Project design document form
(Version 11.0)

BASIC INFORMATION	
Title of the project activity	Renewable Energy Power project by DDWL
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	05
Completion date of the PDD	24/08/2020
Project participants	Dev-Dwarka Wind Project Limited
Host Party	India
Applied methodologies and standardized baselines	Methodology: - ACM0002/ Version 20.0, EB 105, "Grid-connected electricity generation from renewable sources[1]" Standardized Baseline: Not Applicable
Sectoral scopes	Sectoral Scope 1: Energy Industries (renewable - /non renewable sources)
Estimated amount of annual average GHG emission reductions	59,407 tCO_2e

[1] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy source. Dev-Dwarka Wind Project Limited is the promoter of the proposed project activity. The project activity involves installations of 15 wind turbines of 2 MW capacity at Gujarat. The total capacity of the proposed project activity is 30 MW. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 59,407 tCO_2e per year, thereon displaces 63,072 MWh/year amount of electricity from the generation-mix of power plants connected to the INDIAN Electricity grid, which is mainly dominated by thermal/fossil fuel based power plant. Total estimated emission reduction for the chosen renewable crediting period is 415,849 tCO_2e.
The power generated from the project activity will be sold to the State Electricity Board.

The details of the WTGs and the state of installation are mentioned in the table:-

Project Promoters' Name	Capacity in MW	Connection with Grid	Usage	State
Dev-Dwarka Windproject Limited	15 x 2 MW	INDIAN	Sale to EB	Gujarat

Sectoral Scope: 01 Energy Industries (renewable - /non renewable sources)

Title: Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"

References: Approved consolidated baseline methodology ACM0002"Grid-connected electricity generation from renewable sources" (Version 20)[2]

ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 7.0, EB 100 Annex 4[3]
- Tool for the demonstration and assessment of additionality – Version 7, EB 70 Annex 8[4]

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that 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 07.0[5].

Baseline Scenario:

[2] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.pdf

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

[5] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.pdf

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following as per applied methodology:
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".

Hence, pre-project scenario and baseline scenario are the same.

Sustainable development indicators

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 in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India[6].Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well being

The project activity provided / provides job opportunity to local people during erection, commissioning and maintenance of the wind machines. Frequency of visiting villages and nearby areas by skilled, technical and industrialist increase due to installation /site visit/operation and maintenance work related to WTGs. This directly and indirectly positively effects the economy of villages and nearby area.

Environmental well being

The Wind power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions. The impact on land, water, air and soil is negligible. Thus the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.

Economic well being

The CDM project activity generates permanent and temporary employment opportunity within the vicinity of the project. The electricity supply in the nearby area improves which directly and indirectly improves the economy and life style of the area.

Technological well being

The project activity is step forward in harnessing the untapped wind potential and further diffusion of the wind technology in the region. The project activity leads to the promotion of WTGs and demonstrates the success of wind turbines in the region which further motivate more investors to invest in wind power projects. Hence, the project activity leads to technological well-being.

In addition to this, the project participant will contribute 2% of the CDM revenue realized from the CDM project for sustainable development including society/ community development. Project Participant is aware about the DNA guideline on commitment of 2% of the CDM revenues towards

[6] http://www.cdmindia.gov.in/approval_process.php

sustainable development. The Host County Approval issued by India DNA declaring acceptability of the Sustainable Indicators by the project activity shall be submitted to DOE.

The proposed project activity is not a part of any other PoA or CPA that has been excluded from registered CDM POA as a result of erroneous inclusion of CPAs.

A.2. Location of project activity

Host Party **:** India

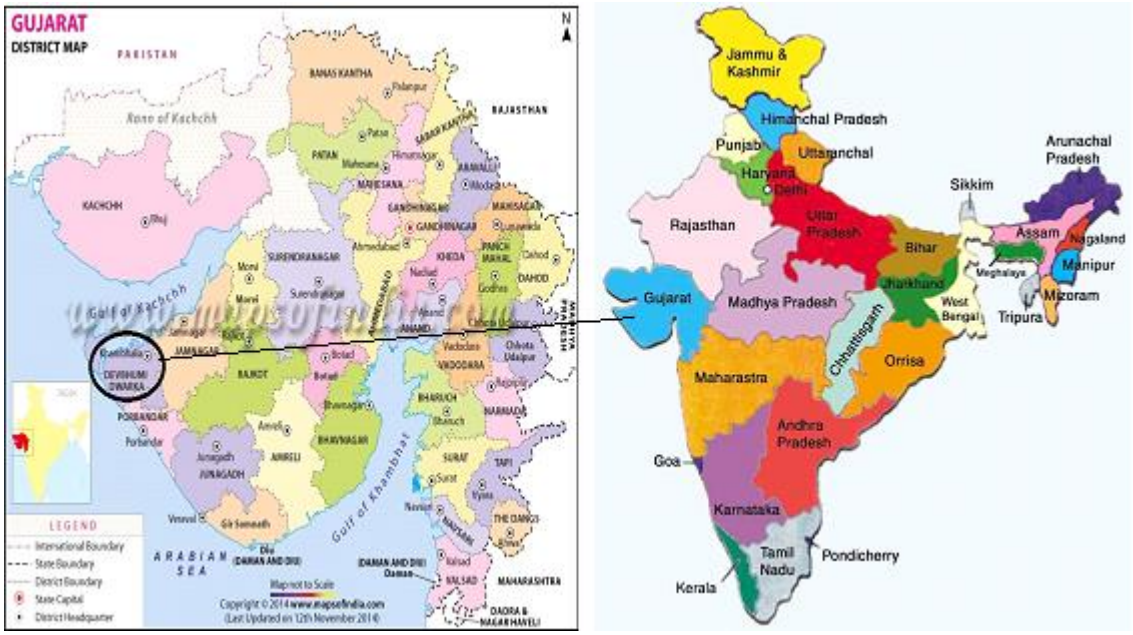
Region/State/Province : Gujarat

Project Promoters' Name	Capacity	Make	Site	District	State
Dev-Dwarka Windproject Limited	15 x 2MW	Vestas	Beraja & Datrana	Dev Bhoomi Dwarka	Gujarat

Physical/Geographical location

Project Investors' Name	WTG ID	Latitude (N)	Longitude (E)	Village	Date of Commissioning
Dev-Dwarka Wind Project Limited	VWL/2000/16-17/3851	22°15'34.4"	69°29'32.0"	Beraja & Datrana	29/06/2016
	VWL/2000/16-17/3852	22°20'20.4"	69°30'45.0"		
	VWL/2000/16-17/3853	22°09'09.6"	69°45'26.8"		
	VWL/2000/16-17/3854	22°15'15.6"	69°54'30.8"		
	VWL/2000/16-17/3860	22°17'15.5"	69°32'32.8"		
	VWL/2000/16-17/4020	22°17'34.4"	69°32'32.0"	Nana Asota	09/01/2017
	VWL/2000/16-17/4021	22°17'20.4"	69°32'45.0"		
	VWL/2000/16-17/4022	22°18'09.6"	69°32'26.8"		
	VWL/2000/16-17/4023	22°18'15.6"	69°32'30.8"	Beraja & Datrana	21/01/2017
	VWL/2000/16-17/4024	22°16'15.5"	69°31'32.8"		
	VWL/2000/16-17/4025	22°16'35.5"	69°32'19.8"		
	VWL/2000/16-17/4026	22°16'35.8"	69°32'17.7"		
	VWL/2000/16-17/4027	22°16'35.2"	69°32'16.6"		30/01/2017
	VWL/2000/16-17/4028	22°16'39.2"	69°32'14.8"		

	VWL/2000/16-17/4029	22°16'32.8"	69°32'21.8"		



A.3. Technologies/measures

The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation. There is no transfer of technology involved in the project activity.

The project activity comprises a total of 15 WTG's of Vestas Ltd of V110 model. The technical specifications of V110 model are mentioned below.

There is no transfer of technology involved in the project activity from any Annex- I countries. The design lifetime of all the WTG's is 25 years.

Technical details for V110, 2000 KW Machine

Particulars	Details
Make	Vestas
Rated power	2000 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	22 m/s
Survival wind speed	52.5 m/s
Generator	Variable Speed Multi Pole Synchronous
Rotor Diameter	110 m
Swept area	9503 m^2
Speed Range	9 to 17.3 rpm
Hub Height	80 m
Design	Tubular, Four Sections
Foundation Type	Floating
Control of Output	Pitch Regulation
Speed Control	Variable, micro controller based
Low Voltage Ride Through (LVRT)	3 seconds
Primary Brake system	Aerodynamic

Pitch System	Electromechanical
Remote Monitoring	VPN
Wind Turbine type class	IEC III A
Design Lifetime	25 years

For monitoring equipment, their location and technical specifications, refer Section B.7. For Plant Load Factor, please refer Section B.6.3.

