WIND POWER PROJECT AT RAJKOT, GUJARAT

Document Prepared by EKI Energy Services

Project Title	Wind Power Project at Rajkot, Gujarat
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1 PROJECT DETAILS

1.1 Summary Description of the Project

Introduction:
ReNew Wind Energy (Rajkot) Private Limited (RNWERPL), the Project Proponent (PP), has installed wind power project of 25.2 MW capacity at Villages: Godladha, Madhavipur, Kalasar, Devpara of Rajkot district of 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.

In the absence of the project activity, the equivalent amount of electricity would have been generated by the grid connected / new power plants in the INDIAN grid, which are / will be predominantly based on fossil fuels. The main emission source in the pre-project scenario is the power plants connected to the INDIAN grid and main greenhouse gas involved is CO_2.

Baseline Scenario:
The Project activity uses wind energy to generate electricity from the project and export it to INDIAN 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 relevant implementation dates

The project plant has commissioned on 29-March-2012 and run satisfactorily since then. The first crediting period was from 29-March-2012 to 28-March-2022 (first and last days included) and the estimated annual emission reduction was 48,338 tCO_2e.

The estimate of annual average and total GHG emission reductions for the second crediting period i.e. from 29-March-2022 to 28-March-2032 is 47,244 tCO_2e per year and 472,440 t CO_2e for 10 years of crediting period.

1.2 Sectoral Scope and Project Type

Sectoral Scope	: 1, Energy industries (renewable / non renewable sources)
Type and Category	: ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.3.0). - For first crediting period ACM0002 “Grid-connected electricity generation from renewable sources” (Version 20.0)[1]-For second crediting period

[1] https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO

This project is not grouped project because there is no addition other project activity. This is non-AFLOU type of project.

1.3 Project Eligibility

The project activity involves installation and generation of electricity using wind energy resources i.e. by using the renewable sources replacing electricity supply from a fossil-fuel dominated electricity, thus leads to reductions of anthropogenic GHG emissions from atmosphere. Hence the project activity is eligible Sectoral scope 1 i.e. energy industries (renewable/ non-renewable sources) under the scope of the VCS Program.

1.4 Project Design

The project involves setting up a wind farm of 25.2 MW ("Project) in the state of Gujarat, India. Hence, the project has been designed to include a single installation of an activity and is not a grouped activity

Eligibility Criteria

Not applicable to this project activity as this is not a grouped project.

1.5 Project Proponent

Organization name	M/S ReNew Wind Energy (Rajkot) Private Limited
Contact person	Mr. Parag Sharma
Title	Chief Operating Officer
Address	601-604 6th Floor DLF Corporate Park, MG Road, Gurgaon, Haryana, India 122001
Telephone	+91 -124-4896670/80
Email	parag@renewpower.in

1.6 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Gaurav Kumar Singh
Title	Executive
Address	Enking Embassy, Office no. 201, Plot 48, Scheme 78 Part-2, Vijay Nagar, Indore-452010, Madhya Pradesh, India

Telephone	09113763638
Email	Email ID: gaurav@enkingint.org / registry@enkingint.org

1.7 Ownership

As per VCS Program Definitions version 4.2, the project ownership is the legal right to control and operate the project activities.

The ownership of the Project and its right to use is completely entrusted to ReNew Wind Energy (Rajkot) Private Limited. The same can be verified by the following evidences:

- Commissioning certificates as issued by Gujarat Energy Development Agency (GEDA), vide Letter No. GEDA/PWF/SGWPL-RWEPL/Jasdan/12- 13/255, dated 26-April-2012
- Commissioning certificates as issued by Gujarat Energy Development Agency (GEDA), vide Letter No. GEDA/PWF/SGWPL-RWEPL/Jasdan/12- 13/1013, dated 11-June-2012
- Host Country Approval by National CDM Authority, Government of India, vide Letter No. 4/12/2012-CCC, dated 10-October-2012

1.8 Project Start Date

As per VCS Standard: VCS Version3 (v 3.3), the project start date is the date on which the Project began generating GHG emission reductions or removals.

Therefore, the project start date for the project activity concerned is the earliest date of Commissioning amongst the WTGs in the project activity, i.e. 29-March-2012.

Start Date: 29-March-2012

1.9 Project Crediting Period

Crediting Period Start Date: 29-March-2022
Crediting Period End Date: 28-March-2032
Total number of years: 20
Possible renewal: 2 times

This is the second crediting period of this project activity i.e. 29-March-2022 to 28-March-2032 (inclusive of both days). The first crediting period of this project activity is given below-

- 1st Crediting Period date: 29-March-2012 to 28-March-2022 (inclusive of both days)

As per VCS guideline, PP has applied for renewal of crediting period within 2 years from the last date of previous crediting period.

