, for demonstrating the additionality using benchmark analysis. Since project proponent is demonstrating the financial unattractiveness of the project, equity IRR has been selected as the financial indicator of the project.

As per guidance 12 of Guidelines on the assessment of investment analysis*, "Required/expected returns on equity are appropriate benchmarks for an equity IRR".* Therefore, the project proponent has chosen Cost of Equity as the benchmark to compare the equity IRR.

As per guidance 15 of Guidelines on the assessment of investment analysis, *"……. the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices……".*

The project proponent has chosen option (a) to estimate the cost of equity. As per Appendix A, the project activity falls under Group 1 category of projects. The default value for expected return on equity for energy industry in India in real term rates as per appendix to the Guidelines on the assessment of investment analysis is 11.75%.

As per Para 7 of the appendix to "Guidelines on the assessment of investment analysis", EB 62, Annex 5
"In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period."

The long-term inflation forecast from Reserve Bank of India which is the central bank of the host country provides the inflation forecast over the next ten years. The inflation expected over the next ten years (duration of crediting period) is 5.60.

Retun on Equity (RoE) in nominal term

= (1+ Default Return on Equity as per EB 62, annex 5, in real term)*(1+Inflation rate)-1

= (1+11.75%)*(1+5.60%)[7]
= 18.01%

Sub-step 2c: Calculation and comparison of financial indicators

Sr. No	Parameter	Value	Unit	Reference
1	No. of WTGs	11	-	Quotation from VETSAS dated 18/07/2013
2	Project Capacity	22.0	MW	Calculated
3	Project Cost			
	WTG supply, erection & commissioning	122.50	Million INR/WTG	Quotation from VETSAS dated 18/07/2013
	Balance of Project (BoP) including civil construction, electrical lines, internal road, SCADA cable etc.	14.30	Million INR/WTG	Quotation from BoP contractor, Kintech Synergy (p) Ltd. dated 07/07/2013
	Total Price	136.80	Million INR/WTG	Calculated
	Land Cost	3.50	Million INR/WTG	Quotation from VETSAS dated 18/07/2013
	Total Price including land	140.3	Million INR/WTG	Calculated
	Cost per MW	70.79	Million INR/MW	
	Total Project Cost	1543.30	Million INR	
4	**Debt Equity Ratio**			
	Debt	70	%	GERC Tariff Order dated 08/08/2012, page no: 15 (http://www.gercin.org/renewablepdf/en_1344430244.pdf)
	Equity	30	%	
5	**Operational Expenses**			
	O & M cost	2.80	Million INR/WTG/ Year	Quotation from VETSAS dated 18/07/2013
	Free O&M	2.0	Year	
	Escalation in O&M/yr	5.0	% per year	
	Service tax on O&M	12.36	%	http://www.simpletaxindia.net/2013/04/service-tax-rate-chart-exemption-limit.html
	Insurance	0.20	Million INR/WTG/ year	Actual Premium paid by the project proponent for the existing WTGs commissioned at the same location. (Insurance policy document dated 14/01/2013 and 04/02/2013 were

[7] http://www.rbi.org.in/scripts/PublicationsView.aspx?id=15099

				referred)
6	**Generation Estimate**			
	PLF	26.72	%	Third Party PLF assessment report dated 30/07/2013[8]
	Total Generation from the Project	51.0266	Million kWh/yr	Calculated
7	**Tariff**	4.15	INR/kWh	Wind Power Policy – 2013 dated 25/07/2013, page no:3 (http://geda.gujarat.gov.in/policy_files/Wind_Power_Policy-2013.pdf)
8	**Depreciation rate**			
	Book Depreciation	5.28	%	Companies Act, (http://taxguru.in/company-law/rates-of-depreciation-under-the-companies-act-as-mentioned-in-schedule-xiv.html)
	Income Tax Depreciation	15.00	%	Income tax fourth Amendment rule, 2012 (http://law.incometaxindia.gov.in/DITTaxmann/Notifications/IncomeTaxAct/2010/Notification15_2012.htm). Additional 20% of depreciation is claimed in the first year as per Section 32(1)(iia), Income tax Act, (http://law.incometaxindia.gov.in/dittaxmann/incometaxacts/2005itact/section32.htm) and (http://www.taxmann.com/taxmannflashes/BUD12-55D.htm)
9	**Corporate Tax Rate**	32.45	%	http://taxguru.in/income-tax/income-tax-rates-ay-201314-fy-201213.html
10	**Bank funding**	1080.31	Million INR	Calculated
11	**Salvage Value**	10	%	GERC Tariff Order dated 08/08/2012, page no: 16 (http://www.gercin.org/renewablepdf/en_1344430244.pdf)
12	**Loan Parameters**			
	Rate of Interest of Loan	13.0	%	GERC Tariff Order dated 08/08/2012, page no:22 (http://www.gercin.org/renewablepdf/en_1344430244.pdf)
	Moratorium	0		
	Loan Repayment period	10	Years	GERC Tariff Order dated 08/08/2012, page no: 22 (http://www.gercin.org/renewablepdf/en_1344430244.pdf)