The Net electricity generated from the project activity is 63,072 MWh/year. The annual GHG emission reduction through this project activity is estimated to be 59,407 tCO_2e whereas the GHG emission reductions for the chosen crediting period of seven years are 415,849 tCO_2e.

Baseline Scenario:

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following as per applied methodology:

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".

Hence, pre-project scenario and baseline scenario are the same.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Dev-Dwarka Windproject Limited (Private Entity)	No

A.5. Public funding of project activity

There is no public funding from Annex 1 countries and no diversion of Official Development Assistance (ODA) involved in the project activity.

A.6. History of project activity

The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA);

The proposed CDM project activity is not a project activity that has been deregistered.

The proposed CDM project activity was a not CPA that has been excluded from a registered CDM PoA;

No any registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity

A.7. Debundling

Not Applicable

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

Title: Consolidated baseline and monitoring methodology for "Grid-connected electricity generation from renewable sources"

References: Approved consolidated baseline methodology ACM0002 "Grid-connected electricity generation from renewable sources" (Version 20.0)[7]

ACM0002 draws upon the following tools which have been used in the PDD:

- Tool to calculate the emission factor for an electricity system – Version 7.0.0, EB 100 Annex 4[8]
- Tool for the demonstration and assessment of additionality – Version 07, EB 83 Annex 8[9]

B.2. Applicability of methodologies and standardized baselines

The project activity meets the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 20.0, Sectoral Scope 1:

Applicability	Project activity vis-à-vis applicability Conditions
This methodology is applicable to grid-connected renewable power generation project activities that: • install a Greenfield power plant; • involve a capacity addition to (an) existing plant(s); • involve a retrofit of (an) existing operating plants/units; • involve a rehabilitation of (an) existing plant(s)/unit(s) or • involve a replacement of (an) existing plant(s)/unit(s).	The project activity is installation of a new grid connected wind power plant[10] at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.
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;	The proposed project activity is an installation of a new grid connected wind power plant[10] and hence this condition is met.
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,	The project does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable[10].

[7] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

[8] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

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

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;	
In case of hydro power plants, one of the following conditions shall apply: • The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or • 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/m^2; or • The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2.	The project activity is a grid connected wind power project[10] and not a hydro power plant. Therefore, these criteria are not applicable for the project activity.
The project activity is an integrated hydro power 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/m^2, all of the following conditions shall apply: • The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2; • Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; • Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be; ✓ Lower than or equal to 15 MW; and ✓ Less than 10 per cent of the total installed capacity of integrated hydro power project.	The project activity is a grid connected wind power project[10] and not a hydro power plant. Therefore, these criteria are not relevant to the project activity.
In the case of integrated hydro power projects, project proponent shall: • 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 • 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	The project activity is a grid connected wind power project[10] and not a hydro power plant. Therefore, these criteria are not relevant to the project activity.

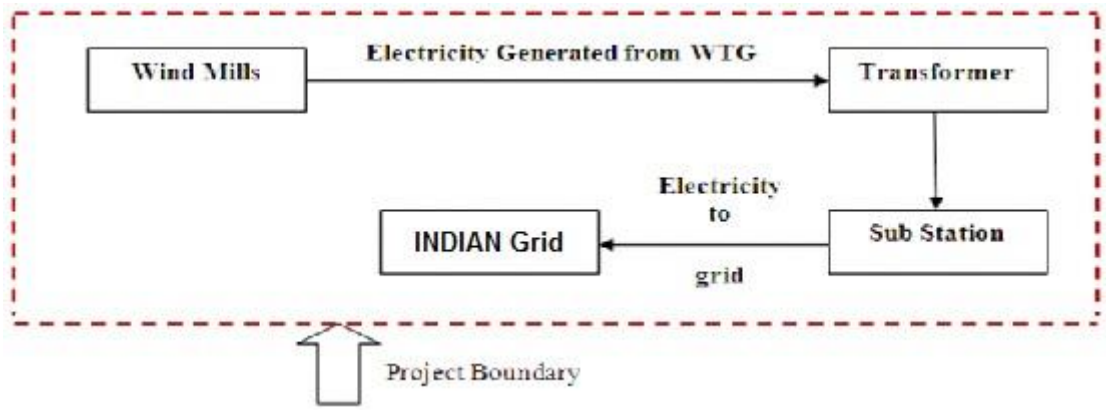
implementation of CDM project activity.	
Methodology is not applicable to the following • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants/units	• The project activity is installation of a new grid connected wind power project[10] and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the project activity. • This is a wind power plant[10] and not a biomass fired plant and hence this criterion is not applicable to the project activity.
In the case of retrofits, rehabilitations, 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, 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".	The project activity is a new grid connected wind power plant[10] and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions of "Tool to calculate the emission factor for an electricity system"	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.1 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since the project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The project activity is a grid connected wind power project and not a hydro power plant. Therefore, this criterion is not applicable for the project activity.

B.3. Project boundary, sources and greenhouse gases (GHGs)

Project boundary has been ascertained using para 20 of ACM0002 (Version 20.0) – "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".

Hence the project boundary includes the wind turbine generator, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the INDIAN grid.

Project Boundary:



The GHG emission sources considered for the project boundary and their explanations are as follows:

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Grid-connected electricity generation	CO_2	Yes	Major emission sources.
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
		Other	No	No other emissions are emitted from the project
Project scenario	Greenfield wind energy generation system	CO_2	No	The project activity does not emit any emissions.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.
		Other	No	Project activity does not emit other forms of GHG emissions

B.4. Establishment and description of baseline scenario

As per the approved consolidated methodology ACM 0002, Version 20.0

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

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

The project activity involves setting up of WTGs to harness the power of wind to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the state grid (part of INDIAN Electricity grid), which is fed mainly by fossil fuel fired plants.

Hence, the baseline for the project activity is the equivalent amount of power from the INDIAN grid.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publically available.

The combined margin of the INDIAN grid (used for determination of Baseline Emission Factor) used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,y}$ or $EF_{grid,CM,y}$	0.9419 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO_2 Emission Database, Version 15.0 Dated Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9622 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 15.0, Dated Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8811 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 15.0, Dated Dec 2019 published by Central Electricity Authority (CEA), Government of India

Baseline CO_2 Emission Database, Version 15.0 Dated Dec 2019[11] was the latest available data at the time of PDD submission for request for registration.

It is to be noted that at the time of submission of PDD for GSC comments, CEA database version 12 was latest data available with PP and based on these data combined margin emission factor comes to be 0.9777 tCO_2/MWh. However PP has referred the latest CEA database version 15.0, for combined margin emission factor calculations and same is calculated as 0.9419 tCO_2/MWh which is more conservative in nature. PP has used conservative emission factor for emission reduction calculations. Section B.6 of PDD referred CEA database version 15.0 due to conservative approach.

B.5. Demonstration of additionality

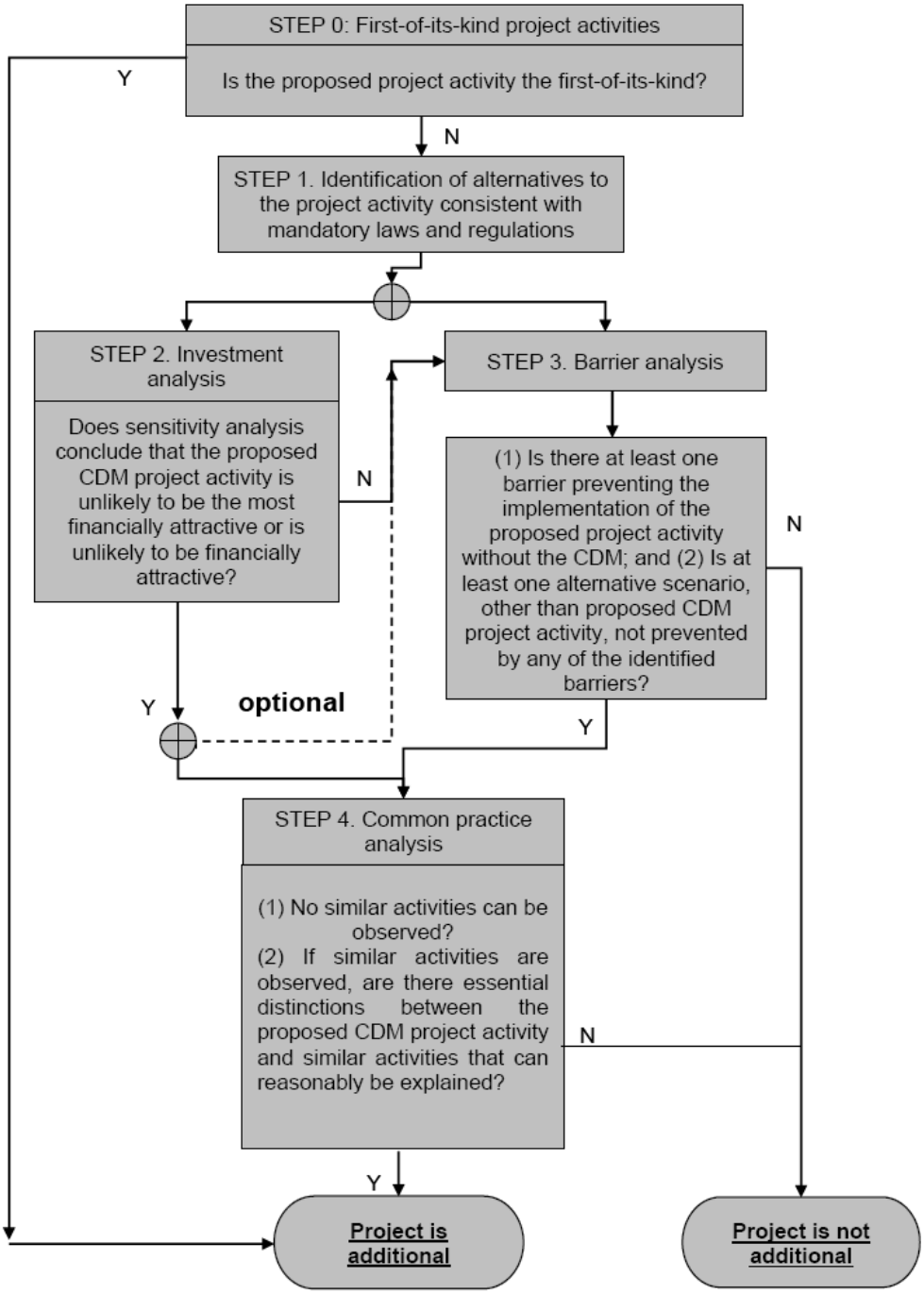
The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology, tool,