The current monitoring period is 01-January-2022 to 30-June-2022, (monitoring period that spans the two crediting periods) i.e.

CP1 covering 01-January-2022 to 28-March-2022

CP2 covering 29-March-2022 to 30-June-2022.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	-

Year	Estimated GHG emission reductions or removals (tCO_2e)
2022-2023	47,244
2023-2024	47,244
2024-2025	47,244
2025-2026	47,244
2026-2027	47,244
2027-2028	47,244
2028-2029	47,244
2029-2030	47,244
2030-2031	47,244
2031-2032	47,244
Total estimated ERs	472,440
Total number of crediting years	10
Average annual ERs	47,244

1.11 Description of the Project Activity

ReNew Wind Energy (Rajkot) Private Limited (RNWERPL), the Project Proponent (PP), has installed wind power project of 25.2 MW capacity at Villages: Godladha, Madhavipur, Kalasar, Devpara of Rajkot district of Gujarat.

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 meters
Power regulation	Pitch
Rotor diameter	88 meters

Swept area	6082 m^2
Generator type	Asynchronous slip ring type inductiongenerator
Generator rated power output	2100 kW
Voltage	690 V
Expected Operational Life	25 years

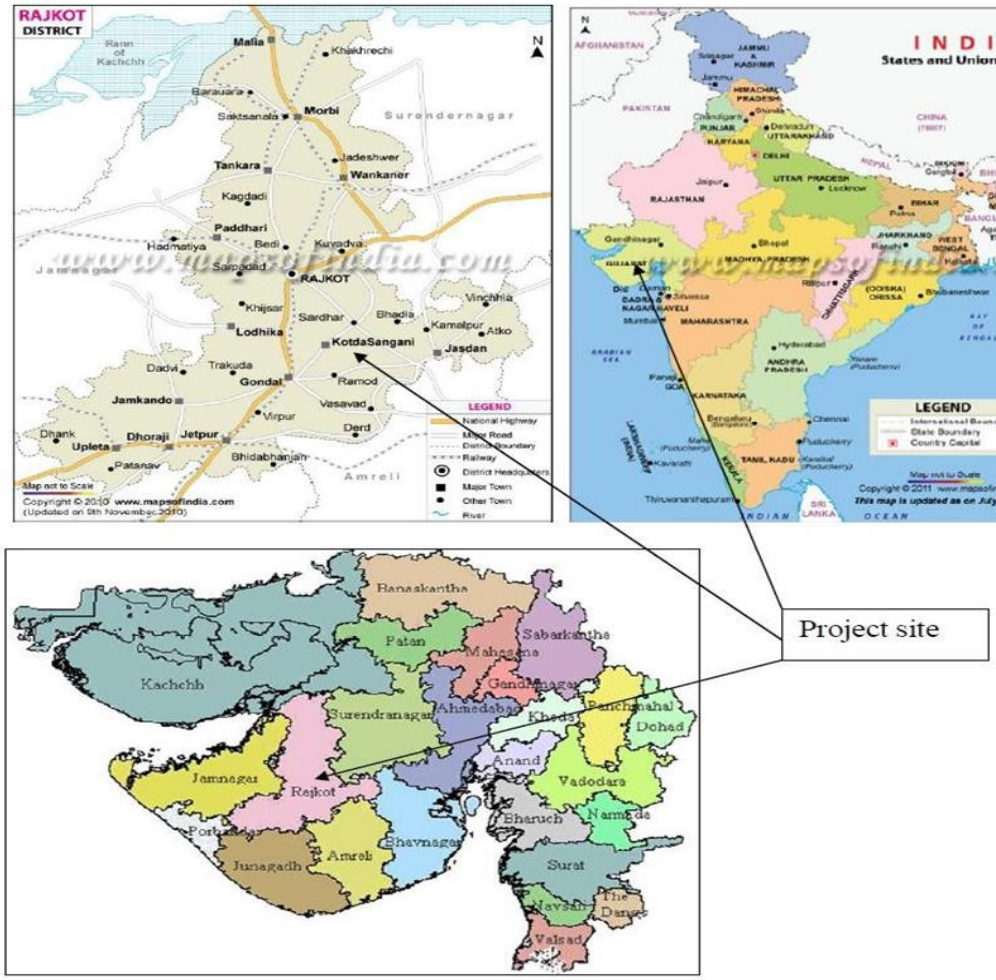
These turbines are supplied by Suzlon Ltd and are designed for particular wind conditions. The technology for the same is environmentally safe and sound and there is no technology transfer to the host party involved in the same. Lifetime of the WTGs is expected to be 25 years as per data shared by the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

1.12 Project Location

The project is located in Godladha, Madhavipur, Kalasar & Devpara villages of Rajkot district in the State of Gujarat, India.

