Project design document form
(Version 11.0)

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BASIC INFORMATION	
Title of the project activity	Wind Power Project at Rajkot, Gujarat
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	08
Completion date of the PDD	11/11/2019
Project participants	M/s ReNew Wind Energy (Rajkot) Private Limited
Host Party	India
Applied methodologies and standardized baselines	Selected Methodology: ACM0002 / Version 19. "Consolidated baseline methodology for grid-connected electricity generation from renewable sources." Standardized Baseline: Not Applicable
Sectoral scopes	Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	47,521 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Introduction:

ReNew Wind Energy (Rajkot) Private Limited (RNWERPL), the Project Proponent (PP), is setting up wind power project of 25.2 MW capacity at Villages: Godladha, Madhavipur, Kalasar, Devpara and Madava of Rajkot district in Gujarat. The project consists of installation of 12 Suzlon make wind turbines of 2.1 MW capacity each.

Purpose of the Project activity:

The purpose of the project activity is to generate electricity using wind as renewable energy source and helping in reducing usage of fossil fuels which are used for electricity generation. This would reduce the dependency on fossil fuels and reduce the Green House Gas (GHG) emissions.

Baseline Scenario:

The Project activity would use wind energy to generate electricity from the project and export it to NEWNE (Northern, Eastern, Western and North-Eastern) grid of India. Hence, it reduces the dependency on fossils fuels which are pre-dominantly used for electricity generation in India and helps reduction of climate change impacts.

The baseline scenario for the project activity as per the applied methodology ACM0002 / Version 19.0.) is : “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 same has been described in the in PDD Section B.4.

Scenario existing prior to the prior to implementation of project activity

As the project activity is a green field project, there was no power plant existing at the project site prior to the installation of the project activity (i.e. in the pre-project scenario)

Contribution to Sustainable Development:

National CDM Authority (Indian DNA), Ministry of Environment & Forests, Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects[1]:

Social well-being:

Since, the project activity is in a rural area of Gujarat, it will help in the overall development of the region. The project activity will result in generation of direct and indirect employment opportunities for the local people residing nearby villages in Rajkot, both during construction and operation phases of the project activity.

Economic well-being:

The project will create a business opportunity for local stakeholders such as suppliers,

[1] http://ncdmaindia.gov.in/approval_process.aspx

manufacturers, contractors etc in Rajkot region of Gujarat.

Environmental well-being:

Since, the project uses wind as renewable source for power generation; it does not lead to any greenhouse gas emission. It will avoid the fossil fuel consumption in the NEWNE grid and in turn it will result in SO_x, NO_x particulate matter emission reduction.

Technological well-being:

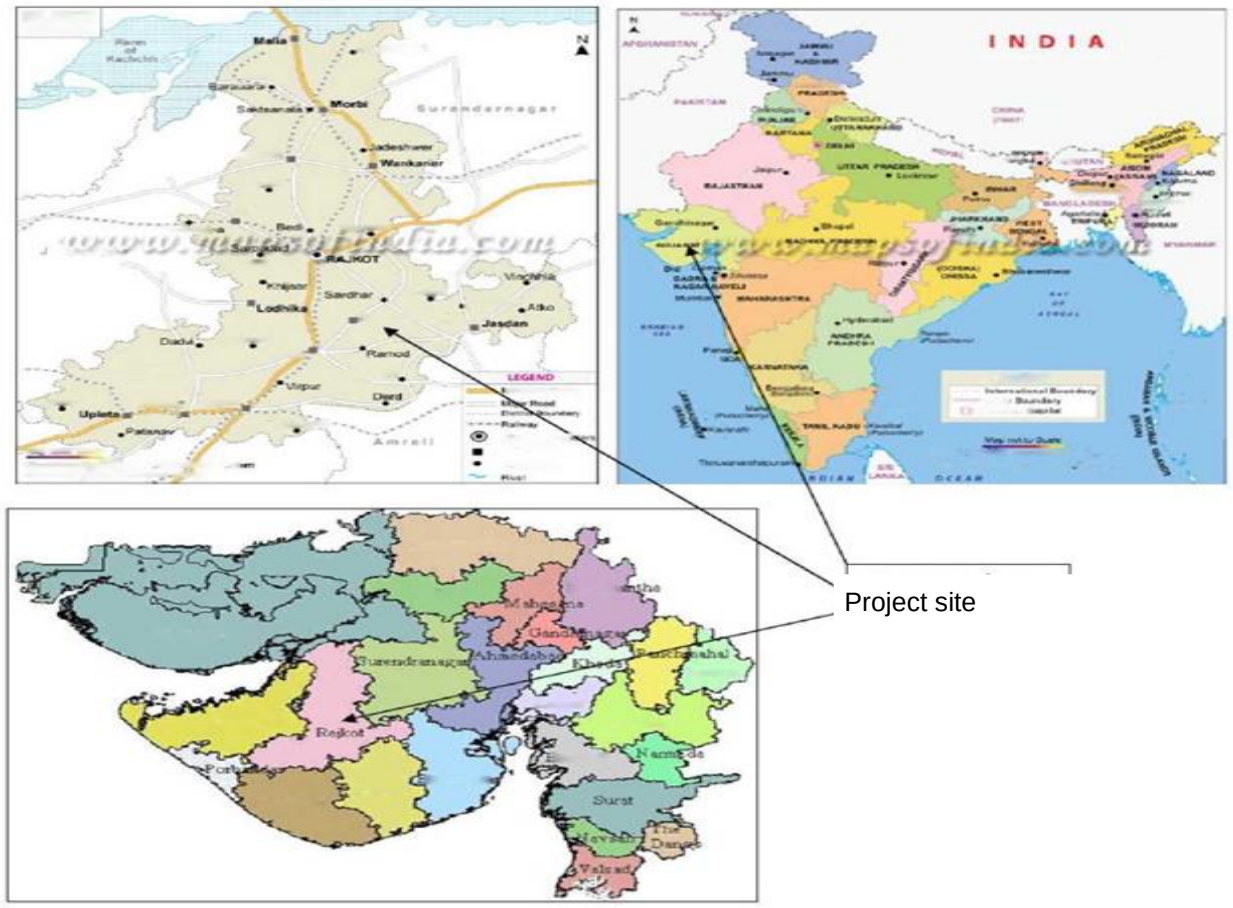
The technology that is being used in the project activity is environmentally safe and sound. The project demonstrates harnessing wind power potential in Gujarat and encourages setting up such projects in near future.

Proposed action plan for Action Plan for Sustainable Development:

RNWERPL plans to use 2% of the net revenues accrued from the sale of Certified Emission Reductions (CERs) of this Project activity post its accrual in areas related to sustainable development. Detailed Credible Monitorable action plan is described in Annex 5 of this CDM PDD.

A.2. Location of project activity

The project is located at Villages: Godladha, Madhavipur, Kalasar, Devpara and Madava of Rajkot .