[11] https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver15.pdf

standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.

Specify the methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by DNAs and approved by the Board, that establish automatic additionality for the proposed project activity (including the version number and the specific paragraph, if applicable).	Not Applicable, as the project is a wind power project
Describe how the proposed project activity meets the criteria for automatic additionality in the relevant methodology, tool, standardized baselines or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.	Not Applicable, as the project is a wind power project

The proposed CDM project generates power using wind energy which is a renewable, zero emission source of energy. Baseline considerations for the project are based on approved consolidated baseline methodology ACM0002 (Version 20.0). The methodology requires the project proponent to determine the additionality based on “Tool for the demonstration and assessment of additionality”, Version 7.0. The step-wise approach to establish additionality of the project activity has been followed, details of which are provided in the following paragraphs:



The additionality of the Project activity is ascertained in line with the applicable guidance from the UNFCCC. The demonstration of additionality for the proposed Project activity is being carried out in accordance with the additionality tool provided by the UNFCCC i.e. “Tool for demonstration and assessment of Additionality” Version 07.0.0,. The tool provides a step-wise approach to demonstrate additionality which is displayed below:

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first of its kind. Hence, this step is not applicable.

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

The methodology ACM0002, prescribe the baseline for the project activity which is an installation of new grid connected power plant and hence no further analysis is required for identification of alternatives.

Step 2: Investment Analysis

Sub-step 2a: Determine appropriate analysis method
Selection of Financial Indicator:

According to the "Tool for demonstration and assessment of Additionality[12]", *the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach*. Therefore in accordance with the guidance, the relevant financial indicator for project activity has been chosen as post tax equity IRR.

Determine appropriate analysis method

As per Sub-step 2a, Paragraph (1), as the project activity is selling the generated electricity to National Grid & getting financial benefits other than CDM benefits hence, Option- I (Apply simple cost analysis) is not applicable under this situation.

Benchmark Calculation
At the time of decision made of project activity, Version 07 of methodological tool "Investment Analysis" (version 7 & 8) were the latest available tools to the PP. However, the request for registration for Version 7 could be submitted till 28/06/2018 and for version 8 the registration request could be submitted till 26/07/2019, version 09 RFR submission valid till 24/07/2020, PP followed version 10 for Investment analysis. Hence, PP has used Methodological Tool for Investment Analysis version 10 (EB 105, Annex 06). Upon comparison of the detail of version 07.0, 08.0 ,version 09.0 and version 10.0 of the methodological tools it was observed that, there is no major difference in the versions except for the change of default value for benchmark calculation. The default value as mentioned in version 07 was 11.06% for the group 1 projects in India, in the version 08 it was 10.73% for group 1 project in India and Value as mentioned in version 09 is 9.79% for group 1 project in India and 10.24% for group 1 project in India and Value as mentioned in version 10. Version 09 default value which is clearly more conservative than version 07, 08, 10 values. Hence, version 09 is used which is appropriate and more conservative for benchmark calculation and PP has considered the same tool for default value of return on equity for the project activity. The default value of Return on Equity for Group-1 projects in India is 9.79 % as per EB 101, Annex 11. It is to be noted that PP has followed the latest TOOL 27: Methodological tool for Investment Analysis, Version 10 for additionality. Though default value as per latest version 10 in 10.24% and as per version 07 (available at the time of decision made) 11.06%, PP considered default value from version 09 i.e 9.79% as a conservative approach.

As per the guidelines on Investment Analysis para 15, "The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR. Benchmarks supplied by relevant national authorities are also appropriate". Since in this project activity, equity IRR has been considered as financial indicator, hence as per guidance 15 of Investment Analysis, Required/expected returns on equity are considered as appropriate benchmarks and benchmark supplied by relevant national authorities has been used.

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

Since the choice of benchmark is based upon parameters that are standard in the market, hence as per Guidance 20 of EB 101 Annex 11[13], "the cost of equity should be determined either by: (a) selecting the values provided in the Appendix; or by (b) calculating the cost of equity using CAPM". Hence as per option (a), the default value for India is being considered as per the value provided in Appendix of EB 101 Annex 11. The benchmark thus selected complies as per the relevant guidelines on Investment Analysis.

Further as per guidance 16 of EB 101 Annex 11, "In situations where an investment analysis is carried out in nominal terms and the available IRR benchmarks are in real terms, project participants shall convert the real term values of benchmarks 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". Following the above guidance, the default value is being converted to nominal values by adding inflation rate for 10 years[14], as per the inflation forecast rate provided by Reserve Bank of India.

Methodology deployed for arriving at a suitable value of Benchmark using Default Value has been described below:

- As the proposed project activity generates power utilizing wind energy, Group 1 as per para 5 of Appendix of EB 101, Annex 11 has been identified as a suitable category.

- The investment analysis has been carried out in Nominal terms. Accordingly, Default value as given in Para 6, Appendix, Annex 11, EB 101 has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India).

- Project investor has calculated Benchmark based on WPI mean inflation rate. As per Para 17 of Appendix of EB 101, Annex 11, the inflation forecast should be for the duration of the crediting period. The project investor has calculated benchmark using 10 years inflation as Benchmark for the project activity.

The benchmark has been computed in the following manner:

Nominal Benchmark[15] = {(1+Real Benchmark)*(1+Inflation rate)}-1
Where,
Real Benchmark = Default Value, i.e., 9.79% (as per Appendix of Annex 11, EB 101)
Inflation rate = Projected Inflation Rate for India

The investment decision made for the project activity is on 04/03/2016.

Default Value Benchmark:

Inflation Forecast for India as per RBI website:

Project Investor	Capacity	Inflation Forecast	Benchmark
		10 Years	

[13] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf

[14] Since RBI provides inflation forecast only for 5 years and 10 years, hence inflation forecast for 10 years is being considered keeping in view length of renewable crediting period.

[15] As per Fisher Equation, https://en.wikipedia.org/wiki/Fisher_equation

Dev-Dwarka Wind Project Limited	20 X 2 = 40 MW (at the time of investment making decision)	3.60%[16]	13.74%
	15 X 2 = 30 MW (actual capacity of the project after downsized)	3.60%[17]	13.74%

The inflation forecast for 10 years has been considered for benchmark calculation of the project activity.

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

Input values are based on project specific documents and publicly available data sources which can be clearly validated by the DOE, thus it complies with guidance 11 of EB 101, Annex 11.

Key assumptions used for calculating post-tax Equity IRR applicable at the time of investment decision, which is in line with are set out below in separate excel sheets.

Input Values for 40 MW Wind Project by Dev- Dwarka Wind Project Limited at Gujarat (at the time of Investment Making Decision)

Cost of the Project Activity	
Investor Name	**DDWL - (20 x 2.0 MW)**
Project Location	Gujarat
State	Gujarat
Machine Details	20 x 2.0 MW
Expected Date of Commissioning	31-Mar-2017
Life of Plant in years	25
	Offer Letter
	01-Mar-16

in INR MN

Items	Cost	Tax	Cost + Tax
Supply of WTG Comprehensive cost	1,821.45	-	1,821.45
Civil Work	23.39	-	23.39
Erection & Commissioning	44.48	-	44.48
Land and Site Development	51.44	-	51.44
Installation & Commissioning	42.72	-	42.72
Right to use Common Facilities	152.00	-	152.00
Total	2,285.38	-	2,285.38
O&M Expenses	44.00	6.34	50.34

[16] https://rbi.org.in/Scripts/PublicationsView.aspx?id=16731

[17] https://rbi.org.in/Scripts/PublicationsView.aspx?id=16731

Free for 1 Yr
5.72% Escalation, starting from 2nd Yr.