Wind turbine wise detailed geo-coordinates are given below:

Location No.	Village/Taluka/District/State	Geographical Coordinates
G 034	Godladhar/Jasdan/Rajkot/Gujarat	N22 02 39.2 E71 18 58.5
G 036	Godladhar/Jasdan/Rajkot/Gujarat	N22 03 01.8, E71 18 08.2
G 037	Madhavipur/Jasdan/Rajkot/Gujarat	N22 03 33.6, E71 18 01.5
G 038	Godladhar/Jasdan/Rajkot/Gujarat	N22 02 52.1 E71 18 58.9
G 039	Godladhar/Jasdan/Rajkot/Gujarat	N22 03 14.8 E71 18 45.6
G 041	Madhavipur/Jasdan/Rajkot/Gujarat	N22 03 47.3, E71 17 49.0
G 042	Madhavipur/Jasdan/Rajkot/Gujarat	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/Rajkot/Gujarat	N22 04 54.0, E71 16 18.0



1.13 Conditions Prior to Project Initiation

The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The project activity replaces anthropogenic emissions of greenhouse gases (GHG's) into the atmosphere by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel-based power plants and future capacity expansions connected to the grid.

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the Indian grid, which are/ will be predominantly based on fossil fuels1. Whereas the electricity generation from operation of Wind Energy Convertors (WEC's) is emission free. As per the applicable methodology the baseline scenario for the project activity is the grid-based electricity system, which is also the pre-project scenario.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

Project activity has complied with all statutory requirements as per State regulations & received commissioning certificate form state regulatory authorities.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

Project has been registered with UNFCCC under Clean Development Mechanism program, Registration reference number is 8095[2].

Registration Date: 09-November-2012

PP has provided undertaking that in current monitoring period, it would not claim GHG emission reduction credits in any GHG program other than that in VERRA. There would be no double counting of GHG emission reductions.

1.15.2 Projects Rejected by Other GHG Programs

Project has not rejected from any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The requirements of the VCS Project Description pertaining to this section have been addressed as follows:

"Where projects reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading, evidence shall be provided that the GHG emission reductions or removals generated by the project have not and will not be otherwise counted or used under the program or mechanism. Such evidence may include:

1) A letter from the program operator designated national authority or other relevant regulatory authority that emissions allowances (or other GHG credits used in the program) equivalent to the reductions or removals generated by the project have been cancelled from the program or national cap, as applicable.

2) Evidence of the purchase and cancellation of GHG allowances equivalent to the GHG emissions reductions or removals generated by the project related to the program or national cap.

3) Evidence from the program operator, designated national authority or other relevant regulatory authority stating that the specific GHG emission reductions or removals generated by the project or type of project are not within the scope of the program or national cap." The host country of the project activity under consideration, i.e., India is a non-Annex-I, or, a developing nation as recognized by the Kyoto Protocol. Hence, there are no GHG emission reduction targets or commitments for India and it does not fall under the purview of any compliance driven Emission Trading Programs.

Furthermore, there are also no such voluntary emission trading Programs similar to the VCS existent in the country. This confirms there are no emissions trading programs prevalent in

[2] https://cdm.unfccc.int/Projects/DB/LRQA%20Ltd1352364786.6/view

the host country of the project activity under consideration, i.e., India at the time of preparation of the VCS PD. The host country of the project activity, India, being a non-Annex-I nation under the Kyoto Protocol, India does not have GHG emission reduction targets or commitments. This confirms there are no national caps on GHG emissions prevalent in India at the time of preparation of the VCS PD. Therefore, it is not applicable for the project activity.

1.16.2 Other Forms of Environmental Credit

Emission reduction generated from the project activity will not be double counted (i.e. issuance of other form of environmental credit/certificate) for a particular crediting period. PP has submitted an undertaking that they shall not claim GHG Emission Reduction credits from another type of credit.

1.17 Sustainable Development Contributions

1.17.1 Sustainable Development Contributions Activity Description

Contribution to Sustainable Development:
National CDM Authority (Indian DNA), Ministry of Environment, Forests & Climate Change (MoEFCC), Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects:

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, 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 Indian grid and in turn it will result in SOx, NOx 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.