The equity IRR thus computed is **9.31**% and compared to the benchmark of **18.01%,** it is evident that the project activity is not financially viable.

[8] Since there is an interchange in location of a WTG between the proposed locations at the time of investment decision and actual installation, i.e. VW 41 is being used in place of JW 08 and capacity of the WTG of 1.8 MW is being enhanced to 2.0 MW, the appointed third party prepared an addendum to the original PLF report. As per the addendum to the third party PLF report, the revised PLF of the project is 26.48%. As the original PLF is 26.72% which is more than the revised one, for the sake of conservativeness, project proponent has kept the higher PLF (26.72%) for financial indicator calculation.

Step 2 (d): Sensitivity Analysis

As per paragraph 20 of "Guidelines on the Assessment of Investment Analysis" Version 05, EB 62, Annex 5, "the purpose of the sensitivity analysis is to determine in which scenarios the project activity would pass the benchmark or become more favourable than the alternative". Further, "only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude)".

Thus, for this project activity, the following parameters are considered for the sensitivity analysis:

i) Capital cost
ii) O&M cost
iii) Tariff
iv) Generation

This guideline also states that, "sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances" and "a scenario resulting in the project activity passing the benchmark or becoming a financially attractive alternative needs to be assessed.

Thus, a sensitivity analysis has been performed by applying a variation of ±10% to the above parameters:

Parameters	**+10%**	**-10%**	**Benchmark IRR**
Project Cost	6.20%	13.23%	18.01%
Tariff	12.84%	5.74%	
PLF	12.84%	5.74%	
O&M Cost	8.41%	9.87%	

From the above table it can be concluded that, if the electricity generation increased by 10%, project cost decreased by 10%, O & M cost decreased by 10% and tariff increased by 10%, financial indicator will not cross the benchmark selected by the PP.

Further, to make the assessment more robust, the project proponent has checked the limit at which the financial indicator breaches the benchmark.

Financial Indicator breaches benchmark when	Project cost	Decreases by 17.75%	The actual project cost as per the agreements signed with Vestas and purchase orders placed to different parties for balance of project (BoP) work sums up to 1433.40 Mn. INR against proposed/assumed project cost of 1543.30 Mn. INR. The actual project cost thus calculates to be 7.12% less than the assumed cost. It should be noted that the project is under construction and there will be some additional cost

			by the time commissioning takes place. Therefore, there is no probability for the project cost to decrease by 17.75%.
	Tariff	Increases by 22.5%	Since the PPA (Power Purchase Agreement) would be signed at the tariff rate determined by GERC vide its tariff order, any change in tariff is not possible.
	Generation	Increases by 22.5%	22.5% increase in generation i.e. a net PLF of 32.73% on sustained basis throughout the entire project life time is highly improbable.
	O&M Cost	Decreases by 145.0%	A reduction of more than 100% in O&M cost is practically impossible.

The project activity is clearly unattractive in absence of CDM income. Hence the project activity is additional. The successful registration of the project as CDM project is imperative in order to make it financially more attractive.

Step 3: Barrier Analysis
Additionality of the project is demonstrated through investment analysis. Hence, barrier analysis is not used.

Step 4: Common practice analysis

As per "Tool for the demonstration and assessment of additionality", version 07.0.0, the common practice analysis test shall be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region. The common practice analysis is a credibility check to complement the investment analysis (Step 2).