Assumptions and Values considered for Financial Analysis are as follows:

Details of the project		Source
State where the project is situated	Gujarat	As Per offer letter
No. of machines	20	As Per offer letter
Capacity /machine (MW)	2.00	As Per offer letter
Total Capacity (MW)	40.00	Calculated Value
Expected Date of Commissioning	31-Mar-17	Assumption
Life of the plant (Yrs.)	25	As per WTG manufacturer specifications
Generation of electricity		
PLF (%)	24.00%	As per GERC Order 08/08/2012(latest available to PP during decision making)[18]
Annual generation (kWh)	84,096,000	Calculated Value
Tariff rate at the decision making (INR/kWh)	4.23	As per GERC Order[19]
Operation and maintenance cost and Insurance		
O & M Expenses (INR Mn.)	50.34	As Per offer letter
O & M free for (Yr.)	1.00	As Per offer letter
Escalation in the operational expenses (%)	5.72%	As Per offer letter
Insurance (INR Mn.)	22.85	CERC Order dated 27/03/2012[20]
Financial parameters		
TOTAL COST (INR Mn.)	2,285.38	As Per offer letter
Loan Amount (INR Mn.)	1,599.76	70% loan and 30% equity
Equity Investment (INR Mn.)	685.61	Calculated Value
Term loan		
Loan Amount (INR Mn.)	1,599.76	As per GERC Order[21]
Interest rate (%)	13.00%	As per GERC Order[22]
Loan Tenure (Qtr.)	40	
Moratorium Period (Qtr.)	-	
Repayment Period (Qtr.)	40	Calculated Value
Repayment instalments value (INR Mn.)	39.994	Calculated Value
1st instalment from (Qtr. end)	30-Jun-17	Considered from the next Quarter End
Book Depreciation (SLM Method)		
Gross Depreciable Value (INR Mn.)	2,285.38	Calculated Value
Salvage Value (%)	10.00%	As per GERC Order[23]

[18] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[19] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[20] http://www.cercind.gov.in/2012/orders/RE_35_2012.pdf

[21] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[22] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[23] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

Salvage value (INR Mn.)	228.54	Calculated Value
Net Depreciable Value (INR Mn.)	2,056.84	Calculated Value
Residual Value (INR Mn.)	228.54	Calculated Value
IT Depreciation		
IT Depreciation (SLM Method) (%) for 10 years	6.00%	As per GERC Order[24]
IT Depreciation (SLM Method) (%) from 11th to 25th year	2.00%	
Income Tax		
Financial Year	**FY 2016-17**	
Income tax rate (%)	34.60%	As Per Income Tax Rule[25]
MAT (%)	20.01%	As per GERC Order[26]
Service Tax (%)	14.00%	As Per Income Tax Rule[27]
Surcharge (%)	7.00%	As Per Income Tax Rule[28]
Education cess (%)	3.00%	As Per Income Tax Rule[29]
Final Tax rates		
Income tax rate (%)	38.13%	Calculated Value
MAT (%)	22.05%	Calculated Value
Service Tax (%)	14.72%	Calculated Value

Please refer excel sheet for input parameters referred for IRR calculation.

The decision to invest in the project activity was taken on 04/03/2016 at the board meeting of Dev-Dwarka Wind Project Limited. To go ahead with the proposed CDM Project activity to generate additional revenues, as the investment was not financially attractive to generate enough revenues.

The board resolution acknowledged that the project does not generate enough returns and CDM revenue is considered in the cash flows to generate extra revenue for the project.

The result of the analysis is as follows:

WTG Owner	Capacity	Equity IRR	Benchmark
Dev-Dwarka Wind Project Limited	20 x 2 MW	7.14%	13.74%

Input Values for 30 MW Wind Project by Dev Dwarka Windproject Limited at Gujarat (Actual Scenario as the project has been downsized[30])

Cost of the Project Activity	
Investor Name	**DDWL - (15 x 2.0 MW)**

[24] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[25] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[26] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[27] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[28] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[29] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[30] Due to some internal change as per management decision and difficulty in execution, the project has been downsized from 40 MW to 30 MW. However the investment analysis has been transparently done for both the capacities in order to retain transparency.

Project Location	Gujarat
State	Gujarat
Machine Details	15 x 2.0 MW
Expected Date of Commissioning	31-Mar-2017
Life of Plant in years	25
	Offer Letter
	01-Mar-16

in INR MN

Items	Cost	Tax	Cost + Tax
Supply of WTG Comprehensive cost	1,366.09	-	1,366.09
Civil Work	17.54	-	17.54
Erection & Commissioning	33.36	-	33.36
Land and Site Development	38.58	-	38.58
Installation & Commissioning	32.04	-	32.04
Right to use Common Facilities	226.43	-	226.43
Total	1,714.03	-	1,714.03
O&M Expenses	33.00	4.76	37.76
	Free for 1 Yr		
	5.72% Escalation, starting from 2nd Yr.		

Assumptions and Values considered for Financial Analysis are as follows:

Details of the project		Source
State where the project is situated	Gujarat	As Per offer letter
No. of machines	15	As Per offer letter
Capacity /machine (MW)	2.00	As Per offer letter
Total Capacity (MW)	30.00	Calculated Value
Expected Date of Commissioning	31-Mar-17	Assumption
Life of the plant (Yrs.)	25	As per WTG manufacturer specifications
Generation of electricity		
PLF (%)	24.00%	As per GERC Order No. 2 of 2012, Page 14[31]
Annual generation (kWh)	630,72,000	Calculated Value
Tariff rate at the decision making (INR/kWh)	4.23	As per GERC Order 08/08/2012(available to PP during decision making)[32]
Operation and maintenance cost and Insurance		
O & M Expenses (INR Mn.)	37.76	As Per offer letter
O & M free for (Yr.)	1.00	As Per offer letter
Escalation in the operational expenses (%)	5.72%	As Per offer letter
Insurance (INR Mn.)	17.14	CERC Order dated 27/03/2012[33]

[31] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[32] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[33] http://www.cercind.gov.in/2012/orders/RE_35_2012.pdf

Financial parameters		
TOTAL COST (INR Mn.)	1,714.03	As Per offer letter
Loan Amount (INR Mn.)	1,199.82	70% loan and 30% equity
Equity Investment (INR Mn.)	514.21	Calculated Value
Term loan		
Loan Amount (INR Mn.)	1,199.82	As per GERC Order 08/08/2012(available to PP during decision making)[34]
Interest rate (%)	13.00%	
Loan Tenure (Qtr.)	40	
Moratorium Period (Qtr.)	-	
Repayment Period (Qtr.)	40	Calculated Value
Repayment instalments value (INR Mn.)	29.996	Calculated Value
1st instalment from (Qtr. end)	30-Jun-17	Considered from the next Quarter End
Book Depreciation (SLM Method)		
Gross Depreciable Value (INR Mn.)	1,714.03	Calculated Value
Salvage Value (%)	10.00%	As per GERC Order 08/08/2012(available to PP during decision making)[35]
Salvage value (INR Mn.)	171.40	Calculated Value
Net Depreciable Value (INR Mn.)	1,542.63	Calculated Value
Residual Value (INR Mn.)	171.40	Calculated Value
IT Depreciation		
IT Depreciation (SLM Method) (%) for 10 years	6.00%	As per GERC Order 08/08/2012(available to PP during decision making)[36]
IT Depreciation (SLM Method) (%) from 11th to 25th year	2.00%	
Income Tax		
Financial Year	**FY 2016-17**	
Income tax rate (%)	34.60%	As Per Income Tax Rule[37]
MAT (%)	20.01%	As per GERC Order 08/08/2012(available to PP during decision making)[38]
Service Tax (%)	14.00%	As Per Income Tax Rule[39]
Surcharge (%)	7.00%	As Per Income Tax Rule[40]
Education cess (%)	3.00%	As Per Income Tax Rule[41]
Final Tax rates		
Income tax rate (%)	38.13%	Calculated Value
MAT (%)	22.05%	Calculated Value
Service Tax (%)	14.42%	Calculated Value

[34] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[35] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[36] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[37] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[38] https://www.gercin.org/wp-content/uploads/document/en_1344430244.pdf

[39] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[40] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

[41] https://taxguru.in/income-tax/income-tax-slab-financial-year-201516.html

The result of the analysis is as follows:

WTG Owner	Capacity	Equity IRR	Benchmark
Dev-Dwarka Wind Project Limited	15 x 2 MW	7.40%	13.74%

The project developer further assessed the impact on equity IRR considering the actual project cost, actual O&M cost and actual Tariff Rate and found that even with an increase of more than 50% in estimated PLF of the project, the equity IRR of the project activity is still below the benchmark and thus deemed additional.