Note: Wind turbine-wise detailed co-ordinates have been tabulated in Appendix 2 of this PDD,

A.3. Technologies/measures

The project consists of installation of 12 Suzlon make wind turbines of 2.1 MW capacity each. The technical specifications of the S-88 model wind turbine are mentioned below:

Description	Specifications
Wind speed at rated output	**14 m/s**
Cut in speed	4 m/s
Cut out speed	25 m/s
Hub height	79 metre
Power regulation	Pitch
Rotor diameter	88 metre
Swept area	6082 m^2
Generator type	Asynchronous slip ring type induction generator
Generator rated power output	2100 kW
Voltage	690 V
Expected Operational Life	25 years

These turbines are supplied by Suzlon Ltd and are designed for particular wind conditions. The technology for the same is environmentally safe and sound and there is no technology transfer to the host party involved in the same. Lifetime of the WTGs is expected to be 25 years as per data shared by the technology supplier.

As per the Energy Estimate report issued by a third party agency, the project activity is expected to supply 50.733 GWh of energy to the Indian (erstwhile NEWNE) Grid of India each year. This translates into a Plant Load Factor (PLF) of 22.98%. Also, this is expected to result in emission reductions of 47,521 tCO_2e per year of operation.

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)	Private entity- ReNew Wind Energy (Rajkot) Private Limited	No
Netherlands	Amsterdam Capital Trading B.V.	No

A.5. Public funding of project activity

There is no public funding involved from parties included in the Annex I for the implementation of the Project activity.

A.6. History of project activity

The project was commissioned on 29/03/2012. Now this project is undergoing for Renewal of Crediting Period (RCP).

A.7. Debundling

Not Applicable as project is large scale project activity.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

Title: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" ACM0002, Version 19.

Reference:

ACM0002, Version 19 draws upon the following tools which have been used in the PDD:

1. Tool to calculate the emission factor for an electricity system (Version 07, EB100, annex 4).
2. Tool for demonstration and assessment of additionality (Version 7.0).

B.2. Applicability of methodologies and standardized baselines

The project activity involves generation of grid connected electricity from renewable wind energy. The project activity has a proposed capacity of 25.2 MW which will qualify for a large scale CDM project activity under Type-I of the large scale methodologies. The project status is corresponding to the methodology ACM0002 version 19.0 and applicability of methodology are discussed below.

Applicability Criterion	Project Case

1. This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s)	The project activity is a Renewable Energy Project i.e. wind Power Project which falls under applicability criteria option 1 (a) i.e., "Install a Greenfield power plant". Hence the project activity meets the given applicability criterion.
2. The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The option (a) of applicability criteria 2 is applicable as project is renewable energy wind power plant/unit.
3. In case of hydro power plants, one of the following conditions shall apply[2]: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is	The project is installation of new wind based electricity generation plants (not a hydro power plant). Hence this criterion is not applicable.

[2] Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the volume of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

greater than 4 W/m2; or (d) 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/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
4. In the case of integrated hydro power projects, project proponent shall:	The project is wind power project and thus the criterion is not applicable to this project activity.
5. 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	The project is wind power project and thus the criterion is not applicable to this project activity.
6. Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project is wind power project and thus the criterion is not applicable to this project activity.

7. The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	(a) The project activity is Greenfield and there is no switching of fossil fuel to renewable energy. Hence the criteria is not applicable to the project activity (b) The project is not a biomass fired power plant. Hence the criteria is not applicable to the project activity.
8. 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".	Not applicable, the wind project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In addition, the applicability conditions included in the tools referred to below apply.[3]	Please refer tables below.

Tool to calculate the emission factor for an electricity system[4] - Version 07.0 (EB 100, Annex 04)

Applicability Criterion	Project Case
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).	The project is a grid connected Greenfield wind power project and thus the tool is applicable.
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, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, 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)	Steps involved in calculation of Emission Factor is included in section B.6.3 of the PDD as per the requirement of the tool

[3] The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants; does not apply to this methodology, as this methodology only refers to some steps of this tool.

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

Applicability Criterion	Project Case
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.	
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.	Project is located in non-Annex I country and hence the tool is applicable
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	The project is a wind project and there is no involvement of biofuels.

Hence, as per the justifications presented in the table above, it can be concluded that the proposed project activity satisfies all the necessary/relevant applicability criteria of ACM0002, version 19.

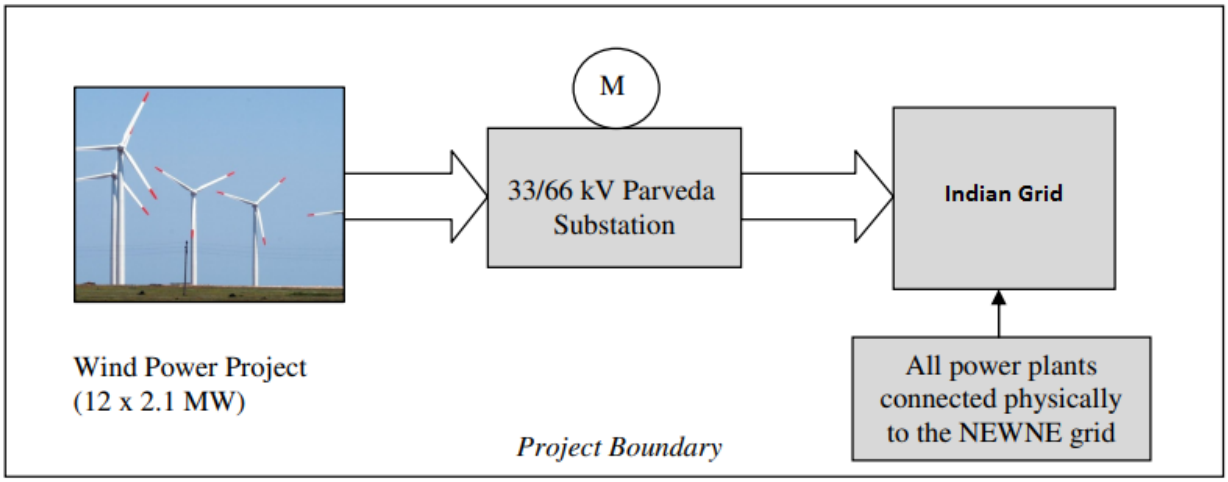
B.3. Project boundary, sources and greenhouse gases (GHGs)

Source		Gas	Included	Justification/explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	For dry or flash steam geothermal power plants, emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	The project activity does not emit carbon dioxide.
		CH_4	No	The project activity does not emit CH_4.
		N_2O	No	The project activity does not emit N_2O.
	For binary geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam	CO_2	No	The project activity does not emit carbon dioxide.
		CH_4	No	The project activity does not emit CH_4.
		N_2O	No	The project activity does not emit N_2O.
	For binary geothermal power plants, fugitive emissions of hydrocarbons such as n-butane and isopentane (working fluid) contained in the heat exchangers	Low GWP hydrocarbon/ refrigerant	NO	Project is wind power project
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar	CO_2	No	The project activity does not emit carbon dioxide.
		CH_4	No	The project activity does not emit CH_4.

