



GRID CONNECTED WIND ENERGY PROJECT IN GUJARAT

Document prepared by Apraava Energy Private Limited¹

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Prepared by	Apraava Energy Private Limited

¹ Name of the Project Proponent has been changed from CLP India Private Limited to Apraava Energy Private Limited with effect from 29-Sept-2021.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Apraava Energy Private Limited (formerly known as CLP India Private Limited) is developing a 252 MW wind project in Devbhoomi Dwarka district in the state of Gujarat, India. The main purpose of this project activity is to generate electricity through renewable energy source and to sale the same to Indian grid. The project activity would utilize wind energy to generate clean power with a view to bring in greenhouse gas emission reductions.

Initially, the project activity has been planned to be implemented with capacity of 250.8 MW (114*2.2 MW) which would use Siemens Gamesa (SG122) make wind turbine and utilize wind power to generate clean power with a view to bring in greenhouse gas emission reductions. During project implementation, PP had decided to change the equipment supplier from Siemens Gamesa to Suzlon due to certain business exigencies. The envisaged capacity of project changed to 252 MW (120*2.1 MW) which is now using Suzlon make S120 Wind Turbine Generators of 2.1 MW each at Sidhpur project site.

This project activity is under construction and development stage and expected to be commissioned in 31 December 2024.

The Project activity is a new facility (Greenfield) and it plans to utilize wind energy to generate electricity and supply it to distribution license which is part of the Indian grid. In the absence of project activity, same quantity of the electricity that would be delivered by the other project activity to the Indian grid would be sourced from the existing grid-connected fossil fuel-based power plants and future capacity additions to meet the growing electricity requirements. Hence, generation mix of Indian grid is considered as the baseline scenario. Thus, the project activity would reduce the dependency on fossils fuels which are pre-dominantly used for electricity generation in India and helps reduction of climate change impacts. Prior to implementation of this project activity, there was no project activity by the AEPL in the same area.

The project activity would help to reduce the demand-supply gap in the country and also help in contributing to the sustainable development by using wind energy as the source of power generation and reduction of GHG emissions.

The project activity is expected to supply 858.725 GWh of energy to the Indian Grid each year. This is expected to result in emission reductions of 804,485 tCO2e per year of operation.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
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Validation	16-December-2019	VCS	LGAI Technological Center, S.A. (Applus+ Certification)	NA
Project Deviation	13 June 2024	VCS	EcoLance Pvt Ltd.	NA

1.3 Sectoral Scope and Project Type

Sectoral scope ²	01-Energy Industries (renewable/non-renewable sources)
Project activity type	Type I – Renewable Energy Projects

1.4 Project Eligibility

1.4.1 General eligibility

The project activity involves the installation of 252 MW wind power project consisting of Suzlon Model S120, total number 120 WTGs of individual capacity 2.1 MW in Gujarat by Apraava Energy Private Limited, thus leading to reductions of anthropogenic GHGs e emissions from the atmosphere. Hence the project activity is eligible for Sectoral scope 1 i.e., energy industries (renewable/ non-renewable sources) under the scope of the VCS Program and does not fall in the excluded category as per section 2.1.3 (Table 1) of VCS standard 4.6.

The project activity has a capacity more than 15 MW and is considered under “Grid-connected electricity generation from renewable sources”. As per the scope of the project activities enlisted in the latest version of the “List of Sectoral Scopes and related approved baseline and monitoring methodologies”, the project activity can be categorized as follows:

Methodology: Grid-connected electricity generation from renewable sources, ACM0002 of version 19.0

Sectoral Scope: 01, Energy Industry (Renewable/Non Renewable Sources)

Web link: <https://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

1.4.2 AFOLU project eligibility

Not Applicable.

1.4.3 Transfer project eligibility

This project activity is a greenfield project and it has not been transferred from any registry either small scale or large scale and has not taken any part of the grouped projects from Verra.

² Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

1.5 Project Design

- ☒ Single location or installation
- ☐ Multiple locations or project activity instances (but not a grouped project)
- ☐ Grouped project

1.5.1 Grouped project design

The project activity is a single project which is located at a single location and has no multiple ownership. Hence, this is not a Grouped project design.

1.6 Project Proponent

Organization name	Apraava Energy Private Limited
Contact person	Raghavendra Madaiah
Title	Manager – Carbon and Sustainability
Address	7 th Floor, Fulcrum, Sahar Road, Andheri (East), Mumbai – 400099, India
Telephone	+ 91-22 6758 8888
Email	carbon@apraava.in

1.7 Other Entities Involved in the Project

Organization name	NA
Role in the project	NA
Contact person	NA
Title	NA
Address	NA
Telephone	NA
Email	NA

1.8 Ownership

The project would use wind energy technology by Suzlon (Model S120) and implements 120 numbers of WTGs with a capacity of 2.1 MW each. All the WTGs are owned by Apraava Energy Private Limited (AEPL). AEPL is the sole owner of project activity, hence it possesses right of use of ER credits. Further the ownership is demonstrated through the following documents.