1.17.2 Sustainable Development Contributions Activity Monitoring

According to the Appendix 3- the document history mentioned in the VCS Standard Version 4.3[3] (Latest version), it is clearly mentioned that Project Proponent is required to demonstrate contributions to a minimum of three SDGs, effective immediately for all projects registered on or after 20 January 2023. Since this is the 4th Verification of this project and it is registered before 20 January 2023, SDG reporting is not required for the current version and the PP will demonstrate contribution to at least three SDGs by 20 January 2025.

[3] https://verra.org/wp-content/uploads/2022/06/VCS-Standard_v4.3.pdf

1.18 Additional Information Relevant to the Project

Leakage Management

Not Applicable

Commercially Sensitive Information

Not Applicable

Further Information

There are no information or incidents that will have bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

As per the Schedule 1 of the EIA notification dated 01-December-2009[4], 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.

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

2.2 Local Stakeholder Consultation

RNWERPL had identified stakeholders for their wind power project in Rajkot district of Gujarat. The meeting was conducted on 23-November-2011 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

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

[44] https://hspcb.gov.in/content/notification/EIA%202006/EIA-Notification-01-12-2009.pdf

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 expressed 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.

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.

The process of local stakeholder consultation is continuous. During the current monitoring period, the project proponent has kept grievance register in plant site office and sought comments/grievances/suggestions from local stakeholders including local community, government agencies and NGOs. However, no comments/grievances/suggestions have been received from the aforementioned stakeholders during the current monitoring period.

2.3 Environmental Impact

As per the Schedule 1 of the EIA notification dated 01-December-2009[5], 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.

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

2.4 Public Comments

The Global Stakeholder Consultation commenting period had been completed before first crediting period. No comments had been received in the commenting period.

2.5 AFOLU-Specific Safeguards

Not Applicable

[55] https://hspcb.gov.in/content/notification/EIA%202006/EIA-Notification-01-12-2009.pdf

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Title: "Grid-connected electricity generation from renewable sources" Version 20.0[6]
Reference: ACM0002: Large-scale Consolidated Methodology

The methodology ACM0002 refers to the latest approved versions of the following tools:

1. Tool to calculate the emission factor for an electricity system, Version 07.0 (EB 100, Annex 04)[7]
2. Tool for the demonstration and assessment of additionality, Version 7.0[8]

3.2 Applicability of Methodology

The project activity is wind based renewable energy source, zero GHG emission power project connected to the Gujarat state grid which in turn forms part of the Indian grid.

The Project will displace fossil fuel-based electricity generation that would have otherwise been provided through operation and expansion of fossil fuel-based power plants in Indian grid. The approved consolidated baseline and monitoring methodology ACM0002 Version 20.0 is the relevant baseline and monitoring methodology and it is applicable because:

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	The option (a) of applicability criteria 2 is applicable as project is renewable energy wind power plant/unit.

[6] https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO
[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

Applicability Criterion	Project Case
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.	
3. In case of hydro power plants, one of the following conditions shall apply:[9] (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/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2; 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/m^2, 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/m^2; (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/m^2 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.	The project is installation of new wind based electricity generation plants (not a hydro power plant). Hence this criterion is not applicable.
4. In the case of integrated hydro power projects, project proponent shall:	The project is wind energy 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 energy project and thus the criterion is not applicable to this project activity.

[9] 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.

Applicability Criterion	Project Case
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 VCS 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 VCS project activity.	The project is wind energy 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.	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 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 energy 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.[10]	Please refer tables below.
Applicability conditions of "Tool to calculate the emission factor for an electricity system", - Version 07.0	
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.6.3 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	Since the project activity is grid connected, this condition is applicable and the emission

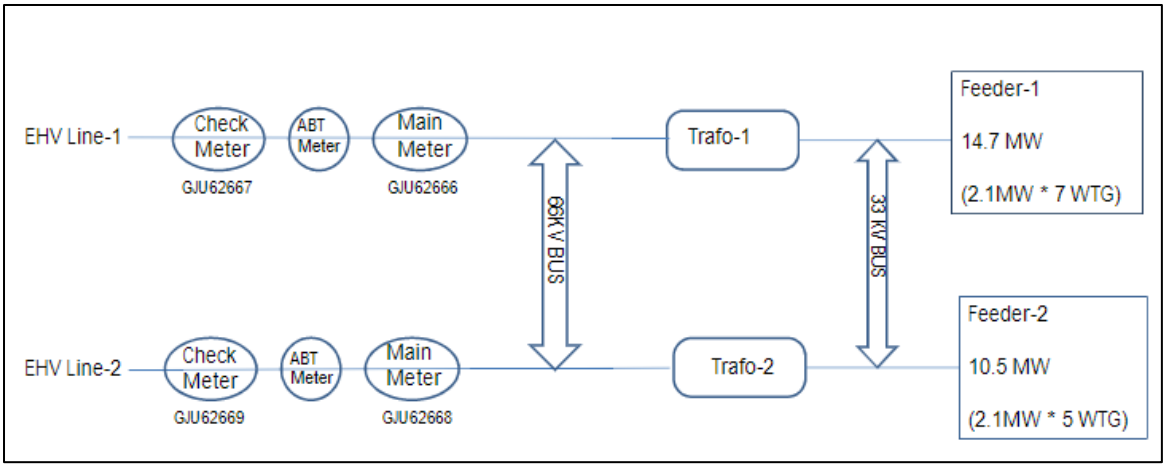
[10] The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants; does not apply to this methodology, as this methodology only refers to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