Source		Gas	Included	Justification/explanation
	thermal power plants and geothermal power plants	N_2O	No	The project activity does not emit N_2O.
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	The project activity does not emit carbon dioxide.
		CH_4	No	The project activity does not emit CH_4.
		N_2O	No	The project activity does not emit N_2O.

Project Boundary Diagram:

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.



M: Metering Point

B.4. Establishment and description of baseline scenario

Updated baseline for the second crediting period in line with the "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Version 03.0.1.

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 274 to 295 of Project Standard version 02.0.

The tool stipulates the following steps to be carried out.

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

The baseline scenario remains unchanged and is in compliance with all the relevant mandatory national and/or sectoral policies.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was the 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 into the grid. Thus this project activity was a voluntary investment which intends to replace equivalent amount of electricity at grid from renewable source. PP was not bound to incur this investment; hence absence of project activity (i.e. the investment) does not lead to any continued baseline practice for PP within their scope whereas the continued operation of the project activity would continue to replace equivalent amount of electricity at grid. Hence, the same baseline as identified in the previous crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under CDM.

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 344,002.39 MW as on 31.03.2018, consisting of 222,906.59 MW Thermal, 69,022.39 MW Renew and 6,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 1[5] that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by increased use of renewable energy sources.

Furthermore, project participant has considered the latest available CO_2 Baseline Database (CEA database, version 14) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission. As per below table, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original.

Table 1: Sector- wise installed capacity (MW) as on 31/03/2018 (CEA Database version 14)

Sector	Thermal				Nuclear	Hydro	RES	Total
	Coal	Gas	Diesel	Total				
State	64670.50	7078.95	363.93	72113.38	0.00	29858.00	2003.37	103974.75
Central	56955.00	7237.91	0.00	64192.91	6780.00	12041.42	1502.30	84516.63
Private	75546.00	10580.60	473.70	86600.30	0.00	3394.00	65516.72	155511.02
All India	197171.50	24897.46	837.63	222906.59	6780.00	45293.42	69022.39	344002.39

Thus, current baseline remain same and there is no impact if circumstances, existing at the time of requesting renewal of crediting period.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

As explained in step 1.2, the baseline scenario was the electricity import/generation from the power plants connected to the electricity grid. The project activity in green field project and there

[5] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

is no any baseline equipment or investment involved in project activity. Therefore this condition is not applicable to the project activity.

Step 1.4: Assessment of the validity of the data and parameters

This step stipulates that "Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity."

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

Step 2: Update the current baseline and the data and parameters

As evident from the explanation provided above the baseline scenario remains unchanged. Only the approach used to calculate the baseline emission factor is updated as per the latest version of CEA database available at the time of PDD submission for renewal.

In line with the project standard version 02.0, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity

The Government of India enacted the Electricity Act in the year 2003 to harmonize and rationalize the provisions in the existing laws. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. With the Enactment of the act, the then existing laws viz, The Indian Electricity Act 1910, The Electricity Supply Act, 1948 and The Electricity Regulatory Commissions Act, 1998 were repealed. The Electricity Act 2003 was in force at the time of the completion of the baseline study for the registered PDD.

Section 3 of the said act required the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy[6] on 12th February 2005 which was in force at the time of completion of the baseline study as stated in the registered PDD of the project activity. This policy has not been revised since then and is currently in force as well.

In addition to the above policies, State Electricity Regulatory Commissions (SERCs) have announced preferential tariffs and Indian Renewable Energy Development Agency (IREDA) provides term loan assistance towards establishing biomass power projects. All these fiscal and financial incentives were in force at the time of completion of the baseline study for the registered PDD of the project activity and still continue to exist.

The state electricity regulatory commission issues tariff order in respect of procurement of power generated wind generators and there is no mandatory national and/or sectoral policies have

[6] http://www.cercind.gov.in/Act-with-amendment.pdf

come into effect that would affect the compliance of the current baseline. Hence, it can be concluded the current baseline complies with all relevant mandatory national and/or sectoral policies that have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period.

However, in spite of the financial incentives given by the government to renewable power projects in India the generation from the low cost must run resources connected to the Southern Grid has not increased to such an extent that this would lead to more than 50% contribution from the low cost must run resources towards the total generation from the Southern Grid.

The approved consolidated baseline methodology, ACM0002 (Version 19), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology "*Tool to calculate the emission factor for an electricity system*" *(version 07.0)* has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

As per CEA CO_2 baseline database version 14, the fossil fuel dominated electricity is more than renewable sector and is continuing with same pattern. In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the Project Standard version 02.0, national and/or sectoral policies and circumstances had been considered towards formulating the OM & BM baseline scenario. Hence the baseline scenario as applied for the present project activity remains justified.

As per the approved consolidated Methodology ACM0002 (Version 19.0) "If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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 wind energy project 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 Indian grid, which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. 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 CEA database version 14 is the latest available data at the time of PD submission to DOE for validation, hence same is considered for emission factor calculations.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source

$EF_{grid,CM,y}$	0.9368 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 14.0, Dec 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9610 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2015-16, 2016-17, 2017-18) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 14.0, Dec 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8723 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 14.0[7], May 2018 published by Central Electricity Authority (CEA), Government of India

B.5. Demonstration of additionality

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 7.0. The tool provides a step-wise approach to demonstrate additionality which is displayed below: Step 1: Identification of alternatives to the project activity consistent with current laws and regulations Sub-step 1a: Define alternatives to the project activity: Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. The project proponent is setting up wind power project of 25.2 MW capacity in Rajkot district of Gujarat. It consists of installation of 12 Suzlon make wind turbines of 2.1 MW capacity each. As the purpose of the Project activity is to generate electrical power to be fed to the grid, the following alternatives are considered:

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

The project proponent could proceed with the implementation of the project without CDM benefits. The electricity produced from the renewable energy project would have been sold to the grid. This is in compliance with all applicable legal and regulatory requirements and can be a part of the baseline. However, the Project activity is not feasible without CDM revenues. This argument has been discussed in step 2 of the Additionality section.

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

The project proponent would have continued without investment in project activity with usual business activities. The grid would continue with the fossil fuel based power projects and this would result in GHG emissions. Hence, the new capacity add-on from a fossil fuel based power plant is appropriate, realistic & credible baseline alternative for the project activity**.**

Outcome of Sub-step 1a: All the realistic alternatives for the project activity have been enlisted above.

[7] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

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

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act[8] 2003
- National Electricity Policy[9] 2005
- Tariff Policy[10] 2006

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments

- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.

- There is no legal requirement on the choice of a particular technology for power generation.