Letter of Award (LoA) for the project activity in the name of Apraava Energy Private Limited issued by Solar Energy Corporation of India Ltd. (SECI), Govt. of India. The commissioning certificates for the project activity were issued in the name of AEPL.

Commissioning certificates of all the installed WTGs are on the name of Apraava Energy Private limited, issued on 06-April-2023 (Reference Number: SECI/Wind Tranche-7/COD-1/AEPL-P1) and 05-May-2023 (Reference Number: SECI/Wind Tranche-8/COD-II-R/AEPL-P2).

1.9 Project Start Date

Project start date	07-April-2023
Justification	As per registered VCS PD, 01-June-2021 but the date of the start of the project has been changed to 07-April-2023 or the commissioning date of the first WTG whichever occurs later.

1.10 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☒ Ten years, fixed ☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	07-April-2023 to 06-April-2033

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

Indicate the estimated annual GHG emission reductions/removals (ERRs) of the project:

- ☐ < 300,000 tCO₂e/year (project)
☒ ≥ 300,000 tCO₂e/year (large project)

Complete the table below for the first (if renewable) or fixed crediting period:

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO ₂ e)
07-Apr-2023 to 31-Dec-2023	572,342
01-Jan-2024 to 31-Dec-2024	804,485
01-Jan-2025 to 31-Dec-2025	804,485
01-Jan-2026 to 31-Dec-2026	804,485
01-Jan-2027 to 31-Dec-2027	804,485
01-Jan-2028 to 31-Dec-2028	804,485
01-Jan-2029 to 31-June-2029	804,485
01-Jan-2030 to 31-June-2030	804,485
01-Jan-2031 to 31-June-2031	804,485
01-Jan-2032 to 31-June-2032	804,485
01-Jan-2033 to 06-Apr-2033	2,32,143
Total estimated ERRs during the first or fixed crediting period	8,044,850
Total number of years	10
Average annual ERRs	804,485

1.12 Description of the Project Activity

The Project activity involves implementation of a 252 MW wind power project consisting of Suzlon Model S120, total number 120 WTGs of individual capacity 2.1 MW in Gujarat by Apraava Energy Private Limited.

The electricity generated by the Project will be exported to the Indian electricity grid. The Project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. AEPL has planned to avail the carbon benefits for the project during project conceptualization stage.

The Project activity is in line with the sustainable development criteria of the country. The electricity generated from the wind farm will be exported to the Indian grid and sold to the state electricity utility, thereby contributing to reducing the energy demand supply gap in the state of Gujarat as well as India.

Technology

The project would use wind energy technology by Suzlon S120 and implement 120 numbers of WTGs of S120 model with a capacity of 2.1 MW each. The technical details of the technologies are mentioned below:

Specification	Details
Rated Power (MW)	2.1
Cut-In Wind Speed (m/s)	3.0
Rated Wind Speed (m/s)	9.5
Cut-Out Wind Speed 3s Avg. (m/s)	26.1
Rotor Diameter (m)	120
Swept Area (sq. m)	11,225
Frequency (Hz)	50
Generator Type	Slip ring asynchronous generator
Tower Hub Height Options (m)	120