The PP has demonstrated the common practice test by "Guidance on Common Practice" Version 02 as below.

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

The capacity of the project activity is 22.0 MW; therefore, the applicable output range as defined in the step is +/-50% of the installed capacity of the proposed project activity (22.0 MW). Hence, the applicable output range will be 11.0 MW to 33.0 MW.

Step 2: Identify similar projects (both CDM and non-CDM)

As per paragraph 1 of common practice guideline, ver 02.0 (EB 69, Annex 8), the PP has chosen the entire host country as the geographical area for the purpose of common practice analysis and considered electricity generation using wind energy is an output. As per step 2 of common practice guideline (Annex 8, EB 69), the number of the project identified (both CDM & non- CDM) with the installed capacities in the range outlined above are 184 as per Wind Power Directory 2013. The Electricity Act, 2003 is legislation in India that aims to transform the power sector in India. Therefore, considering the scenario prior to this act as different, the projects commissioned after this Act have only been considered.

Step 3:

Among them, as per step 3 of the common practice guideline, ver 02.0 (EB 69, Annex 8), the total number of the wind projects of the capacity range (+/-50%), which have been developed under CDM = 92 and the projects not have been developed under CDM = 92.

Hence, N_{all} = 92

Step 4:

In this section, project activities which are different from the proposed project under consideration of the different wind policies and tariffs (from state to state) have been analyzed. The policies/tariff for each state is regulated by the State Electricity Regulatory Commission of the respective states. The project activity is located in the state of Gujarat of India and the policy applicable for the wind projects is regulated by Gujarat Electricity Regulatory Commission. Therefore, it can be assumed that the policies and tariff are different in different states and hence projects installed in other states have been considered in N_{diff}. The identified projects in N_{all} (step 2), are located in other states than Gujarat and are regulated by the other State Electricity Regulatory Commissions (SERCs).

Therefore, these projects come under different investment climate and have been considered under N_{diff} .

Therefore, N_{diff} = 84.

Step 5: Calculate factor F = 1-N_{diff}/N_{all}

The factor F is calculated as below:
F=1-N_{diff}/N_{all}
i. e. F = 1 – (84/92) = 0.087

Therefore,
a) F = 0.087
b) N_{all} – N_{diff} = 8

As per para 10 of the latest common practice guideline, ver 02.0 (EB 69, Annex 8), the proposed project activity is a “common practice” within a sector in the applicable geo-graphical area if the factor *F* is greater than 0.2 and N_{all}-N_{diff} is greater than 3. From the above analysis, it can be seen that though N_{all} – N_{diff} is greater than 3, the project cannot be declared as a common practice in the region as **F is not greater than 0.2.** ,Therefore, the project is not a common practice in the host country (as per para 10 of the common practice guideline, ver 02.0 (EB 69, Annex 8)).

The approval and registration of the proposed project activity as a CDM project would lead to additional revenue thereby improving the returns from the project activity alleviating investment and regulatory policy risk to a certain extent. The successful registration also provides an incentive for other proponents to invest in wind power projects.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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According to the approved methodology ACM0002 (Version 15.0), the Emission Reduction (ERy) has been calculated as:

ERy = BEy – PEy

Where:

ERy	=	Emission reductions in year *y* (t CO_2e/yr)
BE**y**	=	Baseline emissions in year *y* (t CO_2/yr)
PE**y**	=	Project emissions in year *y* (t CO_2e/yr)

Estimation of Baseline Emissions:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that in the absence of the project activity, equivalent amount of electricity would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. Therefore, the baseline emissions have been calculated as follows:

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

Where:

BE_y	=	Emission reductions in year *y* (t CO_2e/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 CO2 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", version 04.0.0 (tCO2/MWh)

The project activity is the installation of a new, grid connected renewable power plant (Greenfield project) with no renewable power plant operating prior to the implementation of the project activity, hence, EG PJ, y has been calculated as:

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

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)