In addition to the above policies, a regulation on Renewable Energy Certificate (REC) for renewable energy generation was published by CERC in India on 14/01/2012[11] . As per this policy, Renewable Energy projects had the option to claim REC benefits if they opted for a lower fixed tariff (APPC) as compared to the preferential tariff that was available to such projects. However, as the REC mechanism was adopted on on 14/01/2010 and falls under EB22 para 7b states as under "(b) National and/or sectoral policies or regulations under paragraph 6 (b) that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in developing a baseline scenario Therefore, REC is considered as 'E- ' policy with reference to EB16 Annex 3 and EB22 Annex 3. Thus policy this has not been considered further.

Outcome of Sub-step 1b: Hence, both the alternatives enlisted above are found to comply with the mandatory laws and regulations taking into account the enforcement of the legislations in the region or country and EB decisions on national and/or sectoral policies and regulations. Alternative 2 has been selected as the appropriate baseline alternative.

Step 2: Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

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[8] https://powermin.nic.in/sites/default/files/uploads/The%20Electricity%20Act_2003.pdf

[9] https://powermin.nic.in/en/content/national-electricity-policy

[10] https://powermin.nic.in/en/content/tariff-policy

[11] https://www.recregistryindia.in/pdf/REC Regulation/2(a)CERC Regulation on Renewable Energy Certificates
REC.pdf

Sub-step 2a: Determine appropriate analysis method

The Project activity envisages generation of revenues by exporting the electricity to Indian (erstwhile NEWNE) grid. Thus, simple cost analysis cannot be used as the analysis method as the sale of the units of generated electricity shall result in a revenue stream during the operations of the Project activity.

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

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

The investment analysis using Benchmark analysis approach (Option III) has been chosen. Further, this method illustrates the evaluation of the Project by the PP before the decision to undertake the project was taken and management approval granted.

Choice of Financial Indicator:

As allowed by the Guidance on the Assessment of Investment Analysis (Version 5.0)[12], Equity Internal Rate of Return (IRR) was selected as the financial indicator to assess the attractiveness of the project

Choice of Benchmark:

The Fisher equation[13] in financial mathematics and economics estimates the relationship between nominal and real interest rates under inflation. It is named after Irving Fisher who was famous for his works on the theory of interest. In finance, the Fisher equation is primarily used in yield to maturity calculations of bonds or IRR calculations of investments. In economics, this equation is used to predict nominal and real interest rate behavior.

Letting denote the nominal interest rate, R denote expected real rate of return, and let I denote the inflation rate, the Fisher equation is:

$r = (1+ I) * (1+ R) -1$

According to above discussion and as per Section IV Selection and Validation of Appropriate Benchmarks, Point 15 of Guidelines on the assessment of the investment analysis (Version 05, EB 62), the value for cost of equity is selected from Appendix. The value of Return on Equity for Group-1 projects in India is 11.75%.

As per paragraph 7 of Appendix of the above mentioned document,
In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used.

[12] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg guid03.pdf

[13] Aswath Damodaran, Book on Investment Valuation _2nd edition (Page 8 of Chapter 13)

Thus, the inflation forecast value has been considered as 5.40%[14] forecasted value for the crediting period chosen by the Central Bank (Reserve Bank of India) of the host country.

Therefore substituting I = 5.40% and R = 11.75% in the above equation, we get

r = (1+0.054) * (1+ 0.1175) -1

i.e. r = 17.7845%

Thus, the benchmark for the project activity has been estimated as **17.78%.**

The Project Proponent has conducted financial analysis taking the Equity IRR as the financial indicator to prove additionality. The Equity IRR has been calculated to be **7.28%**

Key assumptions used for Equity IRR calculations are listed below:

Particulars	**Value**	**Unit**	**Source**
No. of wind turbines	12	Nos	Suzlon Offer
Capacity of each wind turbine	2.1	MW	Suzlon Offer
Capacity of the project	25.2	MW	Calculated
Net Generation	50.733[15]	Million kWh	Apportioned generation for 25.2 MW (Project capacity) from the Wind Assessment Study - AWS Truepower,LLC -Table 6 (Pg.19) which was carried out for 37.8 MW i.e. entire wind farm capacity.
Net Generation	4.23	Million kWh per Machine	Calculated
Net PLF	22.98%	%	Calculated
No. of wind turbines opting for Pref. Tariff Model	7	Nos	Assumed at the time of decision making
No. of wind turbines opting for Open Access Model	5	Nos	Assumed at the time of decision making
Project cost	1,464.996	INR Million	Calculated
Debt	70%	INR Million	GERC Wind Power Tariff Order (dt. 31-01-2010), Page 15
Debt Contribution	1025.50	INR Million	Calculated
Equity Contribution	439.50	INR Million	Calculated
Operation and Maintenance Cost (first	0.65	INR Million Per MW	GERC Wind Power Tariff Order (dt. 31-01-2010), Page 14
Escalation in O & M	5%	%	GERC Wind Power Tariff Order (dt. 31-01-2010), Page 14
Service Tax on O&M	10.30%	%	Indian IT Act

[14] http://rbi.org.in/scripts/PublicationsView.aspx?id=13360

[15] Net Generation for Project activity has been calculated as = 76.1 * (25.2/37.8) = 50.733 GWh.

Open Access Tariff	3.90	Rs/kWh	Assumed at the time of decision making by PP based on an analysis carried out by third party
Preferential Tariff	3.56	Rs/kWh	http://www.sercin.org/renewablepdf/en 1303211765.pdf
Depreciation Rate (Companies Act) - Plant & Machinery	5.28%	%	The Companies Act,1956 - SCHEDULE XIV
IT Depreciation Rate - Plant & Machinery	7.69%	%	Indian IT Rules, Appendix IA
Income tax rate	33.22%	%	Indian IT Act for FY 2011-12
Interest rate	13.25%	%	SBI BPLR Minus 1% (as per GERC
Debt repayment	10	Years	GERC Tariff Order (dt. 31-01-2010),
Salvage value	10%		GERC Tariff Order (dt. 31-01-2010),
MAT rate	20.01%		Indian IT Act for FY 2011-12
GBI	0.5	Rs/kWh	MNRE GBI Guidelines, Page 2
GBI cumulative cap	6.2	INR Million per	MNRE GBI Guidelines, Page 2
Max. GBI allowed in a year	1.55	INR Million per	MNRE GBI Guidelines, Page 2
Max. GBI allowed in a year	22.785	INR Million	Calculated
GBI cumulative cap	91.14	INR Million	Calculated
Max duration for GBI	10	Years	MNRE GBI Guidelines, Page 2

Sub-step 2c: Sensitivity Analysis:

As per guidance provided in the latest version of "Tool for the demonstration and assessment of additionality", the variables, including the initial investment cost, that constitute more than 20% of total project costs or total project revenues have been identified and subjected to a reasonable variation and the results of this variation have been presented below

Change in net generation	**+10.00 %**	**0.00%**	**-10.00%**	**Break-Even Point**	**53%**
Equity IRR	9.45%	7.28%	4.77%		17.94%
Change in Power Sale tariff	**+10.00 %**	**0.00%**	**-10.00%**	**Break-Even Point**	**53%**
Equity IRR	9.43%	7. 28%	4.78%		17.85%
Change in O&M Cost	**+10.00 %**	**0.00%**	**-10.00%**	**Break-Even Point**	**-394%**
Equity IRR	6.95%	7. 28%	7.60%		17.78%
Change in Total Project Cost	**+10.00 %**	**0.00%**	**-10.00%**	**Break-Even Point**	**-37%**
Equity IRR	5.23%	7. 28%	9.42%		17.94%

The purpose of the sensitivity analysis is to demonstrate the sensitivity of the returns from the

Project activity due to uncertainty in plant load factor, capital cost and O&M costs. This is an assessment of the impact of variations in above parameters from the assumed/design values, and represents magnitude of effects of these variations on the returns from the Project activity.