Applicability Criterion	Project Case
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: be met. Namely, the total capacity of off-grid Procedures related to off-grid power generation" should 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.	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/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable.

3.3 Project Boundary

"Project boundary has ascertained using para 20 of ACM0002 (Version 20.0, EB 105, Annex 3) - "The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to".

Hence the both the project boundary includes the Wind Project activity, sub-station, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Indian grid.



Baseline and project emission sources:

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	In the baseline scenario, electricity would be sourced from the Indian Grid which in turn would have been connected to fossil fuel fired power plants which emit CO_2.
		CH_4	No	No methane emission is expected.
		N_2O	No	No nitrous oxide emission is expected.
Project	Greenfield wind energy conversion system	CO_2	No	The project activity does not emit carbon dioxide.
		CH_4	No	No methane emission is expected.
		N_2O	No	No nitrous oxide emission is expected.

3.4 Baseline Scenario

Baseline scenario 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[11].

The tool stipulates the following steps to be carried out.

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

[11] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

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 VCS.

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 382,151.22 MW as on 31-March-2021. Sector-wise de-tails of installed capacity are shown in Table 1. However, it is evident from Table 1[12] 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 17) 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-March-2021(CEA Database version 17)

Sector	Thermal					Nuclear	Hydro	RES	Total
	Coal	Lignite	Gas	Diesel	Total				
State	65931.50	1150.00	7087.36	236.01	74404.86	0.00	27069.50	2395.27	103869.64
Central	62570.00	3640.00	7237.91	0.00	73447.91	6780.00	15646.72	1632.30	97506.93
Private	74173.00	1830.00	10598.74	273.70	86875.45	0.00	3493.00	90406.21	180774.66
All India	202674.50	6620.00	24924.01	509.71	234728.22	6780.00	46209.22	94433.79	382151.22

It is evident from Table 1 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 way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

[12] https://cea.nic.in/wp-content/uploads/tpe cc/2022/02/User Guide ver 17 2021.pdf

Thus, current baseline remains 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 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 03.0, 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[13] on 12-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 from renewables and there is no mandatory national and/or sectoral policies have 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 Indian Grid.

The approved consolidated baseline methodology, ACM0002 (Version 20.0), 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 database version 17, 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 03.0, 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 20.0) para 22: “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 power 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.

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

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 17 is the latest available data at the time of PDD 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
$EF_{grid,CM,y}$	0.9305 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 17.0, Oct 2021 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9522 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2018-19, 2019-20, 2020-21) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 17.0, Oct 2021 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8653 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 17.0, Oct 2021 published by Central Electricity Authority (CEA), Government of India

3.5 Additionality

Regulatory Surplus Demonstration:

In India, there is no any regulation to install the wind projects and the project activity is a voluntary step taken by PP. In India, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original. As discussed in section 3.4 of VCS PD, there is no any Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity and project activity is additional as per CDM Tool for the demonstration and assessment of additionality and as per VCS Program rules.

There are no certain laws and regulations which give comparative advantage to more emission intensive technologies or less emission intensive technologies. There are no any Type E+ and E-policies applicable to the project activity which prevent the implementation of local laws and regulations that would seek to contribute towards climate change mitigation. The project activity is in compliance with local laws and regulations. As explained in section 3.4, the current baseline complies with all relevant mandatory national and/or sectoral policies.

Project 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 6.0.0. 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.

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 2003
- National Electricity Policy 2005
- Tariff Policy 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.

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:

Sub-step 2a: Determine appropriate analysis method

The Project activity envisages generation of revenues by exporting the electricity to Indian 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)[14], 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[15] 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.

[14] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf
[15] Aswath Damodaran, Book on Investment Valuation 2nd edition (Page 8 of Chapter 13)

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.