This substantiates that the investment is not financially attractive (equity IRR for the project activity is less than the Benchmark). Thus it can be easily concluded that project activity is additional & is not business as usual scenario[42].

Sub-step 2d: Sensitivity Analysis

As per Investment Analysis Guidance, 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 and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Guidance also states, "All parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude". The Annex also states, as a general point of departure, variations in the 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.

Since the project cost is already firmed up, the cost is not variable. The tariff is determined by State Electricity Board Tariff Order available at the time of investment making decision which is fixed for years mentioned as per the tariff order and hence it need not be subjected to variation. All other expenses are much less than 20% of the total cost. Hence, only PLF needs to be subjected to reasonable variation. Nevertheless, following factors have been subjected to sensitivity analysis:

1. PLF
2. O&M Cost
3. Project Cost
4. Tariff Rate

The results of sensitivity analysis are as follows:

Equity IRR	Dev-Dwarka Wind Project Limited - 20 x 2 MW			
Variation %	-10%	Normal	10%	Breaching Value
PLF	4.78%	7.14%	9.62%	25.55%
O&M Cost	7.66%	7.14%	6.60%	-142.39%
Project Cost	9.33%	7.14%	5.49%	-23.74%
Tariff Rate	4.78%	7.14%	9.62%	25.55%

The results of sensitivity analysis are as follows:

Equity IRR	Dev-Dwarka Wind Project Limited - 15 x 2 MW			
Variation %	-10%	Normal	10%	Breaching Value

[42] Due to some internal change as per management decision and difficulty in execution, the project has been downsized from 40 MW to 30 MW. An undertaking from PP dated 31/01/2017 has been submitted as well. However the investment analysis has been done for higher capacity and still the project is additional.

PLF	4.89%	7.40%	9.89%	24.84%
O&M Cost	7.92%	7.40%	6.87%	-138.75%
Project Cost	9.62%	7.40%	5.62%	-23.24%
Tariff Rate	4.89%	7.40%	9.89%	24.84%

Outcome of Step 2: From the above analysis, it can be seen that the equity IRR of the project activity remains well below the benchmark even under the sensitivity analysis. Therefore, it can be concluded that the proposed CDM project activity is unlikely to be the most financially/economically attractive and hence, additional.

	Probability to breach the benchmark
PLF	Not possible as the PLF has been reported as per the State Electricity Board Tariff Order as well as Third Party Report based on long term data and hence a PLF fluctuation of more than 10% is unlikely to happen.
O&M	With the country experiencing 7.13%[43] inflation on an average, the question of O&M coming down is ruled out. Moreover, the purchase order provides for a 5% escalation in the cost every year. Even the tariff order of all states provide for a 5.72% escalation in the O&M cost.
Project Cost	The Actual project cost for project activity is more than 10% of the Offer letter cost which was considered during decision making. Since the Purchase Order cost is firm, there is no possibility of project cost going below this level. However, we have conducted sensitivity analysis for project cost being 10% less than that considered during decision making. Still, the IRR does not breach the Benchmark.
Tariff Rate	The tariff is determined by Gujarat State Electricity Board Tariff Order as well as compared with PPA which is fixed for entire lifetime of the project activity. Hence, there is no probability to get variation for the same.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice analysis

Common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB84, Annex 7[44]". In the context of the project activity, the following parameters are defined as per **Part I. Definitions** of the Guidelines on Common Practice:

1. Applicable Geographical Area (Para 9): The Gujarat state has been considered as the applicable geographical area for this project. The detailed explanation for consideration of Gujarat state as geographical region is given below
2. Measure (Para 10): The project activity reduces greenhouse gas emissions by generating electricity using renewable energy source-wind. Therefore, the project activity falls under the following measure:
   (b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies.
3. Output (Para 11): The project activity produces electricity. Therefore, electricity is considered as output of the project activity.

[43] http://www.tradingeconomics.com/india/inflation-cpi

[44] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf

4. Different Technologies (Para 12): The project activity uses wind energy for producing electricity and hence as per Para 12(a), the technologies which use energy source/ fuel other than wind will be considered as the different technologies for the project activity.

PP had considered Gujarat state as geo-graphical area due to regulatory regime since applicable power tariff structure for renewable energy projects is unique for all the states across national boundary of India; which is based on Electricity Act 2003 (EA 2003), section 82 which clearly mentions "*Every State Government shall, within six months from the appointed date, by notification, constitute for the purposes of this Act, a Commission for the State to be known as the (name of the State) Electricity Regulatory Commission*" Appropriateness of the same has been checked and confirmed from EA 2003 (http://www.cercind.gov.in/08022007/Act-with-amendment.pdf[40]).

Furthermore with reference to Section 2 of Indian Wind Energy Outlook 2009, 2011 and 2012; Published by Global Wind Energy Council (http://www.gwec.net/publications/country-reports/) the following significant points on the State specific policy & regulatory framework on the renewable energy projects with special emphasis to wind power projects have been validated:

- Electricity Act 2003 (EA 2003) has changed the legal and regulatory framework for the renewable energy sector in India. The EA 2003 mandates policy formulation to promote renewable sources of energy by the federal government, the State governments and the State Electricity Regulatory Commissions (SERCs) within their jurisdictions.

- The Electricity Act 2003, introduced some enabling provisions conducive to accelerated development of grid connected renewable energy sources. Under Section 61(h), promotion of cogeneration and generation of electricity from renewable sources of energy has been made the explicit responsibility of SERCs, which are bound by law to take these considerations into account while drafting their terms and conditions for tariff regulations. Nearly all SERCs have issued their tariff regulations incorporating suitable clauses, which will enable them to provide a preferential treatment to renewable energy (RE) during the tariff determination process. The SERCs determine the tariff for all renewable energy projects across the States, and the state-owned power Distribution Companies (DISCOMs) ensure grid connectivity to the renewable energy project sites.

- EA 2003 has initiated the adoption of the National Tariff Policy, 2006 as one of the key policies, National Tariff Policy (2006) framed under the Section 3 of the EA 2003. As per the excerpt from National Tariff Policy, 2006; pursuant to provisions of section 86(1)(e) of the EA 2003, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by 01/04/2006.

- As mandated under section 86(1)(e) of the Electricity Act (2003), by June 2012, 26 SERCs had fixed quotas (in terms of % of electricity being handled by the power utility) to procure power from renewable energy sources. The mandate, which is called a Renewable Purchase Specification (RPS), varies from 0.5% to 14% in various states over varying time-scales. Few states have come out with technology specific RPSs. Besides, the state regulators determine the tariff for all RE projects in the states and ensure connectivity to the grid through extension of power evacuation from the RE project sites.

- At present thirteen SERCs have declared preferential feed–in tariffs (FITs) for purchase of electricity generated from wind power projects established in respective states, which varies from state to state in India. All the SERCs have adopted a 'cost plus' methodology to fix the feed–in tariff, which varies across the states depending upon the state resources, project cost and more importantly the tariff regulations of SERCs. Wind power related tariff polices in different states also has difference in regulatory and policy incentives. Several states have implemented fiscal and financial incentives for renewable energy generation,

including; energy buy back (i.e. a guarantee from an electricity company that they will buy the renewable power produced); preferential grid connection and transportation charges and electricity tax exemptions.

Also the project activity is implemented especially as per provisions of state tariff order. Therefore the investment climate for the renewable energy projects varies from State to State within India due to state specific local policy & regulatory framework as outlined by the State Electricity Regulatory Commissions of the respective state. This difference in investment condition leads to essential distinction among wind energy projects between different States of the host country India.

Thus, the specific geographical area i.e. state of Gujarat for the common practice analysis of the proposed project activity is considered. The excel spreadsheet of common practise analysis has submitted as per steps below for projects identification for similar and different projects and found to be appropriate.

The common practice analysis is carried out step by step as per **Stepwise approach for common practice** as follows:

Step (1): *calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.*

Range	Capacity	Unit
+50%	60	MW
Capacity of the proposed project activity	40	MW
-50%	20	MW

Step (2): *identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:*

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Gujarat state has been considered applicable geographical area for the common practice analysis of project activity due to different policies for different state. All power plants generating electricity from wind energy within the capacity range of 20 MW to 60 MW and having commercial operations date before project activity start date (22/03/2016) have been considered. The power generation plants identified in this step are only wind power projects. The total number of power plants is 20.