It can be observed from above table that in various scenarios wherein there are changes in tariff and REC prices, O&M cost, net saleable units and project's capital cost, the Equity IRR does not cross the benchmark. Thus, it can be concluded that revenue from sale of CERs is important to alleviate this gap and hence the project has been considered to be additional.

Step 4 - Common practice Analysis

In the context of the present project activity, the following parameters are defined in line with paragraphs 5 - 10 of this approved methodological tool:

Measure: As per paragraph 6, 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.

Output: As per paragraph 7, "power generation" may be considered to be the output in the context of the project activity. Further as per Step 1 of paragraph 47 of the same tool, the applicable output range will be 12.6 MW to 37.8 MW, i.e. ±50% of installed capacity of the project activity (25.2MW).

As per paragraph 47 of the approved methodological tool, the following Stepwise approach has been followed by the project activity to demonstrate that it is not a Common Practice in the applicable geographical area:

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

The capacity of the project activity is 25.2 MW. The project capacity has been subject to the variation in the range of +/- 50%, the following table depicts the outcome of the variation applied. Hence, the applicable output range will be 12.6 MW to 37.8 MW, i.e. ±50% of installed capacity of the project activity

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number Nall. Registered CDM project activities shall not be included in this step.

India has been considered applicable geographical area as a default, for the common practice analysis of project activity. All power plants generating electricity within the capacity range of 12.6 MW to 37.8 MW and having commercial operations date before project activity start date have been considered in this analysis. The power generation plants identified in this step are hydro, thermal, nuclear, biomass based, solar and wind power projects. The total number of power plants in the applicable output range = 320.

Category of Power plants	No. of Projects
Thermal	94
Hydro	209
Wind*	32
Nuclear	0
Solar	0
Biomass	123
Total (Nall)	458

Therefore N_{all} = 458

Note: Registered/under validation CDM project activities have been excluded in this step .The spreadsheet containing the list of the plants identified has been provided separately to the DOE.

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number Nf.

In accordance with Guidelines on Common practice following criterion has been used to arrive at the number of different technology power plants;
Different technologies in the context of the project activity:

Energy Source / Fuel
The project activity involves electricity generation from wind. The other project activities using water (Hydro, Biomass, Solar), conventional fuels (Coal, Lignite, Natural Gas & Liquid Fuel based - i.e. Thermal) as energy sources for the generation of electricity respectively are considered as plants with different technologies and included under N_{diff}.

The N_{diff} value is thus arrived at as tabulated below:

Category of Power plants	No. of Projects
Thermal	94
Hydro	209
Wind	0
Nuclear	0
Solar	0
Biomass	123
Total (N_{diff})	426

Step 4: Calculate factor $F=1-N_{dif}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

N_{all}	458
N_{diff}	426
Nall - N_{diff}	32
$F = 1-N_{diff}/N_{all}$	0.0699

The factor F and Nall-Ndiff is calculated and following values are arrived at; F =0.0699
Nall-Ndiff = 32

As value of F is less than 0.2 so it can be concluded that the project activity is not a common practice in the applicable geographical area.

The above discussions show that wind power development is not a common practice in the applicable geographical area and the Project activity is not financially attractive; hence the Project activity is additional.

In view of the above, the PP had considered CDM as a source of additional revenue to improve financial viability of the project while deciding to make invest in the Project activity.

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

Sr. No.	Event	Date
1.	Board Decision making to invest in the project activity considering CDM revenue (Serious consideration of CDM)	10/08/2011
2.	Purchase order for wind turbines placed (Start date)	26/08/2011
3.	CDM Prior consideration notification to UNFCCC	07/11/2011
4.	CDM Prior consideration notification to host country DNA (MoEF)	09/11/2011
5.	Local stakeholder consultation meeting	23/11/2011
6.	Appointment of DoE	17/02/2012
7.	Commissioning date of the project	29/03/2012

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

As per the approved consolidated Methodology ACM0002 (Version 19.0) para 42:
Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (t CO2/yr)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

Note: Being greenfield project activity, the Quantity of net electricity generation that is produced and fed into the grid is represented as $EG_{PJ,y}$. However in the registered PDD & methodology the same had been represented as $EG_{facility,y}$. So in order to maintain the consistency $EG_{facility,y}$ has been used in the PPD Version 08. Thus, $EG_{PJ,y} = EG_{facility,y}$

As per methodology, combined grid emission factor as per the "Tool to calculate the emission factor for an electricity system" version 07 is calculated as below.

CO_2 Baseline Database for the Indian Power Sector, Version 14, Dec 2018[16] published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per Methodological tool: Tool to calculate the emission factor for an electricity system (Version 07.0, EB 100, Annex 4), following six steps have been followed:

(a) Step 1: Identify the relevant electricity systems;

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

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

(d) Step 4: Calculate the operating margin emission factor according to the selected method;

(e) Step 5: Calculate the build margin (BM) emission factor;

(f) Step 6: Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electricity systems

As described in tool "For determining the electricity emission factors, identify the relevant project 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	Tamil Nadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Telangana
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	Puducherry

[16] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

Rajasthan		Goa	Tripura	Lakshadweep
Uttar Pradesh				
Uttarakhand				

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

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

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.
The Project Participant has chosen only grid power plants in the calculation.

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

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 and Dispatch data analysis OM is not possible due to lack of availability of data to project developers. The choice of other two options for calculating operating margin emission factor depends on 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**
India	18.6%	16.8%	15.1%	14.6%	14.3%

Data Source: Central Electricity Authority (CEA) database Version 14, Dec'2018[17]

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

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

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:

(a) 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

[17] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

(b) 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 calculation of Simple OM emission factor using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PD 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 ($EF_{grid,OMSimple,y}$) 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)			
	2015-16	**2016-17**	**2017-18**
INDIAN Grid	871,753	916,278	960,693

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2015-16	**2016-17**	**2017-18**
INDIAN Grid	0.9655	0.9636	0.9543

Weighted Generation Operating Margin	
INDIAN Grid	**0.9610**

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

As per "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 72:

In terms of vintage of data, project participants can choose between one of the following two options:

(a) Option 1 - for the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of PD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third

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

1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 as described above is chosen by PP 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 PD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2017-18
INDIAN Grid	**0.8644**

Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$)

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 81:

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

(a) Weighted average CM; or
(b) Simplified CM.