The proposed project activity is located in the state of Gujarat, which falls under the network of NEWNE grid. Therefore, as per the methodological tool, the CO2 emission factor for the displacement of electricity generated by power plants in the respective electricity system (i.e. NEWNE grid) is the combined margin emission factor (CM) of NEWNE grid. The CM is calculated using a weighted average of two emission factors pertaining to NEWNE grid, i.e. the operating margin (OM) and the build margin (BM) according to the procedures prescribed in the latest tool

"Tool to calculate the emission factor for an electricity system", Version 04.0.0. The steps of calculation are as follows:

STEP 1: Identify the relevant electricity systems

The Indian Electricity Grid system is divided into two independent regional grids, namely Integrated Northern, Eastern, Western, and North-Eastern (NEWNE) grid and the Southern Grid as per recently published CO2 Baseline Database for the Indian Power Sector, Version 9.0, 27/01/2014 by Central Electricity Authority (CEA), Government of India. As the project is located in the state of Gujarat, therefore, is under the network of NEWNE grid, NEWNE grid has been considered as the project electricity system.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I corresponds to the procedure contained in earlier versions of this tool. Option II allows the inclusion of off-grid power generation in the grid emission factor. Option II aims to reflect that in some countries off-grid power generation is significant and can partially be displaced by CDM project activities, e.g. if off-grid power plants are operated due to an unreliable and unstable electricity grid. Option II requires collecting data on off-grid power generation and can only be used if the conditions outlined therein are met. Option II may be chosen only for the operating margin emission factor or for both the build margin and the operating margin emission factor but not only for the build margin emission factor. If Option II is chosen, off-grid power plants should be classified in different classes of off-grid power plants. Each off-grid power plant class should be considered as one power plant *j, k, m or n*, as applicable. In case of project activity, Option I is used.

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

The project proponent wishes to use the Simple Operating Margin (OM) method for the estimation of the baseline. The use of the Simple OM method is justified as the share of the low cost/must-run resources constitutes less than 50% of the total grid generation in average of the five most recent years. The ex-ante option has been chosen where in a 3 year generation weighted average, based on the most recent data would be calculated and is fixed for the entire crediting period. Hence, the parameters for the calculation of OM do not need to be monitored and the OM does not need to be calculated during the chosen entire crediting period of ten years.

Step 4: Calculation of the operating margin emission factor according to the Simple OM method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

The Central Electricity Authority, Ministry of Power, Government of India has published a 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. The CO_2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system, Version 04.0.0". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

As per „Tool to calculate the emission factor for an electricity system", Option A ("Based on the net electricity generation and a CO_2 emission factor of each power unit") is used to calculate simple OM emission factor. Where Option A is used, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$$\mathbf{EF_{grid,OMsimple,y} = \Sigma\ (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	All power units serving the grid in year y except low-cost / must-run power units
y	the relevant year as per the data vintage chosen in STEP 3

The CO_2 emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database[9] (Version 9.0) for the last three years is as follows.

CO_2 emission factor for simple OM (tCO_2/MWh) (incl. Imports)			
Grid	**2010-11**	**2011-12**	**2012-13**
NEWNE	0.9710	0.9691	0.9914
South	0.9421	0.9602	0.9972
India	0.9641	0.9664	0.9915

The net electricity generation ($EG_{m,y}$) data, available under the CEA database[10] (Version 9.0), of all generating power plants (not including low-cost / must-run power plants / units) for the last three year is as follows:

Net Electricity Generation for Simple OM (MWh) (incl. Imports)			
Grid	**2010-11**	**2011-12**	**2012-13**
NEWNE	476,986,721	502,300,381	539,385,372

Thus, as can be seen from the above tables, the 3 years generation-weighted OM average for the most recent three years available at the time of PDD for validation, i.e. 2010-11, 2011-12 and 2012-13 for NEWNE grid is:

$EF_{grid,\ OM,\ y} = 0.9776\ tCO_2/MWh$

Step 5: Calculate the build margin emission factor

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

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

The project participants have chosen Option I, i.e. fixing 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.