Thus, the inflation forecast value has been considered as 5.40%[16] 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 7.26%

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	50.73	Million kWh	Wind Assessment Study - AWS Truepower, LLC -Table 6 (Pg.19)
Net Generation	4.23	Million kWh per Machine	Calculated
Net PLF	23.0%	%	Calculated
No. of wind turbines optingfor Pref. Tariff Model	7	Nos	Assumed at the time of decision making
No. of wind turbines	5	Nos	Assumed at the time of decision

[16] https://rbi.org.in/scripts/PublicationsView.aspx?id=10294

Particulars	Value	Unit	Source
optingfor Open Access Model			making
Project cost	1,464.996	INR Million	Calculated
Debt	70%	INR Million	GERC Wind Power Tariff Order (dt. 31-January-2010), Page 15
Debt Contribution	1025.43	INR Million	Calculated
Equity Contribution	439.47	INR Million	Calculated
Operation and Maintenance Cost (first year)	0.65	INR Million Per MW	GERC Wind Power Tariff Order (dt. 31-January-2010), Page 14
Escalation in O & M	5%	%	GERC Wind Power Tariff Order (dt. 31-January-2010), Page 14
Service Tax on O&M	10.30%	%	Indian IT Act
Open Access Tariff	3.90	Rs/kWh	Assumed at the time of decision making
Preferential Tariff	3.56	Rs/kWh	http://www.gercin.org/renewablepdf/en_1 303211765.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 Tariff Order (dt. 31-January-2010)) Link: SBAR as on 11-July-2011 http://in.reuters.com/article/2012/01/09/in dia-plr-idINL3E8C962820120109
Debt repayment	10	Years	GERC Tariff Order (dt. 31-January-2010), Page 16
Salvage value	10%		GERC Tariff Order (dt. 31-January-2010), Page 22
MAT rate	19.93%		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 MW	MNRE GBI Guidelines, Page 2
Max. GBI allowed in a year	1.55	INR Million per MW	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%**		**51%**

Equity IRR	9.43%	7.26%	4.75%	**Break-Even Point**	17.93%
Change in Power Sale tariff	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**52%**
Equity IRR	9.41%	7.26%	4.76%		17.96%
Change in O&M Cost	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**-394%**
Equity IRR	6.93%	7.26%	7.58%		17.72%
Change in Total Project Cost	**+10.00%**	**0.00%**	**-10.00%**	**Break-Even Point**	**-36%**
Equity IRR	5.21%	7.26%	9.40%		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 N_{diff}.

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-Ndiff/Nall 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

Nall	458
Ndiff	426
Nall - Ndiff	32
F = 1-Ndiff/Nall	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	10-August-2011
2.	Purchase order for wind turbines placed (Start date)	26-August-2011
3.	CDM Prior consideration notification to UNFCCC & DNA (MoEFCC)	07-November-2011
4.	Stakeholders meeting	23-November-2011
5.	Appointment of DoE	17-February-2012
6.	Commissioning date of the project	29-March-2012

3.6 Methodology Deviations

There is no any methodology deviation applicable for the project activity.

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Estimation of Baseline Emissions:

As per the approved consolidated Methodology ACM0002 (Version 20.0) para 39:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that 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 (tCO_2/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 VCS 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" (tCO_2/MWh)

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 17, OCT 2021[17] 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.

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 Indian grid from FY 2007-08 onwards for the purpose of this CO_2 Baseline Database. As of 31/12/2013, the Southern grid has also been synchronised with the Indian 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

Indian Grid				
Northern	Eastern	Western	North-Eastern	Southern

[17] https://cea.nic.in/wp-content/uploads/tpe cc/2022/02/User Guide ver 17 2021.pdf

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
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 **Option I:** 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)

	2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**
India	15.1%	14.6%	14.3%	14.5%	17.0%	16.5%

Data Source: Central Electricity Authority (CEA) database Version 17, Oct'2021[18]

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.

[18] https://cea.nic.in/wp-content/uploads/tpe cc/2022/02/User Guide ver 17 2021.pdf

The simple OM emission factor is calculated as the generation-weighted average CO_2 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

(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)			
	2018-19	**2019-20**	**2020-21**
INDIAN Grid	995,957	965,009	958,218

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2018-19	**2019-20**	**2020-21**
INDIAN Grid	0.9603	0.9555	0.9405

Weighted Generation Operating Margin	
INDIAN Grid	**0.9522**

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

As per Methodological tool: “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 crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

(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)	
	2020-21
INDIAN Grid	**0.8653**

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, $EF_{grid,CM,y}$ = 0.9522 * 0.75 + 0.8653 * 0.25
= 0.9305 tCO_2/MWh

Annual Baseline Emissions Reduction:

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

= 50,772.96 MWh * 0.9305 tCO_2e/MWh
= 47,244 tCO_2e/year

4.2 Project Emissions

As per the guidance provided in the methodology ACM0002 (Version 20.0), "For most renewable power generation project activities, PE_y = 0.