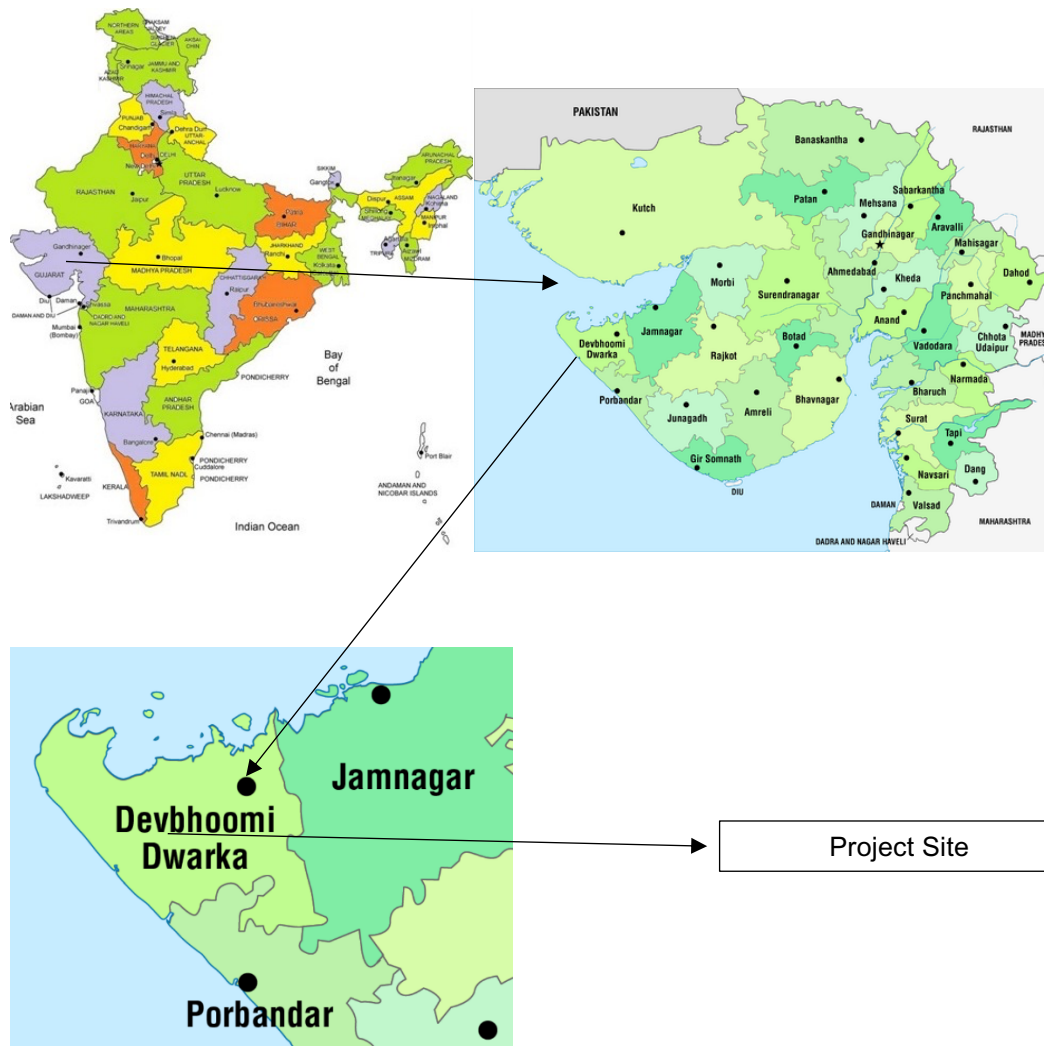
The average life time of the WTGs under project activity is considered as 25 years in line with tariff order issued by the Gujarat state electricity regulatory commission.

In the absence of the project activity the equivalent amount of electricity would have been generated/imported from the connected/ new power plants in the Indian grid, which is predominantly based on fossil fuels⁴, hence baseline scenario of the project activity is the grid based electricity system, which is also the pre-project scenario.

1.13 Project Location

The proposed wind project, located in Gujarat, is approximately 45 km to the west of Jam Khambhalia, and 80 km southwest of Jamnagar. Its location is indicated on the regional map in below figure:

⁴ http://www.cea.nic.in/executive_summary.html



Further, selection of actual WTG locations and micro setting of the project is ongoing.

1.14 Conditions Prior to Project Initiation

This greenfield project activity involves installation of new 252 MW wind energy based plant for generating electricity. In the absence of the project activity, the equivalent power generation would have taken place from the fossil fuel dominated Indian Grid. Prior to implementation of this project activity, there were no project activities at site. Same amount of electricity was generated from other grid connected power plant. The main emission in the pre-project scenario is the power plants connected to the Indian Grid, and main GHG involved is CO₂. The baseline identified in section 2.4 is same as the pre-project scenario.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project has received necessary approvals for development and commissioning from the state nodal agencies and is in compliance to the local laws and regulations. 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.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit?

☐ Yes ☒ No

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system?

☐ Yes

☒ No

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes

☒ No

1.18 Sustainable Development Contributions

Ministry of Environment and Forests and Climate Change has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

Social wellbeing & Economic wellbeing:

The project activity will lead to improved infrastructure in the area due to construction of roads and other project related activities. The project will provide employment opportunities to skilled and unskilled workers from the region during its construction and operation. The proposed project activity also contributes to the improvement of the economic conditions of the local people as there will be an improvement in the availability of electricity which leads to further economic development of the area. Further, series of CSR activities has been planned for the project location which would positively stimulate the social & economic wellbeing of the local area.

Technological wellbeing:

The technology employed is proven and environmentally safe and sound. The technology is available and supplied from the host country and hence there is no transfer of technology from an Annex-I country.

Environmental well-being:

The project activity reduces carbon dioxide emissions through the avoided usage of fossil fuel based electricity generation. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus, the project will cause no negative impact on the surrounding environment contributing to environmental well-being.

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

Not applicable to the project activity.

1.19.2 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

1.19.3 Further Information

Not Applicable

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	Stakeholders associated with the project activity throughout its lifetime are identified at different stages of project development. The stakeholders identified are generally grouped under two categories- directly affected parties, and indirectly affected parties as shown below: a) Representatives from service provider b) Representatives from WTG supplier c) Employees of CLP India Pvt. Ltd/AEPL. d) Villagers from nearby villages Furthermore, all the stakeholders mentioned above were identified at the project's validation. There has been no change in stakeholder makeup since validation.
Legal or customary tenure/access rights	The project activity is a greenfield wind power project and it has not involved any legal or customary tenure/access rights to territories and resources. So, this section is not applicable
Stakeholder diversity and changes over time	Not applicable