Step (3): *within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number* N_{all}*.*

CDM project activities which have got registered or are under validation have been excluded in this step. The list of the plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects,

N_{all} = 2

Step (4): *within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.*

As per the tool on Common Practice, different technologies are technologies that deliver the same output and differ by at least one of the following:

i. Energy Source/Fuel
ii. Feed stock
iii. Size of installation (power capacity)
    - Micro
    - Small
    - Large
iv. Investment climate in the date of the investment decision, inter alia:
    - Access to technology;
    - Subsidies or other financial flows;
    - Promotional policies
    - Legal regulations
v. Other features, inter alia:
    - Nature of the investment

The project activities have been separated from the different technologies on the basis of the Investment climate in the date of the investment decision

Investment climate in the date of the investment decision: The project activity involves electricity generation from wind. There are different state electricity board regulatory policy, hence each state have different tariff order. Since project activity is located in Gujarat state, the all projects located in Gujarat state are considered for common practise analysis under N_{diff}.

N_{diff} = 0

Step (5): *calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.*

From step 3 and step 4 following table is arrived at;

N_{all}	2
N_{diff}	0
N_{all} -N_{diff}	2
F	**1**

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

value of factor F as calculated in Step 4 is 1 which is less than 0.2 and difference of N_{all}-N_{diff} is 2 which is not greater than 3. Hence the project activity is not a common practice.

The analysis clearly demonstrates that project activity is not a common practice within the sector in the applicable geographical area. Therefore, it can be concluded that the project activity is additional and requires CDM revenues to alleviate the investment barrier to the project activity.

For 30 MW Project activity (actual capacity after the project has been downsized), the steps involved for Common practise analysis are as follows:

Step (1): *calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.*

Range	Capacity	Unit
+50%	45	MW
Capacity of the proposed project activity	30	MW
-50%	15	MW

Step (2): *identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:*

(g) The projects are located in the applicable geographical area;
(h) The projects apply the same measure as the proposed project activity;
(i) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(j) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(k) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(l) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Gujarat state has been considered applicable geographical area for the common practice analysis of project activity. All power plants generating electricity from wind energy within the capacity range of 15 MW to 45 MW and having commercial operations date before project activity start date (22/03/2016) have been considered. The power generation plants identified in this step are only wind power projects. The total number of power plants is 24.

Step (3): *within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number* N_{all}.

CDM project activities which have got registered or are under validation have been excluded in this step. The list of the plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects,
$\mathbf{N_{all}}$ = **3**

Step (4): *within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number* N_{diff}.

As per the tool on Common Practice, different technologies are technologies that deliver the same output and differ by at least one of the following:

vi. Energy Source/Fuel
vii. Feed stock
viii. Size of installation (power capacity)
- Micro
- Small
- Large

ix. Investment climate in the date of the investment decision, inter alia:
- Access to technology;
- Subsidies or other financial flows;
- Promotional policies
- Legal regulations

x. Other features, inter alia:
- Nature of the investment

The project activities have been separated from the different technologies on the basis of the Investment climate in the date of the investment decision

Investment climate in the date of the investment decision: The project activity involves electricity generation from wind. There are different state electricity board regulatory policy, hence each state have different tariff order. Since project activity is located in Gujarat state, the all projects located in Gujarat state are considered for common practise analysis under N_{diff}.

N_{diff} = 0

Step (5): *calculate factor* $F=1-N_{diff}/N_{all}$ *representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.*

From step 3 and step 4 following table is arrived at;

N_{all}	3
N_{diff}	0
N_{all} -N_{diff}	3
F	**1**

As per the Guidelines, the proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all}-N_{diff} is greater than 3. The value of factor F as calculated in Step 4 is 1 which is greater than 0.2 and difference of N_{all}-N_{diff} is 3 which is not greater than 3. Hence the project activity is not a common practice.

The analysis clearly demonstrates that project activity is not a common practice within the sector in the applicable geographical area. Therefore, it can be concluded that the project activity is additional and requires CDM revenues to alleviate the investment barrier to the project activity.

Demonstration of Parallel and continuing actions

CDM Project Standard Version 09.0, Section 6.5 states that "*For a proposed CDM project activity with a start date on or after 2 August 2008, project participants shall inform the host Party's designated national authority (DNA) and the secretariat of their intention to seek CDM status in accordance with the Project cycle procedure*".

In line with the above guidance, project investors have intimated the UNFCCC and host party DNA i.e. National CDM Authority (NCDMA) of its intention to seek CDM for the proposed project activity in a defined F-CDM form within 180 days of the project start date i.e. on 22/03/2016 (earliest date of novation agreement between PP and technology supplier). The project start date is 22/03/2016 (date of novation agreement between the PP, technology supplier and project developer) and intimation is done on 16/08/2016. Hence, it can be clearly established that CDM was seriously considered in the decision to proceed with the proposed project activity.

Project Owner	Capacity	Investment Decision Date	Project Start Date	Date of Notification to CDM EB & NCDMA
Dev-Dwarka Wind Project Limited	20 x 2 MW[45]	04/03/2016	22/03/2016	16/08/2016

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

According to the approved baseline methodology ACM0002 Version 20.0

Baseline emissions:

The baseline emission calculation for the project activity is attributable to the CO_2 Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the INDIAN grid will be multiplied by the grid emission factor to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y	=	Baseline Emissions in year y; tCO_2
$EG_{PJ,y}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y(MWh)
$EF_{grid,CM,y}$	=	CO_2 emission factor of the grid in year y; tCO_2/MWh

The methodology provides following approaches for emission factor calculations:

(a) *Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology "Tool to calculate the emission factor for an electricity system".*

OR

[45] Initially the project was being planned for 40 MW however due to some change in management decisions, the project has been downsized to 30 MW.

(b) *The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.*

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system' since data is available from an official source.

As explained in section B.4, the CEA database version 15 is considered for emission factor being a conservative approach. CO_2 Baseline Database for the Indian Power Sector, Version 15, Dec 2019[46], published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 07.0, EB 100, Annex 4, the following steps have been followed.

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems

The tool defines that "*for determining the electricity emission factors, identify the relevant electricity system. Similarly, identify any connected electricity systems".* It also states that *"If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used".* Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern.

However since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO_2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

Table: Geographical Scope of Indian Electricity Grid

Northern	Eastern	Western	North-Eastern	Southern
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Delhi	Jharkhand	**Gujarat**	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Kerala
Himachal Pradesh	West Bengal	Dadar& Nagar Haveli	Meghalaya	Tamilnadu

[46] https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver15.pdf

Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Puducherry
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

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

Project participants have the option of choosing between the following two options to calculate the operating margin and build margin emission factor:

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

The Project Participant has chosen only grid power plants in the calculation.

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

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

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

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers. The choice of other two options for calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
India	18.6%	16.8%	15.1%	14.6%	14.3%	14.5%

Data Source: Central Electricity Authority (CEA) database Version 15, Dec '2019

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of three most recent years) for the INDIAN grid is less than 50 % of the total generation. Thus the average emission rate method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The "Simple operating margin" has been calculated as per the weighted average emissions (in tCO_2/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation;

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- **Ex ante option:** If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. **Or**

- **Ex post option:** If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex ante option for the calculation of OM with 3 years generation weighted average of the most recent years available at the time of submission of CDM-PDD to the DOE for validation.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage:

Net Generation in Operating Margin (GWh) (incl. Imports)			
	2016-17	2017-18	2018-19
INDIAN Grid	916,278	960,693	995,957

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2016-17	2017-18	2018-19
INDIAN Grid	0.9636	0.9543	0.9685

Weighted Generation Operating Margin	
INDIAN Grid	**0.9622**

STEP 5: Calculate the build margin emission factor ($EF_{BM,y}$)

Option 1 as described above is chosen to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2018-19
INDIAN Grid	**0.8811**

(With sample group constituting most recent capacity additions to the grid comprising 20% of the system generation)

STEP 6: Calculate the combined margin (CM) emissions factor

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system,

Version 07.0.0, EB 100, Annex 4, allows to weigh the operating margin and Build margin at 75% and 25%, respectively**.**

The baseline emission factor is calculated using the combined margin approach as described in the following steps:

Calculation of Baseline Emission Factor EF_y

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 **($EF_{BM,y}$)**:

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

Where,

w_{OM}	75% weight for wind energy projects
w_{BM}	25% weight for wind energy projects
$EF_{OM,y}$	calculated as described in Steps 3&4 above (tCO_2/MWh)
$EF_{BM,y}$	calculated as described in Steps 5 above (tCO_2/MWh)

Baseline Emission factor (INDIAN Grid) = 0.75*0.9622 + 0.25*0.8811
= 0.9419 tCO_2/MWh

Project Emissions: For most renewable power generation projects activities PE_y =0. As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity is a wind power project,
Hence PE_y= 0

Leakage Emissions: No Leakage emissions are considered as per applied methodology ACM 0002 Version 20.0.
Hence, LE_y= 0

Emission reduction (ER_y): The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction ER_y by the project activity during a given year y is the difference between Baseline emission and Project emission & Leakage emission.