PP has chosen option (a) i.e weighted average CM to calculate the combined margin emission factor for the project activity.

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 (t CO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (t CO_2/MWh)
W_{OM} = Weighting of operating margin emissions factor (per cent)
W_{BM} = Weighting of build margin emissions factor (per cent)

The following default values should be used for W_{OM} and W_{BM}:

Wind and solar power generation project activities: W_{OM}= 0.75 and W_{BM}= 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods. Since project activity is of wind power generation, the above weightage has been considered for OM and BM.

Therefore, $EF_{grid,CM,y}$ = 0.9610 * 0.75 + 0.8644 * 0.25
= 0.9368 tCO_2/MWh

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2e/MWh
Description	Simple operating margin for Indian grid
Source of data	Calculated from CEA database, Version 14, Dec 2018[18]
Value(s) applied	0.9610
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2015-16, 2016-17 & 2017-18. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 14, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	Calculation of baseline emissions
Additional comment	Fixed ex-ante for entire crediting period

Data/Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2e/MWh
Description	Build margin for Indian grid
Source of data	Calculated from CEA database, Version 14, Dec 2018[19]
Value(s) applied	0.8644
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as per the latest data available for the most recent year 2017-18. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 14, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	Calculation of baseline emissions
Additional comment	Fixed ex-ante for entire crediting period

[18] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

[19] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

Data/Parameter	$EF_{grid, CM, y}$
Data unit	tCO_2e/MWh
Description	Combined Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 14, Dec 2018 [20]
Value(s) applied	0.9368
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	Calculation of baseline emissions
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

B.6.3. Ex ante calculation of emission reductions

Detailed Calculations:

Baseline emissions (BE_y)

Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.
Baseline emission factor (Combined Margin) ($EF_{grid,CM,y}$)
= 0.9368 tCO_2e/MWh

Annual electricity supplied to the grid by the Project ($EG_{PJ,y}=EG_{facility,y}$)
=25.2MW (capacity) * 22.98 %(PLF) * 8760(hours)
=50,728 (MWH)

Annual Baseline Emissions Reduction: $BEy = EG_{PJ, y} * EF_{grid,CM,y}$
= 0.9368 tCO_2e/MWh * 50,728 MWh
= 47,521 tCO_2e/year

Note: The Quantity of net electricity generation that is produced and fed into the grid is represented as $EG_{PJ,y}$. However in the registered PDD the same had been represented as $EG_{facility,y}$. So in order to maintain the consistency $EG_{facility,y}$ has been used in the PPD Version 8.

Leakage emissions:

No leakage emissions are considered as per ACM 0002 version 19.

Project activity emissions:

The Project activity does not envisage any fossil fuel consumption. Therefore, the parameter $PE_{FF, y}$ = 0 tCO_2e/ annum. Also, as the proposed CDM Project activity is not a geothermal project activity or a hydro project activity, hence, the Project emissions as per parameters $PE_{GP, y}$ and $PE_{HP, y}$ are also zero.

Therefore, PE_y = 0 tCO_2e/annum

[20] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

According to equation (7), overall emission reductions (ER_y) are,

$ER_y = BE_y – PE_y$

$= 47,521- 0$

$= 47,521\ tCO_2e$

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	47,521	0	0	47,521
Year 2	47,521	0	0	47,521
Year 3	47,521	0	0	47,521
Year 4	47,521	0	0	47,521
Year 5	47,521	0	0	47,521
Year 6	47,521	0	0	47,521
Year 7	47,521	0	0	47,521
Total	**3,32,647**	0	0	**3,32,647**
Total number of crediting years	7			
Annual average over the crediting period	47,521	0	0	47521

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{facility,i,y}$
Data unit	MWh/ year
Description	Quantity of net electricity generation supplied by the project WTGs connected to feeder i to the grid in period y
Source of data	Sum of net electricity generation values as per all the certificates for share of electricity generated by Wind farm provided by GETCO/SLDC[21] for the period y and for all the feeders to which WTGs of the project activity are connected. In cases where there are other (non-project) WTGs connected to the same feeder, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied. Also for cases when the start/end dates of monitoring period do not match with the start/end dates of certificates for share of electricity generated by Wind farm provided by GETCO/SLDC, appropriate apportioning mechanism specified in PDD section B.7.3 shall be applied.
Value(s) applied	50,728 MWh
Measurement methods and procedures	The net electricity generated and fed into the grid shall be directly referred from the respective certificates for share of electricity generated by Wind farm provided by GETCO/SLDC. The above values are calculated by specific apportioning mechanism. The same has been provided in appendix 5 of this PDD for reference. As Readings from both the WTG yard meters (tri-vector meters) as well as the

[21] https://www.sldcguj.com/EnergyAccount/Energy_Block.php

	ABT[22] meters installed at the 33/66 kV Parveda substation are used for arriving at the net electricity generation supplied by the project to the grid, their, measurement methods and procedures are described below: Monitoring: Continuous measurement and at least monthly recording. Archiving: Electronic and Paper Data type: Measured & Calculated Responsibility: The O&M site-in-charge shall be responsible for the regular recording of data. For ABT meter: Accuracy Class: 0.2S (Active) and 0.5S (Reactive) For Tri-vector meter (installed at the yard near each WTG): Accuracy Class: 0.2S
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	The Quantity of net electricity generation from the certificate for share of electricity can be cross-checked with the invoices for the sale of power by the project proponent. The meter(s) shall be calibrated and maintained by the state utility as per their own schedule and this frequency of meter calibration is not within the control of the Project Proponent. However, PP would ensure that calibration is carried out at least once in 3 years.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs

Data/Parameter	$EG_{WTG\_yard,i,y}$
Data unit	MWh/year
Description	Sum of electricity generation measured at individual yard meters of all project WTGs that are connected to feeder i during period y
Source of data	Yard meter readings of project activity WTGs
Value(s) applied	-
Measurement methods and procedures	This parameter would only be used for calculation of $EG_{faciiity,i,y}$ in cases when the start/end dates of monitoring period do not match with the start/end dates of certificate for share of electricity generated by Wind farm provided by GETCO/SLDC or if there are both project and non project WTGs connected to a particular feeder i. This parameter is the sum of electricity measured at yard meters of all the project WTGs on a continuous basis. These meter readings will be recorded at on a daily basis. O&M contactor will have the responsibility of monitoring this parameter. This value will be used in an appropriate apportioning formula specified in PDD section B.7.3 to calculate quantity of net electricity generation supplied by the project to the grid. Monitoring: Continuous measurement and at daily recording. Archiving: Electronic and/or Paper Data type: Measured & Calculated Note: Accuracy Class of all the meters have been specified in appendix 5 of this PDD
Monitoring frequency	Continuous measurement and daily recording