4.3 Leakage

No Leakage emissions are considered. Hence, LE_y= 0

4.4 Estimated Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$ER_y = BE_y – PE_y$

Where:

ER_y = Emission reductions in year y (t CO_2e/yr)
BE_y = Baseline emissions in year y (t CO_2/yr)
PE_y = Project emissions in year y (t CO_2e/yr)

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2022-2023	47,244	0	0	47,244
2023-2024	47,244	0	0	47,244
2024-2025	47,244	0	0	47,244
2025-2026	47,244	0	0	47,244
2026-2027	47,244	0	0	47,244

2027-2028	47,244	0	0	47,244
2028-2029	47,244	0	0	47,244
2029-2030	47,244	0	0	47,244
2030-2031	47,244	0	0	47,244
2031-2032	47,244	0	0	47,244
Total	**472,440**	**0**	**0**	**472,440**

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO2e/MWh
Description	Simple operating margin for Indian grid
Source of data	CO_2 baseline database (Version 17) published by CEA in October 2021[19]
Value applied:	0.9522
Justification of choice of data or description of measurement methods and procedures applied	This value is calculated by taking weighted average of 3 years values for Simple Operating Margin of Indian grid viz. 2018-19, 2019-20 and 2020-21
Purpose of Data	Calculation of baseline emissions
Comments	Fixed ex-ante for entire crediting period

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO2e/MWh

[19] https://cea.nic.in/wp-content/uploads/tpe cc/2022/02/User_Guide_ver_17_2021.pdf

Description	Build margin for Indian grid
Source of data	CO_2 baseline database (Version 17) published by CEA in October 2021[20]
Value applied:	0.8653
Justification of choice of data or description of measurement methods and procedures applied	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 2020-21. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 17, published by the Central Electricity Authority, Ministry of Power, and Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	Fixed ex-ante for entire crediting period

Data / Parameter	W_{OM}
Data unit	%
Description	Weightage of operating margin emissions factor
Source of data	Latest version of the "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4)[21]
Value applied:	0.75
Justification of choice of data or description of measurement methods and procedures applied	Default values used as per the "Tool to calculate the emission factor for an electricity system" Version 07.0
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	W_{BM}

[20] https://cea.nic.in/wp-content/uploads/tpe cc/2022/02/User Guide ver 17 2021.pdf

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

Data unit	%
Description	Weightage of build margin emissions factor
Source of data	Latest version of the "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex)[22]
Value applied:	0.25
Justification of choice of data or description of measurement methods and procedures applied	Default values used as per the "Tool to calculate the emission factor for an electricity system" Version 07.0
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	Emission factor for Indian grid
Source of data	Calculated from CEA database, Version 17, OCT 2021[23]
Value applied:	0.9305
Justification of choice of data or description of measurement methods and procedures applied	This value is calculated using $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ values as per Version 07.0 of methodological tool to calculate the emission factor for an electricity system
Purpose of Data	Calculation of baseline emissions
Comments	-

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$

[22] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[23] https://cea.nic.in/wp-content/uploads/tpe cc/2022/02/User Guide ver 17 2021.pdf

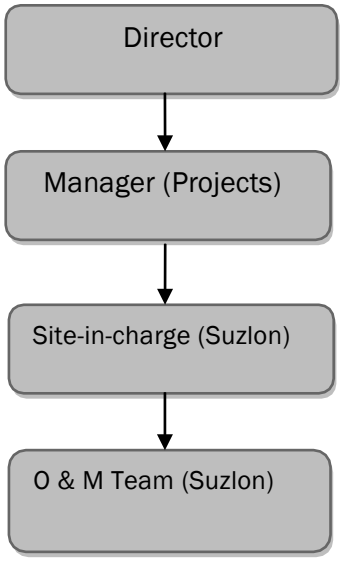
Data unit	MWh/ year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Certificate for share of electricity generated by Wind farm provided by GETCO
Description of measurement methods and procedures applied	The electricity generated and fed into the grid shall be monitored using special energy meters which are ABT meters. Monitoring: Continuous measurement and at least monthly recording. Archiving: Electronic and Paper Data type: Measured & Calculated Recording Frequency: Continuous monitoring and monthly recording Responsibility: The O&M site-in-charge shall be responsible for the regular recording of data. Calibration Frequency: once in 3 years Accuracy Class: 0.2_S (Active) and 0.5_S (Reactive)
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value applied:	50,772.96 MWh
Monitoring equipment	ABT meter with accuracy class 0.2_S (Active) and 0.5_S (Reactive)
QA/QC procedures applied	The Quantity of net electricity generation from the certificate for share of electricity will 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.
Purpose of data	Calculation of baseline emissions
Calculation method	-

Comments	The data are kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

5.3 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 are as per the Power Purchase Agreement with the state utility.