$ER_y = BE_y - PE_y$

Where,
ER_y = Emission Reduction in tCO_2/year
BE_y = Baseline emission in tCO_2/year
PE_y = Project emissions in tCO_2/year

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019[47]
Value(s) applied	0.9622
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07.0.0" as 3-year generation weighted average using data for the years 2016-17, 2017-18 & 2018-19. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data/Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019[48]
Value(s) applied	0.8811
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07.0.0" as per latest year 2018-19. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

[47] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

[48] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

Data/Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019[49]
Value(s) applied	0.9419
Choice of data or measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ 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 (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

B.6.3. Ex ante calculation of emission reductions

Formula used to calculate the net emission reduction for the project activity is

$ER_y = BE_y - PE_y$

Where,
ER_y = Emission Reduction in tCO_2/year
BE_y = Baseline emission in tCO_2/year
PE_y = Project emissions in tCO_2/year

Baseline Emission (BE_Y)

The baseline emissions are the product of electrical energy baseline $EG_{PJ,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.
$BE_Y = EG_{PJ,y} * EF_{grid,CM,y}$

Where,
$EG_{PJ,y}$ = Total quantity of net electricity delivered to the INDIAN grid

Project Investors' Name	Capacity	PLF (%)	Generated Power(MWh) p.a	Baseline Emission Factor (tCO_2/MWh)	Baseline emissions (tCO_2/ year)
Dev-Dwarka Windproject Limited	15 x 2 MW	24.00%	63,072	0.9419	59,407

As per EB 48, Annex- 11, Option 3(b), PLF for the proposed project activity has been found to be 23.5% based upon the report provided by a Third Party Engineering Company contracted by the PP. However for IRR calculation, 24% PLF is considered as per state tariff order, hence for consistency, the same PLF of 24% is considered for ER estimation.

$EF_{grid,CM,y}$= Baseline emission factor
= 0.9419 tCO_2/MWh

[49] https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver15.pdf

BE_y = 63,072 * 0.9419
= 59,407 tCO_2e/yr

Thus,
$ER_y = BE_y - PE_y$
$ER_y = BE_y - 0$
$ER_y = BE_y$

Therefore,
$ER_y = BE_y$ = **59,407 tCO_2e/yr**

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	59,407	0	0	59,407
Year 2	59,407	0	0	59,407
Year 3	59,407	0	0	59,407
Year 4	59,407	0	0	59,407
Year 5	59,407	0	0	59,407
Year 6	59,407	0	0	59,407
Year 7	59,407	0	0	59,407
Total	415,849	0	0	415,849
Total number of crediting years	07			
Annual average over the crediting period	59,407	0	0	59,407

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)
Source of data	Monthly Share Certificate issued by GETCO
Value(s) applied	63,072 (Estimated Value)
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Energy Meters of accuracy class 0.2 are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: Once in 5 years[50] Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the Project Participant to the State Electricity Board.
Monitoring frequency	Monthly
QA/QC procedures	The energy meters used are trivector meters which are of accuracy class 0.2.

[50] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

	The meters are monitored continuously & cumulative readings are taken at the end of the month by joint meter reading procedure. These are sealed by GETCO to avoid malfunctioning with meter readings. The officials frequently check the meters for tampering and malfunctioning with the meters. Meter is calibrated once in 5 years[51] by the authority in the presence of O&M Contractor / investors representatives and GETCO officials to ensure the working of meter within permissible limits. The calculation of net electricity supplied to grid is under purview of state electricity board and PP do not have control on it. The available parameter to PP is net electricity supplied to grid and same is mentioned as monitoring parameter.
Purpose of data	The Data/ Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

B.7.2. Sampling plan

Sampling is not required for the given project activity.

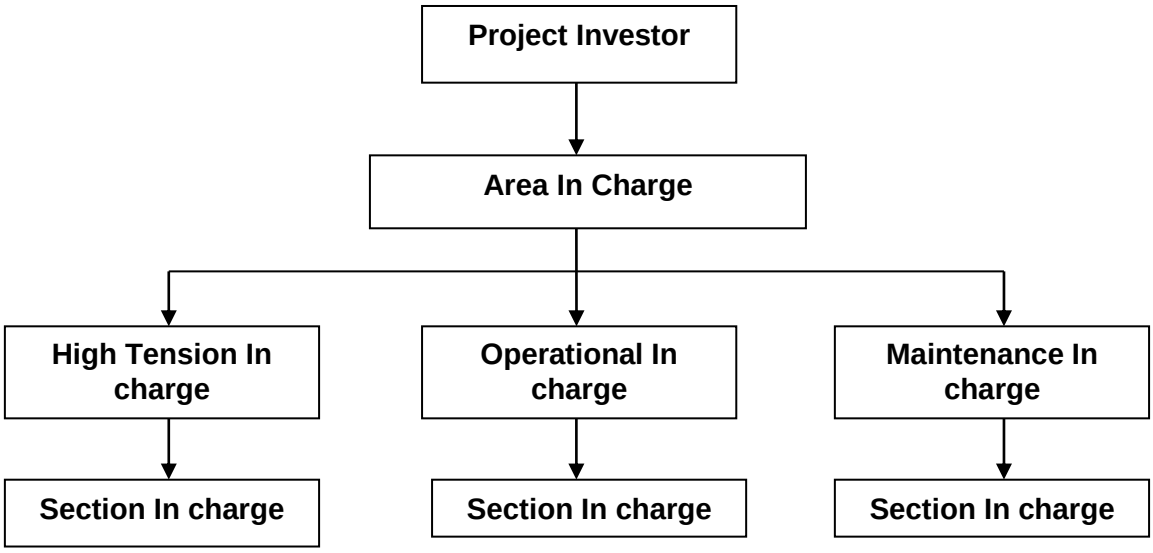
B.7.3. Other elements of monitoring plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected wind power project being implemented in Gujarat, India. The monitoring plan, which will be implemented by the project participant describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

Organisational Structure for data recording and monitoring

A detailed description of metering measurements methods procedures to be applied to the project activity has been well incorporated in section B.7.1, favouring Gujarat-site.

The organizational hierarchy of Project Investor & Project management entity is as follows:



Monitoring Plan:

QA/QC Procedures:

[51] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

The main and backup meter installed at connected substations for monitoring of the project activity are electronic tri-vector energy meters of 0.2 accuracy class. Each meter is jointly inspected and sealed on behalf of project proponent and GETCO, in the presence of its authorised representatives. All main and backup meter are calibrated once in 5 year by GETCO or its representatives.

Description of calibration

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

Data Management and Data Archiving:

Copies of the break-up sheet, invoices raised to Discom and sales receipts will be retained and archived for the entire crediting period plus two years by the project investor.

Procedures for Data Adjustments/Uncertainties:

Data uncertainty in the project activity monitoring could occur under the following circumstances:

1. During the monthly joint meter reading at connected substations, the reading of the main meter and backup meter are cross checked to insure that the meters are working within the permissible limit. If during the cross checking the reading is found to be outside the permissible limit of accuracy, then calibration is done to identify the meter with the error and the faulty meter is replaced immediately. The meter reading for that month is to be taken from the correct meter.
2. During the monthly joint meter reading at the connected substations, if the display defect is in the main meter than in that case the backup meter reading are considered for the purpose of preparation of the break-up sheet and billing purpose. Defective main meter will be replaced immediately.
3. During the monthly share certificate reading at the connected substation, if the display defect is in the check meter than in that case the main meter reading are considered for the purpose of preparation of the break-up sheet and billing purpose. Defective check meter will be replaced immediately.
4. If during calibration of the meters at the connected substations, the main meter is found to be outside the permissible limit of accuracy and if the main meter reading have been used to prepare the break-up sheet, then the identified error would be applied to all the measured value since the date of last calibration. Further the main meter would be replaced immediate.
5. If during the calibration of the meters the connected substations, the check meter is found to be outside the permissible limit of accuracy and if the check meter reading have been used to prepare the break-up sheet, then the identified error would be applied to all the measured value since the date of last calibration. Further the check meter would be replaced immediate.

Procedure for data apportioning:

Apportioning of net electricity generation from each WTG located at Gujarat determined by GETCO is as follows:

The apportioning of the electricity is the responsibility of the State Utility. The sample apportioning procedure adopted for any given WTG for any given month is given below:

Generation Ratio at metering point (33 kV/220 kV level GSS): The generation ratio is the ratio of electricity generated by installed WTG of PP to the total generation by all the connected WTGs to the applicable metering point.

$$G_{R,\text{ metering point}} = EG_{\text{Controller, WTG}} / EG_{\text{Controller, metering point}} \quad \text{(a)}$$

Where,

$G_{R,\text{ metering point}}$: Generation Ratio at metering point

$EG_{\text{Controller, WTG}}$: Electricity generated by installed WTG of PP connected to the applicable metering point

$EG_{\text{Controller, metering point}}$: Total generation by all the connected WTGs to the applicable metering point

Calculation of net electricity exported at applicable metering point:

The Main and Check meters at the applicable metering point measure a number of parameters including export and import for all the connected WTGs.