	This is renewable energy project and does no impact on the diversity of the stakeholders.
Expected changes in well-being	There are not any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity. Furthermore, wind projects in India have indirect positive socio-economic impacts: a) Job Creation: Wind energy projects create jobs in various sectors, contributing to local economic growth. b) Economic Growth: These projects contribute to economic growth and community investment. c) Reduced Electricity Rates: Wind energy can reduce electricity rates for project neighbours. d) Health Benefits: Wind turbines help reduce carbon footprints and improve air quality, leading to better health outcomes. e) Educational Opportunities: They provide educational and research opportunities, fostering innovation and knowledge exchange.
Location of stakeholders	No negative impact generated outside/inside of the project boundary. (All stakeholders who will be directly affected by the project activity are included within the project boundary. Further, this grouped project activity does not require the relocation of any stakeholder, Indigenous people, or local communities.)
Location of resources	Not Applicable (In the project activity, neither any territories and resources are owned by the stakeholders, nor they have any customary access)

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	Stakeholders' consultation is a continuous process and hence a feedback register is kept at the project site office where any stakeholder can come and share his/her feedback. The feedback irrespective of the type is taken care by PP with utmost priority.
Stakeholder engagement process	23-September-2019

Consultation outcome	Monitored outcomes are conveyed to the stakeholders in two ways: 1.Through VERRA Website: - PP will submit third-party (i.e., VVB) verified monitoring results to VERRA, and once approved, the project documentation is made publicly available on the VERRA webpage for each monitoring period. 2.Through PP regional office: - A copy of all the project related documents and monitoring data (e.g., grievance register) is available at regional offices of the PP, which is accessible to all the stakeholders associated with the project activity.
Ongoing communication	The Local Stakeholder Consultation (LSC) records were submitted to VVB at the time of validation and grievance register records for the current monitoring period will be submitted to VVB.
Stakeholder input	Stakeholder input

2.1.3 Free Prior and Informed Consent

Obtaining consent	The project activity is greenfield wind power project, in which all the approvals and prior consent to operate have been taken from the local authorities and there was no objection from their side.
Outcome of FPIC	The project activity involves the installation of wind power project which has not encroached any kind of land from the local and government authorities.

2.1.4 Grievance Redress Procedure

Development process	The grievance mechanism process could be illustrated as below: As part of organizational policy, there are continuous interactions undertaken by Project Participant's officials with local community stakeholders. During these discussions, local villagers share their observations and comments. Common queries raised and the suggestions given by villagers have been presented below for reference: Whether Project Participant is going to enhance the drinking water facility for more schools going students in the vicinity of project site?
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	Project Participant should work more on enhancing the health van services for more villages falling in the vicinity of project site.
Grievance redress procedure	All the observations, comments and queries raised during discussion have been adequately responded to. Some of the suggestions have also been incorporated in the overall vision and stakeholder engagement action plan of the organization. The project has not received any negative comments from the stakeholders.

2.1.5 Public Comments

Comments received	Actions taken
No comments were received	Project was webhosted for global stakeholders' consultation process from 28/10/2019 to 27/11/2019 and project has not received any comments up-to its last access on 01/12/2019. Thus, no further action is required in this regard.

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The PP is Independent Power Producer (IPP) and has been in the renewable energy business for more than 20 years. PP has been actively involved in design or implementation of project activity. The management is experienced and well educated as per the understanding of the carbon market. The field staff has been trained well and annual trainings are provided to keep them up to date.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	No risk identified	Project activity involves the installation of WTG which are considered as nature friendly and placed far away from human

		interference, hence no risk to human and nature.
Risks to stakeholder participation	No risk identified	Project activity only has benefits for the stakeholders as it provided clean energy with zero risk to human and nature.
Working conditions	No risk identified	Project activities create indirect livelihood opportunities for local people. The working conditions are inline with government norms.
Safety of women and girls	No risk identified	The HR policies are stated as per the safety of both women and girls
Safety of minority and marginalized groups, including children	No risk identified	PP has followed all the regulations and safety protocols provided to the minority and marginalized groups and also not employed any children below 18 ages.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified	The project activity involves installation of wind power project, which do not emit any kind of air, water, soil, and hazardous material.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified⁵	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	PP is committed to providing an environment free from sexual harassment. PP follows company