[22] https://www.sldcguj.com/EnergyAccount/Energy_Block.php

QA/QC procedures	The yard meters installed near individual WTGs will be tested at least once in a year and calibrated (if required).
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs

Data/Parameter	$EG_{Allyard,i,y}$
Data unit	MWh/year
Description	Sum of electricity generation measured at individual yard meters of all project and non-project WTGs that are connected to feeder i during period
Source of data	Yard meter readings of project & non-project activity WTGs
Value(s) applied	-
Measurement methods and procedures	This parameter would only be used for calculation of $EG_{faciiityj,y}$ in cases when the start/end dates of monitoring period do not match with the start/end dates of certificate for share of electricity generated by Wind farm provided by GETCO/SLDC or if there are both project and non project WTGs connected to a particular feeder i. This parameter is the sum of electricity measured at yard meters of the project and non-project WTGs on a continuous basis. These meter readings will be recorded at on a daily basis. O&M contactor will have the responsibility of monitoring this parameter. This value will be used in an appropriate apportioning formula specified in PDD section B.7.3 to calculate quantity of net electricity generation supplied by the project to the grid. Monitoring: Continuous measurement and at daily recording. Archiving: Electronic and/or Paper Data type: Measured & Calculated Note: Accuracy Class of all the meters have been specified in appendix 5 of this PDD
Monitoring frequency	Continuous measurement and daily recording
QA/QC procedures	The yard meters installed near individual WTGs will be tested at least once in a year and calibrated (if required). Note: The project proponent does not have any control over the yard meter readings of other project developers and therefore the values certified by the O&M contractor/GETCO/SLDC will be directly used for the purpose of calculation.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

B.7.2. Sampling plan

Since the data and parameters monitored in section B.7.1 above are not determined by a sampling approach, the sampling plan is not provided.

B.7.3. Other elements of monitoring plan

In Monitoring &Verification protocol, the objective is to have clear, credible and accurate monitoring, evaluation and verification procedures. This involves recording, data collection of all wind turbines, metering of electricity generated at substation, on daily basis as well as on monthly basis. The general conditions for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the Power Purchase Agreement with the state utility.

Procedure for apportioning of electricity:

1. In case the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by GETCO/SLDC, following apportioning procedure will be applied for the first and the last monitoring period within a particular crediting period:

   Apportioning will be carried out based on ratio of generation data recorded using WTG yard meter installed near each WTG. The emission reductions of that particular period (between the start/end date of monitoring period and the end/start of the billing period) will be calculated based on percentage generation of that particular period at WTG using yard meter data multiplied with the total units generated in the month as per the Certificate for share of electricity generated by Wind farm provided by GETCO/SLDC. The calculation formula has been furnished below:

Generation from all project WTGs for the period y1= $EG_{WTGyard,i,y1}$
Generation from all project WTGs for the period y2 = $EG_{WTGyard,i,y2}$
Net energy supplied used for calculation of emission reduction for the monitoring period y1

$$\sum_{i=1}^{N} ((EG_{facility,i,y2})* (EG_{WTGyard,i,y1}/ EG_{WTGyard,i,y2}))$$

Where:
y1 = No. of days within a billing period up to which generation is considered for emission reduction calculation
y2 = No. of days in the billing period
N = No. of feeders to which project WTGs are connected to.

2. In case if there are project and non-project WTGs connected to a particular feeder i, the quantity of net electricity supplied by project WTGs to the grid connected to that particular feeder will be calculated based on the formula specified below:

   Total generation from all project WTG(s) connected to the feeder i in period y = $EG_{WTGyard,i,y}$
   Total generation from all project and non-project WTGs connected to the feeder i in period y = $EG_{Allyard,i,y}$

Quantity of net electricity supplied by all (project and non-project) WTGs connected to feeder i to the grid in period y= $EG_{facility,i,y}$

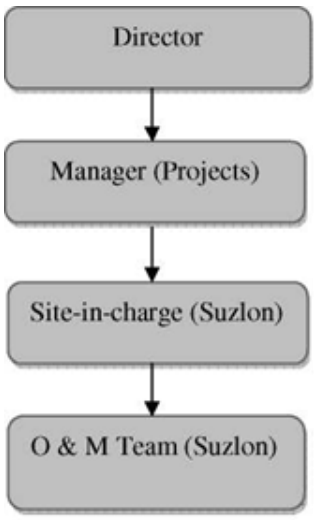
Net electricity supplied by the project WTGs connected to feeder i to the grid in period y =

$$\sum_{i=1}^{N} ((EG_{facility,i,y})* (EG_{WTGyard,i,y}/ EG_{Allyard,i,y}))$$

Where:
N = No. of feeders to which project WTGs are connected to.

3. In cases where both scenarios mentioned above exist at the same time (i.e. both project and nonproject WTGs connected to the same feeder(s) and the start/end date of the monitoring periods do not match with those of the JMR readings), firstly the apportioning as per point # 2 above will be applied for the billing period y2 to estimate the Net electricity supplied by the project WTGs connected to feeder Z to the grid in period y2. Then this value would replace ($EG_{facility,y2}$) in the formula specified under point # 1 above to arrive at the Net energy export used for calculation of emission reduction for the monitoring period y1.

The project proponent proposes following arrangements in order to carry out metering and O & M activities for all wind turbines:



At 33 kV/66 kV Parveda substation (Currently managed by Suzlon), there are two feeders; Feeder 1 and Feeder 2. Main meter, check meter and ABT meters are located at this substation.

The detailed monitoring, recording and apportioning procedure has been described in appendix 3 of this PDD. The meter readings will be reported to the site-in-charge and the compiled reports will be sent to the Manager (Projects) and Director. The Manager will monitor overall activity of the project and report to the Director. As per O & M schedule, the operation and maintenance activities will be carried out by trained and qualified technical staff of Suzlon.

Each party shall maintain complete and accurate records and all other data required by each of them for the purposes of proper administration and the operation of the project

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

26/08/2011 (Placement of purchase order to technology supplier)

C.2. Expected operational lifetime of project activity

25 years-0 months

C.3. Crediting period of project activity

C.3.1. Type of crediting period

Renewable crediting period. This is the Second crediting period.

C.3.2. Start date of crediting period

15/11/2019 (inclusive of the date)

C.3.3. Duration of crediting period

7 years- 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

As per the Schedule 1 of the EIA notification dated 1/12/2009[23], given by the Ministry of Environment and Forests under the Environment (Protection) Act 1986, the proposed Project activity does not fall under the list of activities requiring EIA as the environmental impacts for such project are not considered as significant by the host Party or Project Proponent.

D.2. Environmental impact assessment

Not applicable as the environmental impacts for such project are not considered as significant by the host Party or Project Proponent.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

RNWERPL had identified stakeholders for their wind power project in Rajkot district of Gujarat. The meeting was conducted on 23/11/2011 near the project site at Jasdhan, Rajkot.