The build margin emissions factor is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = (\Sigma EG_{m,y} \times EF_{EL,m,}) / \Sigma EG_{m,y}$$

Where:

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

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 4 (a) for the simple OM, using options A1B1 using for *y* the most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

The build margin emission factor ($\mathbf{EF_{grid,BM,y)}}$ for the year 2012-13 (most recent year) for NEWNE grid is 0.9673 tCO2/MWh

Step 6. Calculate the combined margin emissions factor

The emission factor $EF_{grid,\ CM,\ y}$ of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as $EF_{grid\ OM,y}$ and $EF_{grid\ BM,y}$, then the $EF_{grid,CM,\ y}$ is given by:

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

Where:

$EF_{grid,\ BM,\ y}$ - Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,\ OM,\ y}$ - Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} - Weighting of operating margin emissions factor
w_{BM} - Weighting of build margin emissions factor (where $w_{OM} + w_{BM} = 1$).

The "Tool to calculate the emission factor for an electricity system" requires that for intermittent sources for power generation like wind as in the case of proposed CDM project activity the following weights to be used for calculating the emission factor for Combined Margin.

$W_{OM} = 0.75$
$W_{BM} = 0.25$

Using the values of emission factors for OM and BM for NEWNE grid, provided in the CEA official database and as computed above; and the weights provided above, the value of the emission factor for the combined margin has been determined to be:

= 0.9776 * 0.75 + 0.9673 * 0.25 tCO2/MWh
= 0.9750 tCO2/MWh

Project Emission Calculations:

According to the baseline methodology ACM0002 (Version 15.0), the GHG emission of the proposed project within the project boundary is zero, i.e.

$PE_y = 0$

Leakage Emission Calculation:
As per the applicable methodology ACM0002, Version 15.0, no leakage emissions are considered.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

Data / Parameter	$EF_{Grid,OM,y}$
Unit	tCO_2/MWh
Description	Operating margin CO2 emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 09
Value(s) applied	0.9776
Choice of data or Measurement methods and procedures	The operating margin emission factor is a 3-year generation-weighted average data, based on the most recent data available on CEA database at the time of submission of the CDM-PDD to the DOE for validation. Data compiled in CEA CO2 CDM database is in line with the requirements Version 04.0.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of data	Calculation of baseline emissions
Additional comment	This parameter is calculated ex ante and remains fixed for the entire crediting period.

Data / Parameter	$EF_{Grid,BM,y}$
Unit	tCO_2/MWh
Description	CO_2 Built Margin emission factor of the grid
Source of data	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 09
Value(s) applied	0.9673
Choice of data or Measurement methods and procedures	The build margin emission factor is the most recent data available from CEA CO2 Baseline database. Data compiled in CEA CO2 CDM database is in line with the requirements Version 04.0.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of data	Calculation of baseline emissions
Additional comment	The build Margin is calculated ex ante and fixed for the entire crediting period.

Data / Parameter	$EF_{Grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined Margin Grid emission factor
Source of data	Central Electricity Authority:CO2 Emission Database CEA CO2 Baseline database Version 09
Value(s) applied	**0.9750**
Choice of data or Measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}$ The following default values should be used for w_{OM} and w_{BM}: For Wind power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 for the selected crediting period Data compiled in CEA CO_2 CDM database is in line with the requirements Version 04.0.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of data	Calculation of baseline emissions
Additional comment	The Combined Margin is calculated ex ante and fixed for the crediting period.

B.6.3. Ex ante calculation of emission reductions

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Baseline Emissions:

$BE_y = EG_{facility,y} * EF_{grid,CM,y}$

= 51,494.8 [11]*0.9750
= 50,207tCO_2e (Rounded Down)

As the project activity is wind power project, project emissions are zero.
Therefore, Emission reductions are:

$ER_y = BE_y - PE_y$
= 50,207- 0
= 50,207tCO_2e

[11] As per third Party PLF assessment report

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1:2014 - 2015	50,207	0	0	50,207
Year 2:2015 - 2016	50,207	0	0	50,207
Year 3:2016 – 2017	50,207	0	0	50,207
Year 4:2017 – 2018	50,207	0	0	50,207
Year 5:2018 – 2019	50,207	0	0	50,207
Year 6:2019 – 2020	50,207	0	0	50,207
Year 7:2020 – 2021	50,207	0	0	50,207
Year 8:2021 – 2022	50,207	0	0	50,207
Year 9:2022 – 2023	50,207	0	0	50,207
Year 10:2023 – 2024	50,207	0	0	50,207
Total	502,070	0	0	502,070
Total number of crediting years	10			
Annual average over the crediting period	50,207	0	0	50,207