The import, kWh by the WTG at the metering point is calculated in the following manner:

$$EG_{\text{Import, metering point}} = G_{R,\text{ metering point}} \times EG_{\text{Total Import, metering point}} \quad \text{(b)}$$

Where,

$EG_{\text{Import, metering point}}$: Import, kWh by the WTG at the metering point

$G_{R,\text{ metering point}}$: Generation Ratio at metering point

$EG_{\text{Total Import, metering point}}$: Total Import, kWh by all the WTGs at the metering point

The export, kWh by the WTG at the metering point is calculated in the following manner:

$$EG_{\text{Export, metering point}} = G_{R,\text{ metering point}} \times EG_{\text{Total Export, metering point}} \quad \text{(c)}$$

Where,

$EG_{\text{Export, metering point}}$: Export, kWh by the WTG at the metering point

$G_{R,\text{ metering point}}$: Generation Ratio at metering point

$EG_{\text{Total Export, metering point}}$: Total Export, kWh by all the WTGs at the metering point

The net electricity exported by the WTG at the 33 kV/220 kV level metering point is calculated by subtracting equation (b) from (c).

Thus, the net electricity exported at 33 kV/220 kV level metering point:

$$= EG_{\text{Export, metering point}} - EG_{\text{Import, metering point}} \quad \text{(d)}$$

Generation Ratio at common delivery point:

It is the ratio of electricity generated by installed WTG to the total generation by all the connected WTGs/ or connected metering points under common delivery point.

$$G_{R,\text{ Common Delivery Point}} = EG_{\text{Controller, WTG}} / EG_{\text{Controller, Common Delivery Point}} \quad \text{(e)}$$

Where,

$G_{R, Common\ Delivery\ Point}$: EG Controller, Common Delivery Point

$EG_{Controller, WTG}$: Electricity generated by installed WTG

$EG_{Controller, Common\ Delivery\ Point}$: Total generation by all the connected WTGs/ or connected metering points under common delivery point

Calculation of net electricity delivered to the Grid:

The values of transmission loss during export & import for the given WTG are subtracting from $EG_{Export, metering\ point}$ & $EG_{Import, metering\ point}$ respectively to get the values of export and import respectively for the given month.

The net electricity delivered to the Grid by the given WTG for the given month (net export kWh) is then obtained by subtracting import from export.

Thus,

Net Electricity = Export – Import (f)

These apportioned values viz., import, export and net export kWh can be referred from the Monthly Break up of net export units report. The above procedure of calculation of net electricity supplied to grid by project activity is under purview of state electricity board and PP does not have any control on it.

If there is mismatch between dates of monitoring period and billing cycle period, then controller data will be used for apportioning of net electricity supplied to grid.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

Start date of the project activity is the date of Supply Agreement between PP and Technology Supplier as on 22/03/2016.

C.2. Expected operational lifetime of project activity

25 Years 00 Months

C.3. Crediting period of project activity

C.3.1. Type of crediting period

Renewable crediting period of 7 years 00 Months have been opted for the project activity. This is the first crediting period of the project activity.

C.3.2. Start date of crediting period

15/09/2020 or Date of submission of complete request for registration by the DOE whichever is later.

C.3.3. Duration of crediting period

07 Years 00 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

Proposed project activity is using renewable energy generation technology which is free from any kind of anthropogenic emission. Project activity is not having any negative environmental impact. Only small amounts of oily and solid wastes associated with the installation of the WTG can be ignored when compared to Emission reductions.

D.2. Environmental impact assessment

As per the notification from MoEF dated September 14, 2006[52] and its amendment notification S.O.-3067(E) dated 1/12/2009[53], the list of project activities which require prior environmental clearance is stipulated. This does not include the proposed project activity type as it involves wind power generation. Hence the proposed project activity does not require any Environmental impact analysis. Project activity has no significant emissions. Hence no environmental impact analysis was conducted.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

The Local Stakeholder Meetings were organized for local stakeholder consultation on 18/03/2016 and informed local stakeholder regarding the meeting on 05/03/2016 by means of Public Notice as well as personal interactions.

The following are the stakeholders for the project activity:

- Local community
- Local village administration
- Technology suppliers
- Local vendors

All the stakeholders have been invited through invitation letters (delivered in hand) and public notice to attend the stakeholders meeting on 18/03/2016.

The names of the Stakeholder Meeting Participants for Dev-Dwarka Windproject Limited Project at Dev Bhoomi Village, Dev Bhoomi Dwarka District, Gujarat are as follows:

1. Dipesh Patel- School Teacher
2. Narendra Bhai- Shopkeeper
3. Mohit Patel- Farmer
4. Ayushi- Teacher
5. Suraj Bhai- Farmer
6. Mukesh Deep- Villager
7. Satya Lal- Student
8. Arjun- Student
9. Vijay Shankar- Driver
10. Sanjay Patel- Shopkeeper

In the introductory speech, the representatives welcomed the gathering and given a brief about the CDM project activity. Subsequent to the introductory speech, stakeholders were explained about the electricity generation from wind project is an environmental friendly power generation

[52] http://envfor.nic.in/legis/eia/so1533.pdf

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

technology contributing to reduction in GHG emissions. They were also explained about the benefits of the wind power projects like, increasing energy availability and improving quality of power and its assistance to the local population by providing employment opportunities to both skilled & unskilled labours.

Explanation about the main purpose of the project activity i.e. 'to generate electrical energy through green energy generation resource & to utilize the generated output for selling it to the state electricity utility' was narrated. Furthermore it was elaborated that the said project also conceives the following:-

- Indian economy is highly dominated by generation of electricity using fossil fuel, & coal is majorly used in thermal power plants to generate energy & for production processes, yet the basic necessity of large section is not being met. Use of renewable form of energy generation will change consumption pattern & will mitigating the immense stress on the environment.

- Spread of the commercialization of the wind projects in the region.

- Contribute to sustainable development of the region, socially, environmentally & economically.

The Minutes of meeting with commenting sheet from LSH, invitation letter receipt copy shall be submitted to the DOE.

E.2. Summary of comments received

Meeting started with opening speech by representative of project participant. He introduced all guests on dais. The representative of project participant explained Technical aspects of project to stakeholders. He also explained about social, environmental & economic benefits of the project. He also elaborated about CDM & its requirement for the current project. After the presentation, the session was open for questions/feedback from stakeholders.

The villagers raised various queries as summarised below:

- Does the project provide employment opportunities or improve economic development of area?
- Will the project help in improving the electricity supply to the villagers or the neighbourhood areas?
- How will the project activity benefit the villages around the project site and their residents?

After the detailed presentation some of the stakeholders raised questions on the proposed wind energy based power project to clear their doubts. Following questions were asked which were adequately explained and answered:

Q: How does local people will utilise this power?
A: The generated power will be fed in the grid. Project promoter can't supply directly power to the local people. They have to get authorized connection from Govt. body. But due to the project activity the supply of power in the area will increase.

Q: Is it affecting the rain?
A: No, wind generation does not have any impact on rain.

Q: Whether the project will provide employment opportunities?

A: Sure, already the PP has employed many local people for the project activity, such as drivers, security guards, technicians etc. Apart from that indirect benefits are also there for the local people.

Q: What social services will be done by project investors?
A: A lot of initiatives like farmer trainings, animal health, check-up camps and computer training to children will be provided by the project investors to the local people.

All the above queries have been suitably and satisfactorily replied / clarified by project participant's representatives. Local stakeholders welcomed and expressed their support to the project. The meeting was concluded by vote of thanks to all the participants.

E.3. Consideration of comments received

There were no comments raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

SECTION F. Approval and authorization

The project obtained Host Country Approval from Indian DNA i.e. Ministry of Environment Forest and Climate Change vide letter no.4/7/2016-CC dated 8th Feb, 2017.

Appendix 1. Contact information of project participants

Organization name	Dev Dwarka Windpower Limited
Country	INDIA
Address	Street/P.O. Box: Dr. C.H.Street, Building: 404, Chartered House,City: Mumbai, Postcode:400002.
Telephone	022-22073790
Fax	-
E-mail	pranavketan@hotmail.com
Website	-
Contact person	Mr. Pranav Kumar Sharma.

Appendix 2. Affirmation regarding public funding

No public funding for this project activity was received from annex 1 parties.

Appendix 3. Applicability of methodologies and standardized baselines

Please refer section B of the PDD for the same.

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

Please refer Section B.6.1 of the PDD

Appendix 5. Further background information on monitoring plan

Please refer section B.7.1 and B.7.2 for information on monitoring.

Appendix 6. Summary report of comments received from local stakeholders

No negative comments have been received from local stakeholders regarding the project activity.

Appendix 7. Summary of post-registration changes

Not Applicable

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
05.0	25 June 2014	Revision 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; • Make 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).

Version	*Date*	*Description*
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
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