⁵ The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

		policy on 'Prevention of Sexual Harassment at the Workplace Policy' which protects from sexual harassment by vendors, contractors, and third parties.
Sexual harassment	No risk identified	The PP is Independent Power Producer (IPP) and has been in the renewable energy business for more than 20 years. PP has been actively involved in design or implementation of project activity. PP has policies in place to inform management and employees about the avoidance of corruption, code of conduct, and business ethics.
Equal pay for equal work	No risk identified	The PP is Independent Power Producer (IPP) and has been in the renewable energy business for more than 20 years. The PP has policies in place to ensure fair opportunity and equal pay for work done to both men and women.
Gender equity in labor and work	No risk identified	The PP is Independent Power Producer (IPP) and has been in the renewable energy business for more than 20 years. PP has policies which prohibits child labor or forced, involuntary or trafficked labor in any form. All employees shall treat one another with respect, dignity and common courtesy.
Forced labor	No risk identified	The PP is Independent Power Producer (IPP) and has been in the renewable energy business for more than 20 years. PP has policies which prohibits child labor or forced, involuntary or trafficked labor in any form. All employees shall treat one another with

		respect, dignity and common courtesy.
Child labor	No risk identified	The PP is Independent Power Producer (IPP) and has been in the renewable energy business for more than 20 years. PP has policies which prohibits child labor or forced, involuntary or trafficked labor in any form. All employees shall treat one another with respect, dignity and common courtesy.
Human trafficking	No risk identified	PP is committed to providing an environment free from sexual harassment. PP follows company policy on 'Prevention of Sexual Harassment at the Workplace Policy' which protects from sexual harassment by vendors, contractors, and third parties.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project does not violate the human rights of indigenous people.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified	The project does not affect the indigenous people and their cultural heritage.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
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No risk identified	This project does not infringe with property rights and resources. Hence, there is no need to implement any measures to protect and preserve the property rights of stakeholders, IPs, LCs, and customary rights holders.
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2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	Project activity is a greenfield wind power project where the benefit sharing is not applicable.
Summary of the benefit sharing plan	Project activity is a greenfield wind power project where the benefit sharing is not applicable.
Approval and dissemination of benefit sharing plan	Project activity is a greenfield wind power project where the benefit sharing is not applicable.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure(s) taken
Impacts on biodiversity and ecosystems	No risk identified	Since the project activity is wind power plant, there is no impact on biodiversity and ecosystem.
Soil degradation and soil erosion	No risk identified	Since the project activity is wind power plant, there is no soil erosion and degradation are likely to be caused.
Water consumption and stress	No risk identified	Since the project activity is wind power plant, there is no water consumption and stress is likely to be caused.

2.4.1 Rare, Threatened, and Endangered Species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

Not applicable.

Species and habitat	After installation or during the install of WTGs there is no impact to the rare, threatened or endangered species of the surroundings.
Areas needed for habitat connectivity	Not Applicable

Not applicable.

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	No risk identified	Not Applicable
Areas for habitat connectivity	No risk identified	Not Applicable

2.4.2 Introduction of Species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
No species has been introduced in the implementation of this project activity.	Not applicable	Not applicable	Not applicable

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
No species has been found in the area of the installation of the WTGs or in the implementation of this project activity.	Not applicable

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	No risk identified	Not applicable

2.4.3 Ecosystem Conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	Not applicable

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Grid-connected electricity generation from renewable sources,	19.0
Tool	07	Tool to calculate the emission factor for an electricity system	7.0
Tool	01	Tool for the demonstration and assessment of additionality	7.0
Tool	27	Methodological tool for Investment analysis	9.0

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
ACM0002	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	The proposed project activity is a Greenfield, grid connected renewable power project. The project activity uses renewable wind source to generate electricity that will be fed into the Indian grid. In the absence of the project activity this power would have been produced by the current grid generation mix which is predominantly fossil fuel based, thus the

	(e) Involve a replacement of (an) existing plant(s)/unit(s)	project activity meets this criterion.
	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 proposed project activity is the installation of a greenfield wind power plant/unit. Therefore, the project activity is satisfying the said criteria.
	In case of hydro power plants, one of the following conditions shall apply:⁶ The project activity is implemented in existing single or multiple reservoirs, with	The proposed project activity involves installation of a wind power plant/unit. As the criteria are related to hydro power project, therefore, the

⁶ 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.

	no change in the volume of any of the reservoirs; or • The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m²; or • The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m²; or • 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.	said criteria are not applicable.
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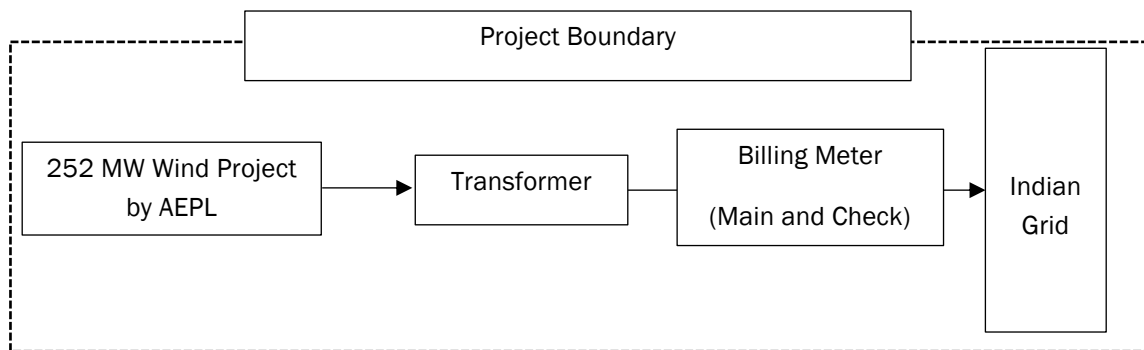
	In the case of integrated hydro power projects, project proponent shall: • Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or • Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The proposed project activity involves installation of a wind power plant. As the criteria are related to hydro power project, therefore, the said criteria are not applicable.
	The methodology is not applicable to: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants/units.	The proposed project activity is the installation of wind power plant/unit. Therefore, the said criteria is not applicable.
	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	The proposed project activity is a Greenfield project, thus this criteria is not applicable.

	was already in use prior to the implementation of the project activity and undertaking business as usual maintenance.	
	In addition, the applicability conditions included in the tools referred to below apply.	Please refer tables below.