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter	$EG_{facility,y}$
Unit	MWh/year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Monthly Certificate for Share of Electricity Generated by Wind Firm issued by GETCO
Value(s) applied	51,494.8
Measurement methods and procedures	Monitoring: a) At WTG yard: Electrical Energy Meters which are electronic tri-vector meters of accuracy class 0.5s or above b) At substation: Electrical Energy Meters which are bidirectional electronic tri-vector ABT meter of accuracy class 0.5s or above Data type: Measured & Calculated Archiving: Paper & Electronic Responsibility: a) At WTG yard: The O&M site-in-charge shall be responsible for the regular recording of data b) At substation: The representative of the state electricity board at the substation shall be responsible for the regular recording of data Calibration Frequency: The meters shall be calibrated at least once in a three years period.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	The Quantity of net electricity generation from the monthly wind energy certificates will be cross-checked with the invoices for the sale of power by Powerica. Meter calibration shall be conducted at least once in a three years period.
Purpose of data	To calculate baseline emission
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. In the case of the crediting period start & end dates of the project activity falls in – between the billing cycles, then for emission reduction calculations, the daily generation reports provided by the O&M team/service provider, shall be considered.

Data / Parameter	$EG_{LCS,y}$
Unit	MWh/year
Description	Summarised quantity of electricity generation recorded at LCS of each WTGs
Source of data	Generation at LCS recorded through SCADA system/Centralised Monitoring System (CMS)
Value(s) applied	
Measurement methods and procedures	The monthly summary of LCS meter readings will be prepared based on the reading of all individual WTGs monitored at CMS by the O&M team.
Monitoring frequency	Continuous
QA/QC procedures	The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the WTG would stop working and generate the error report.
Purpose of data	This parameter will not be used for CER calculation as only net electricity generation supplied to the grid is used in calculation of emission reductions. This parameter will only be used in the case of the crediting period start & end dates of the project activity falls in – between the billing cycles.
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Sampling plan

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Data and parameter monitored in section B.7.1 above does not require sampling.

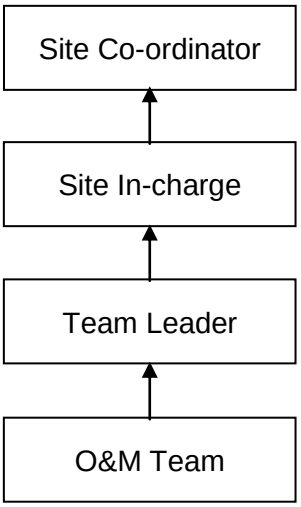
B.7.3. Other elements of monitoring plan

>>

The project activity is in accordance with approved large scale methodology ACM 0002, Version 15.0, and therefore, can use the monitoring methodology for the same.

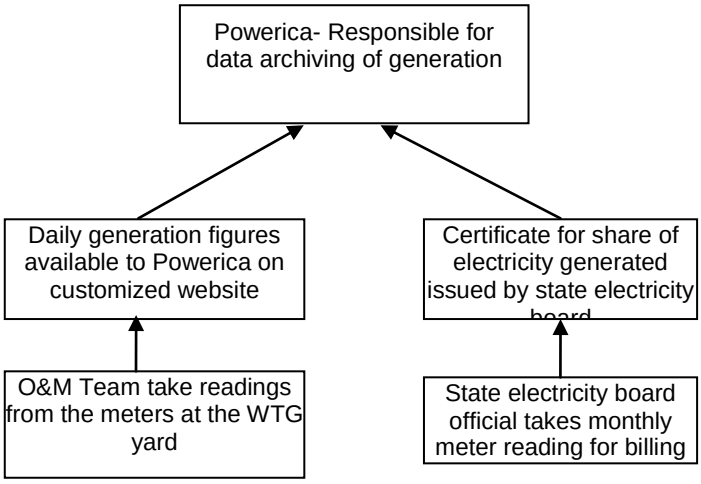
The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of metering the electricity supplied to the grid by the renewable technology. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity.

Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required. The sole parameter for monitoring is the electricity exported to the grid. The Project is operated and managed by a fully-fledged O&M team deputed at the project site. There would be a designated Site-In-Charge (O&M) on site who will be responsible for monitoring the electricity exported from the project activity. The organizational structure of the O&M team is as follows:



Personal Training:
The training for operating and maintaining the plant will be provided to the O&M team whenever there would be necessity or any technological up gradation

The overall flow of information has been depicted using the following hierarchical structure:



Monitoring Process at project site
Metering of wind power is done as under:

- Joint monthly meter reading is taken from substation meter by representative of state electricity board and O&M team/service provider (on behalf of individual wind farm owners). Let the total generation recorded for particular month is 'X' units in sub-station meter.
- Joint daily meter reading is taken at Local Meter-(transformer yard meter of each WTG) by representative of O&M team/service provider (on behalf of individual wind farm owners) which is approved by representative of state electricity board on a monthly basis. Let us assume total approved generation of Powerica recorded for particular month is 'Y_1' units.
- Similarly joint meter reading for other wind farm owners is also taken. Let the generation of individual owner recorded for particular month are 'Y_2, Y_3,.....Y_n' units.
- The state electricity board apportions 'X' to individual wind farm owners using following formula and issues monthly certificates.
  Net units calculated for billing = $X * Y_i / \Sigma Y_n$
- For Powerica, net units calculated for billing = $X * Y_1 / \Sigma Y_n$
- It must be noted here that the meter readings as mentioned above are calculated as the product of meter multiplication factor and the difference of the current and previous meter readings

Based on the above procedure, the Monthly Wind Energy Certificates are provided to the project proponent. This is to be noted that the detail procedure of monitoring is illustrated here for the sake of understanding; for the preparation of monitoring report during periodic verifications, only the net electricity generation value mentioned in monthly wind energy certificates shall be directly used for emission reduction calculation. No other parameters as explained above shall be used and presented in the monitoring report.

Emergency preparedness:
In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter will be used for readings.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

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Date of completion of study on application of the selected methodology: 15/04/2014

Contact Information:

Aamir Qazi
General Manager (Wind Division)
Powerica Limited
Sion (E), 9th Floor, Godrej Coliseum
Mumbai, Maharashtra
400022

Powerica Limited is the project proponent in appendix-1 below.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

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31/12/2013 (Date when supply agreement was signed with technology provider)

C.1.2. Expected operational lifetime of project activity

>>

20 Years 0 Month[12]

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Fixed

[12] Reference: Technical specification of V100-2.0 MW WTG of VESTAS make certified by DNV

C.2.2. Start date of crediting period

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01/10/2014 or the date of registration of the project under UNFCCC, whichever is latter.

C.2.3. Length of crediting period

10 years 0 Month

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

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In the applicable EIA notification i.e. S.O. 3067[13], dated 01/12/2009, Ministry of Environment & Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted. The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. However due weightage has been given to environmental aspects.
However, some of the significant impacts taken into consideration during the construction and operation of the wind farm are as follows:

1. Land Use: Due consideration has been taken in order to ensure that the land available for the setting up of the wind farm has no alternative use. Furthermore, no forest land was used for the purpose. Stringent measures were followed in order to prevent any soil erosion during the construction phase.

2. Noise Pollution: Typically, the wind farms are located in isolated areas and thereby the noise impacts on the neighbouring population are reduced. Also during the construction phase, suitable noise prevention and reduction measures were employed in order to reduce the ill-effects of noise pollution on the construction labourers.

3. Water Pollution: The nearest large water body present is the Arabian Sea. However, no significant impacts are envisaged due to the project activity.

4. Air Pollution: The implementation of the project activity will reduce the dependence on fossil fuel generated power and thereby lead to the improvement in air quality during the operational phase.

5. Visual Impact: As gathered in the stakeholder analysis, the wind mills do not have a negative impact on the surrounding villagers in terms of visual intrusion/impact.

6. Local Flora and Fauna: The land used for the purpose of setting up the wind farm was a barren land and therefore did not require any destruction of local flora. The only vegetation in the vicinity was shrubs and weeds.

Hence it can be concluded that the proposed project activity does not have any major negative impacts.