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 to which 7 wind turbines and Feeder 2 to which 5 wind turbines are connected. Main meter, check meter and ABT meters are located at the substation.

The meter readings are reported to the site-in-charge and the compiled reports are sent to the Manager (Projects) and Director. The Manager is monitoring overall activity of the project and report to the Director. As per O & M schedule, the operation and maintenance activities are carried out by trained and qualified technical staff of Suzlon.

Each party are maintaining 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.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/ year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Value applied:	01-January-2022 to 28-March-2022- 9,160.07 29-March-2022 to 30-June-2022- 16,005.35 Total- 25,165.42
Comments	The data are kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

6.2 Baseline Emissions

Baseline Emissions (BE_y)

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

The calculation of yearly baseline emission is provided below:

CP1			
	$EG_{PJ,y}$ (MWh)	**$EF_{grid,CM,y}$ (tCO_2/MWh)**	**BE_y (tCO_2)**
01-January-2022 to 28-March-2022	9,160.07	0.9528	8,727
CP2			
	$EG_{PJ,y}$ (MWh)	**$EF_{grid,CM,y}$ (tCO_2/MWh)**	**BE_y (tCO_2)**
29-March-2022 to 30-June-2022	16,005.35	0.9305	14,892

Hence the baseline emission for monitoring period 01-January-2022 to 30-June-2022 is

BE_y = 23,619 tCO_2e (Rounded down Value)

6.3 Project Emissions

As per the guidance provided in the methodology ACM0002 (Version 20.0), "For most renewable power generation project activities, PE y = 0.

6.4 Leakage

The methodology ACM0002 (Version 20.0) does not consider any leakage emissions.

Hence, $LE_y = 0$

6.5 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$\mathbf{ER_y = BE_y - PE_y}$$

Where:

$\mathbf{ER_y}$ = Emission reductions in year y (t CO_2e/yr)
$\mathbf{BE_y}$ = Baseline emissions in year y (t CO_2/yr)
$\mathbf{PE_y}$ = Project emissions in year y (t CO_2e/yr)

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01-January-2022 to 30-June-2022	23,619	0	0	23,619
Total	23,619	0	0	23,619

APPENDIX I: <CALIBRATION DETAILS>

Meter	66 KV PAREWADA-KAMALAPUR S/S ABT METER LINE 1	66 KV PAREWADA-KAMALAPUR S/S ABT METER LINE 2
Make	Larsen & Toubro	Larsen & Toubro
Serial number	GJ-1045-A	GJ-1046-A
Calibration Date	05-January-2022	05-January-2022
Calibration due date	04-January-2025	04-January-2025
Previous calibration date	31-January-2018	31-January-2018
Previous calibration due date	30-January-2021	30-January-2021

Note: Considering the monitoring period as 01-January-2022 to 30-June-2022, there has been delay in calibration of meters, hence error factor 0.2% has been applied to the values of both electricity export and electricity import on January 2022 as a conservative approach.

APPENDIX II: <BREAKDOWN DETAILS>

Date	Site Name	Name of the Line / Feeder	Shutdown (Hours: Minutes)	Cause of Shutdown	Action Taken
09-Jan-22	Jasdan	Both EHV line (66 KV)	0:24	66 KV grid down due to Kamlapur GSS tripping from upper GETCO network	charge by GETCO end
19-Jan-22	Jasdan	Both EHV line (66 KV)	2:18	Shutdown taken by GETCO for 66KV bus work	Charged
21-Jan-22	Jasdan	Both EHV line (66 KV)	0:30	66 KV grid down due to Kamlapur GSS tripping from upper GETCO network	charge by GETCO end
23-Feb-22	Jasdan	Both EHV line (66 KV)	6:42	Shutdown taken by GETCO for 132KV GETCO SS WORK	Charged
27-Mar-22	Jasdan	Both EHV line (66 KV)	1:18	66 KV grid down due to Kamlapur GSS tripping from upper GETCO network	charge by GETCO end