3.3 Project Boundary

As per ACM0002 version 19.0 - “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to”.

The project boundary includes the wind project, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Indian grid. Therefore, the entire Indian grid and all connected power plants have been considered in the project boundary for the proposed VCS project activity.



Therefore, the project boundary includes the wind project connected to the network of the Indian grid, i.e. the project boundary also includes the Indian grid. Thus, the project boundary further includes all the power plants physically connected to the Indian grid.

Source		Gas	Included?	Justification/Explanation
Baseline	Source 1	CO ₂	Yes	Major emission source
		CH ₄	No	Minor emission source. Same has been excluded from consideration for simplification.
		N ₂ O	No	Minor emission source Same has been excluded from consideration for simplification.
		Other	Not Applicable	Not Applicable
Project	Source 1	CO ₂	No	The project activity is a wind power project and not a geothermal project. Thus, these emission sources are not applicable to the proposed project.

Source	Gas	Included?	Justification/Explanation
	CH ₄	No	Minor emission source. Same has been excluded from consideration for simplification.
	N ₂ O	No	Minor emission source Same has been excluded from consideration for simplification.
	Other	Not Applicable	Not Applicable

3.4 Baseline Scenario

As per para 22 of ACM0002 version 19.0, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

“Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in “TOOL07: Tool to calculate the emission factor for an electricity system”.

As per para 42 of ACM0002 version 19.0, “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 project activity involves setting up of new wind project to harness the kinetic energy of wind power 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. Further, 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.

3.5 Additionality

Please refer to section 3.5.2 of this report.

3.5.1 Regulatory Surplus

Is the project located in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country ☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes

☒ No

3.5.2 Additionality Methods

In line with VCS Standard version 4.6, the additionality of the Project activity is ascertained in line with the applicable guidance from the UNFCCC. The demonstration of additionality for the proposed Project activity is being carried out in accordance with the additionality tool published by the UNFCCC i.e. “Tool for demonstration and assessment of Additionality” Version 07.0.0. The tool provides a step-wise approach to demonstrate additionality which is displayed below:

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

The proposed project activity is a wind power project located in Gujarat which is using the latest available and proven technology. Thus, this project activity is not a first-of-its-kind project. The additionality of the project activity has demonstrated by using the investment analysis and the same has been discussed in the following steps.

Outcome of Step 0: This project activity is not a first-of-its-kind project.

Step1. Identification of alternatives to the proposed project activity consistent with current laws and regulations

As per the applied methodology ACM0002 version 19.0; 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 plant and by the addition of new generation sources. As the baseline scenario is prescribed by applied methodology, hence no further analysis is carried out to identify alternatives.

Outcome of Sub-step 1b: The alternative for this project activity has been prescribed by the ACM0002. Hence, no further analysis is required for identification of alternatives.

Step 2: Investment Analysis

Sub-step 2a: Determine appropriate analysis method

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

Option I : Simple cost analysis

Option II : Investment comparison analysis

Option III : Benchmark analysis

The project will generate revenues from sale of electricity; therefore, Option I is not applicable. Option II also does not apply since there is no comparable investment alternative available to the project participant. The most appropriate financial analysis method is therefore option III: the benchmark analysis, where the returns on investment in the project activity are compared to benchmark returns that are available to any investors in the country.

Sub-step 2b: Option III. Apply benchmark analysis

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

Choice of Financial Indicator:

As allowed by the Methodological tool for Investment analysis (version 09.0), post tax Equity Internal Rate of Return (IRR) was selected as the financial indicator to assess the attractiveness of the project.

Choice of Benchmark:

As per paragraph 15 of the 'investment analysis tool' version 09.0,

"The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or WACC are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for equity IRR. Benchmarks supplied by relevant national authorities are also appropriate. The DOE shall validate that the benchmarks used are applicable to the project activity and the type of IRR calculation presented."

As per the above guideline the required/expected returns on equity are appropriate benchmarks for equity IRR. In accordance with the para 20 of the Investment Analysis tool, version 09.0.

'If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix; or by (b) calculating the cost of equity using CAPM. The default values in the Appendix A are based on long term historical returns and therefore may also be applied by projects with a start date prior to the adoption of default values by the Board.'

The project proponent has referred the latest version of investment guidelines/tool available at the time of conceptualization of particular sub-project for determination of respective "Benchmark", as described below in details.