D.2. Environmental impact assessment

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The environmental impacts of the project activity are not considered to be significant by the project participant or the host party.

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

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

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Project Proponent has invited different stakeholders to a meeting to explain the proposed project activity and benefits associated with it on 10/01/2014.

The stakeholders identified for the project activity are as follows:
1. Local villagers
2. Local Gram Panchayat Members
3. Local School Staffs
4. Employees Powerica Limited

These stakeholders were invited for the meeting through public notice on local paper dated 04/01/2014 and personal invitation also, a week in advance of the meeting. A record of the people attending the meeting was maintained and all comments from the stakeholders received during the meeting were recorded and compiled in the minutes of meeting.

In the meeting, the stakeholders were briefed about the project activity in the local language and were informed as to how power is generated using wind energy. They were then informed about global warming and its causes and the effects. Subsequently, they were introduced to the concept of CDM and how it is helping the world in mitigating Green House gas emissions. The stakeholders were then invited to provide their comments on how the project activity had affected their lives and about their expectations from the project activity.

E.2. Summary of comments received

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Powerica Limited is in process of receiving all necessary approvals / clearances / permissions from various local bodies which represent the local stakeholders. The stake holder meeting was conducted at the respective project sites and was attended by the office bearers and residents of the nearby villages. The stakeholders shared their views on the project activity. Most of them showed positive response. They were hopeful that the proposed project activity will help in the development of the local community, generate more employment and solve the electricity problem without harming their natural surroundings. No adverse comments were received regarding the project activity and all the queries raised were satisfactorily addressed. The stakeholders were very observant and supportive. All the documents related to stakeholder meeting will be submitted to DOE during Validation.

The local stakeholders were also informed about of sharing 2% of the Certified Emission Reduction (CERs) generated out of the project for the development of the local communities. The activities to be conducted for the same and its implementation plan were discussed during the stake holder consultation process. The implementation plan for 2% CER revenue share was finalized after discussion and mutual consent from local stakeholders and representatives of project proponent.

E.3. Report on consideration of comments received

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The stakeholder’s comments have been considered while preparing the PDD. No negative comments were received from any of the stakeholders which mandated an action on the part of the project promoter.

SECTION F. Approval and authorization

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Host Country Approval for the project with reference number: 4/1/2014-CCC, dated 03/09/2014 is received from National CDM Authority of India.

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

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Powerica Limited
Street/P.O. Box	Sion (E)
Building	9th Floor, Godrej Coliseum
City	Mumbai
State/Region	Maharashtra
Postcode	400022
Country	India
Telephone	+ 91 22 40012000
Fax	+91 22 40012620
E-mail	pradeep.gupta@powericaltd.com
Website	http://www.powericaltd.com/
Contact person	
Title	General Manager
Salutation	Mr.
Last name	Qazi
Middle name	
First name	Aamir
Department	Wind
Mobile	+91 9833521640
Direct fax	+91 22 40012620
Direct tel.	+ 91 22 40012673
Personal e-mail	aamir.qazi@powericaltd.com

Appendix 2. Affirmation regarding public funding

No public funding is availed by the project proponent for the project activity

Appendix 3. Applicability of methodology and standardized baseline

Please refer to section B.2.

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

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

Appendix 5. Further background information on monitoring plan

The monitoring plan has been explained in section B.7.3.

Appendix 6. Summary of post registration changes

Not applicable

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ANNEX-1

Action Plan for expenditure incurred through 2% of CER revenues									
Financial Year (A)	**Activity (B)**	**Sold 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)**
Indicates the year for which the assessment is being provided	*Provides details of the social/ community activities on which the expenditure has been incurred*	*Quantity of CERs sold for the assessment year*	*CER price at which the transaction has happened*	*Total amount CDM amount received*	*Expenditure made on the social/ community development activity in the current assessment year*	*Additional expenditure incurred on capital goods in the previous assessment years being carried forward to the current assessment year*	*Net Expenditure on social/ community development activity for the current year*	*Indicates the % of the total CDM amount spent on social/community development activity*	*Indicates the documentation to be provided to the DOE during the verification to evidence the amount spent on social/community development activity*

Document information

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

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