The PP had identified the local stakeholders who may be impacted by the project activity and invited them via invitation letters. The category of stakeholders invited is listed below:
1. Representatives from Suzlon
2. Employees of RNWERPL
3. Contractors and Vendors
4. Villagers from nearby villages in Rajkot

E.2. Summary of comments received

Meeting started with introductory speech by a local social leader. He introduced all attendees and the meeting agenda. The Project Proponent mentioned the meeting agenda then explained about Technical aspects of Project to stakeholders. He also explained about social, environmental & economical benefits of the Project. He also elaborated about CDM & its requirement. After detailed elaboration on Project, the meeting was open for discussion and feedback from stakeholders.

The villagers raised query that whether local villages would get electricity generated from the project. The Project Proponent answered that electricity generated would be exported to the grid of the State and the same cannot be distributed to the local villages due to technical difficulties. Then, villagers asked about any other benefits that local villages would receive. The project proponent replied that the project would help the local villagers in terms of direct and indirect employment generation. The project would also bring infrastructure facilities viz. Road in nearby villages.

To sum up the local villagers have given very positive response. They are one of the direct as well as indirect beneficiaries of the project. The construction and continuous operation of the project is providing employment opportunities for them. They have also express their support to project as it does not require any major displacement nor create any inconvenience to the local population. Wind being clean technology this will help in bridging the gap of power demand & generation with no pollution.

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

E.3. Consideration of comments received

There was no negative feedback from any of the stakeholders who attended the meeting. They in fact supported the initiative taken by the project proponent for carrying out such an activity in the region.
Hence, there is no need to take due account of the comments.

SECTION F. Approval and authorization

The letter of approval from the host country Designated National Authority (DNA) for the project activity was not available at the time of submitting the PDD to the validating DOE.

The PP had made an application for receipt of letter of approval and authorization from the host country DNA and has attended the National CDM Authority (NCDMA) meeting dated 24/07/2012. The PP has now received approval and authorization from the NCDMA vide its letter No. 4/12/2012-CCC dated 10/10/2012.

Appendix 1. Contact information of project participants

Organization name	ReNew Wind Energy (Rajkot) Private Limited
Country	India
Address	601-604 6th Floor DLF Corporate Park, MG Road, Gurgaon, Haryana, 122001
Telephone	+91- 124 – 4896670
Fax	-
E-mail	parag@renewpower.in
Website	http://renewpower.in/
Contact person	Mr. Parag Sharma

Appendix 2. Affirmation regarding public funding

There is no public funding involved from parties included in the Annex I for the implementation of the Project activity.

Appendix 3. Applicability of methodologies and standardized baselines

Refer section B.2 of the PDD.

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

Refer to PDD section B.6.3 for further information on ex ante calculation of emission reductions

Appendix 5. Further background information on monitoring plan

Refer to section B.7.3 of the PDD

Appendix 6. Summary report of comments received from local stakeholders

Refer to section D of the PDD

Appendix 7. Summary of post-registration changes

None

Annexure 1

Proposed action plan for Action Plan for Sustainable Development

SUSTAINABLE DEVELOPMENT PLAN

The Company will contribute 2% of its net CER revenue realized to sustainable development of the region where the project activity is being carried out. The following table lists the Sustainable development scope and the monitoring action plan of the scope.

S. No	Activity	Monitoring action Plan
1.	**Health of the Community:** Under this, medical counseling sessions, health camps will be held to create awareness among the people residing in the region. The Company will conduct these camps with local NGOs involved in such activities. The Company will provide funding to these initiatives in partnership with local bodies. Under this, following activities will be carried out. • Medical camps • Medical camps • Medical camps	The company will ensure that health initiatives will be taken regularly in the region. All the events related to health programmes conducted by the Company will be recorded and documented.
2.	**Education:** The Company will conduct activities/programmes related to education in the region. The main focus will be on children education. Under this, following activities will be carried out by the Company.	The Company' will maintain all records of receipts from the dealers/suppliers. Regular visits will be organized to monitor the status of the programmes.

ReNew Wind Energy (Rajkot) Pvt. Ltd.

Corporate Office: 5th Floor, Aurum House, 25-Dady Seth Road, MUMBAI - 400 007
Redg. Office: AB01A, Neelam Centre, Hind Cycle Road. Worli, Mumbai -400 030,
Ph: - +91 22 61919700 Fax: - +91 22 61919720

- Encouraging girl child for education
- Adult education programme
- Computer Literacy
- Scholarships to Meritorious students, their educational expenses

Monitoring for the Action Flan for expenditure incurred through 2% of CER revenues									
Financial Year (A)	Activity (B)	Issued CERs (C)	CER Price (D)	Total CDM Amount (E=CxD)	Expenditure in Current year(F)	Expenditure Carried forward (G	Net Expenditure for Current Year(H = F+G)	Expenditure as % of CDM amount for current year (1 = H/E)	Reference Documentation (J)
Indicates the year	Provides	Quantity	CER	Total amou	Expenditure	Additional	Net Expenditur	Indicates ihe % of the	Indicates the

which the assessment is being provided	details of the social/ community activities on which the expenditure has been incurred	of CERs issued for the assessment year	price at which the transaction has happened	nt CDM amount received	made an the siKin!/ community development activity in the current assessment year	expenditure incurred on capital goods hi the previous assessment years being carried forward to the current assessment year	e cm social/ community development activity for Ihe current year	total CDM amount spent on soda J/coninnmity development activity	documentation to be provided to the DOE during the verification to evidence the amount spent on social/community development activity

Annexure 2

Location No.	Village/Taluka/District/State	Geographical Coordinates
G 034	Godladhar/J asdan/Raj kot/Guj arat	N22 02 39.2 E71 18 58.5
G 036	Godladhar/Jasdan/Raj kot/Guj arat	N22 03 01.8, E71 18 08.2
G 037	Madhavipur/J asdan/Raj kot/Guj arat	N22 03 33.6 , E71 18 01.5
G 038	Godladhar/J asdan/Raj kot/Guj arat	N22 02 52.1 E71 18 58.9
G 039	Godladhar/J asdan/Raj kot/Guj arat	N22 03 14.8 E71 18 45.6
G 041	Madhavipur/J asdan/Raj kot/Guj arat	N22 03 47.3, E71 17 49.0
G 042	Madhavipur/J asdan/Raj kot/Guj arat	N22 03 45.5, E71 18 10.6
G 046	Kalasar /Jasdan/Rajkot/Gujarat	N22 05 06.0, E71 16 42.6
G 055	Devpara /Jasdan/Rajkot/Gujarat	N22 06 04.6, E71 14 19.7
G 056	Devpara /Jasdan/Rajkot/Gujarat	N22 06 18.1, E71 14 15.1
G 068	Madava /Jasdan/Rajkot/Gujarat	N22 08 36.6, E71 14 06.0
G 112	Kalasar/Jasdan/Raj kot/Guj arat	N22 04 54.0, E71 16 18.0

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.

Version	*Date*	*Description*
04.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
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