Calculations of Default Benchmark:

Guidelines on the para 16 of the Investment Analysis tool, version 09.0 is referred for calculation of benchmark because it was the latest version of guidelines valid and available at the time of decision making.

In accordance with the paragraph 16 of the Investment Analysis tool, version 09.0 “In situations where an investment analysis is carried out in nominal terms and the available IRR benchmarks are in real terms, project participants shall convert the real term values of benchmarks to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. 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”.

As mentioned in para 6 of Appendix of the Investment Analysis tool, version 09.0, specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 9.79%

The Required return on equity (benchmark) was computed in the following manner:

$$\text{Nominal Benchmark}^7 = \{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$$

Where:

- Default value for Real Benchmark i.e. 9.79%
- Inflation Rate forecast by Reserve Bank of India (RBI) (i.e. Central Bank) for India

Benchmark estimation:

para 6 of Appendix of the Investment Analysis tool, version 09.0 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 9.79%

Further, long term median forecasts for growth and inflation rate forecast issued by RBI which was available during decision making = 4.40%

$$\begin{aligned} \text{Thus, Benchmark} &= \{(1 + 9.79\%) * (1 + 4.4\%)\} - 1 \\ &= 14.62\% \end{aligned}$$

Hence value of benchmark is arrived as 14.62%.

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

The Post tax Equity IRR is evaluated for the entire lifetime of the project activity, i.e. 25 years. It is calculated based on the cash outflows from and cash inflows into the project activity.

All the input values used in all investment analysis were valid and applicable at the time of the investment decision taken by the management.

Key assumptions used for calculating post-tax Equity IRR applicable at the time of investment decision are mentioned below:

⁷ As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

Particulars	Input values from Original Investment decision	Input values from revised Investment decision	Unit	Source/Remarks
Capacity of the WTG	2.2	2.1	MW	Purchase Orders
Total No. of WTG	114	120	Nos.	Purchase Orders
Capacity of the project	250.8	252	MW	Calculated
PLF	36.90	38.90	%	Supplier Offer
Project cost	16,030.40	18,395.24	INR Million	Calculated based on offer letters received at the time of decision making
Debt	70	70	%	GERC Tariff Order dated 30/08/2016 (https://demo.kreatetechologies.com/gerc/wp-content/uploads/document/07c74229-5dc4-4406-89d3-25a82fa0931b.pdf)
Equity	30	30	%	
Debt	11,221.28	12,876.67	INR Million	Calculated
Equity	4,809.12	5,518.57	INR Million	Calculated
Interest rate	11.80%	11.80	%	GERC Tariff Order dated 30/08/2016 (Ref pg 25) (https://demo.kreatetechologies.com/gerc/wp-content/uploads/document/07c74229-5dc4-4406-89d3-25a82fa0931b.pdf)
Debt Repayment tenure	10	10	years	
Moratorium	0	0	year	
Total Operation and Maintenance charges	1.70	1.70	INR Million / WTG	Signed O&M Agreement
Escalation in WTG O&M	4.00	4.00	%	Proposal received from WTG Supplier and service provider at the time of decision making
Escalation in O&M by KP Energy	5.00	5.00	%	Commercial Offer from KP Energy Limited dated 30/07/2019
Tariff	2.8500	2.85	INR/k Wh	PPA

Particulars	Input values from Original Investment decision	Input values from revised Investment decision	Unit	Source/Remarks
Depreciation Rate (Book)	4.75	4.75	%	Companies Act Schedule XIV
IT Depreciation Rate	7.69	7.69	%	Appendix IA of IT Rules
Income tax rate	34.94	34.94	%	Calculated
MAT rate	21.55	21.55	%	Calculated
Salvage Value	10	10	%	GERC Tariff Order dated 30/08/2016 (Ref pg 18) (https://demo.kreatetechologies.com/gerc/wp-content/uploads/document/07c74229-5dc4-4406-89d3-25a82fa0931b.pdf)
Depreciable cost of Project	90	90	%	
Working Capital				
For Fixed Charges				
O&M Charges (Month of O&M Charges)	1	1	Month	GERC Tariff Order dated 30/08/2016 (Ref pg 25) (https://demo.kreatetechologies.com/gerc/wp-content/uploads/document/07c74229-5dc4-4406-89d3-25a82fa0931b.pdf)
Receivables for Debtors	2	2	Months	
For Variable Charges				
Interest On Working Capital	11.8	11.8%	%	
Tax Rates				
Financial Year	FY 2019-20	FY 2019-20		
Income tax rate (%)	30.00	30.00	%	Indian IT Act for FY 2019-20 (https://www.indiabudget.gov.in/finance_bill.php)
MAT (%)	18.50	18.50	%	
Surcharge (%)	12.00	12.00	%	
Health and Education cess (%)	4.00	4.00	%	

Particulars	Input values from Original Investment decision	Input values from revised Investment decision	Unit	Source/Remarks
Goods and Services Tax (GST)	18.00	18.00	%	https://cbic-gst.gov.in/gst-goods-services-rates.html

Due to change in WTG supplier, there are changes in Project Cost, PLF and O&M cost due to revised investment decision. There is no change in other input parameters which were considered during initial investment decision.

The result of the analysis is as follows:

Considering the input values, Equity IRRs is given below:

Organization Name	Equity IRR without Carbon Revenue	Benchmark (Equity IRR)
AEPL	7.59 %	14.62 %

The Post tax Equity IRR is evaluated for the entire lifetime of the project activity, i.e. 25 years. It is calculated based on the cash outflows from and cash inflows into the project activity. Based on result of IRR excel spreadsheets, equity IRR is less than Benchmark. This substantiates that the investments are not financially attractive (Equity IRR for the project activity is less than the Benchmark). Thus, it can be easily concluded that project activities are additional & is not business as usual scenario.

Sub-step 2d: Sensitivity Analysis

Addressing Guidance 27 of Tool 27, Investment Analysis, only variables, including the initial investment cost, that constitutes more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PD and be reproducible in the associated spreadsheets. Guidance also states, "All parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude". The Annex also states, as a general point of departure, variations in the sensitivity analysis should at least cover a range of +10% and -10%, unless this is not deemed appropriate in the context of the specific project circumstances.

The tariff has already determined after competitive reverse bidding which is fixed for entire life of the project and hence it need not be subjected to variation. All other expenses are much less than 20% of the total cost. Hence, only generation needs to be subjected to reasonable variation. Nevertheless, following factors have been considered in to sensitivity analysis:

- Plant Load Factor
- Electricity Tariff
- Project Cost

- O&M Cost

The rationale of sensitivity is, "The ultimate objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to provide a cross-check on the suitability of the assumptions used in the development of the investment analysis." The results of sensitivity analysis show that even with a variation of +10% & -10% in project cost, O&M cost, PLF and Tariff Rate, Equity IRR is significantly lower than the benchmark and it is evident from the results given above; the project remains additional even under the most favourable conditions.

Variation %	-10%	0%	10%	Variation required to breach benchmark
Electricity Tariff	5.48%	7.59%	9.70%	32.50%
Plant Load Factor	5.48%	7.59%	9.70%	32.50%
Project Cost	9.83%	7.59%	5.81%	-25.10%
O&M Cost	7.89%	7.59%	7.28%	-275.00%

To evaluate the additionality of the project, electricity tariff structure is sourced from ceiling (maximum) tariff mentioned in "RfS document for Setting up of 1800 MW ISTS-Connected Wind Power Projects (Tranche-VIII) dated 26/06/2019" for tariff based competitive bidding process". According to this selection document, Solar Energy Corporation of India (SECI) considered the levelized tariff of INR 2.85 as the ceiling tariff for prospective bidders who willing to participate in the selection process. However, after competitive bidding, 252 MW project was awarded to AEPL and Letter of Award (LOA) has been issued at the tariff rate of INR 2.83 per unit which would be fixed for a period of 25 years. Since the tariff is fixed for a period of 25 years, i.e. lifetime of the project, revenue generation is also fixed for the entire lifetime of the project and considering actual tariff rate of INR 2.83 per unit, equity IRR is coming out 7.59 %. Thus, considering this tariff rate, in any scenario, equity IRR would not cross the benchmark. Further, sensitivity analysis of +10% to -10% have been conducted and in both the cases equity IRR is less than the benchmark. Sensitivity analysis shows that project would cross the benchmark if electricity tariff increased by 32.50% which is not possible in as tariff rate is already fixed by competitive bidding process for the entire life time of the project.

The plant load factor (PLF) affects the equity IRR of the project activity as increase in the PLF would leads to an increase in export of electricity and the revenues associated with the project activity. For this project, 38.90% PLF has been considered to demonstrate the additionality of the project in line with supplier offer. Further, sensitivity analysis of +10% to -10% have been conducted and in both the cases equity IRR is less than the benchmark. Sensitivity analysis shows that project would cross the benchmark, if in any favorable scenario, PLF increased by 32.50%. Since the project is still under commissioning and due to low wind availability, actual generation is 57.08% less than estimated as per registered VCS PD during current monitoring period.

To assess the additionality, project cost has been considered from the offer letters submitted by the respective service providers and WTG supplier. PP has considered total project cost of 16,030.40 INR million for 250.8 MW. The equity IRR is 9.08 % with benchmark return as 14.62% and equity IRR will cross the bench mark only if project cost of project activity is reduced by 25.10 %. However, actual project cost of project activity is 18,395.24 INR million for 252 MW. The equity IRR at actual project cost is 7.59 % which is less than the benchmark (14.62%).

To assess the additionality of this project, total O&M cost of 1.7 INR million/WTG was considered inline with the offer letters submitted by the respective service providers and WTG supplier with yearly escalation. Considering the same, equity IRR is coming out 8.09%. The sensitivity analysis of +10% to -10% have been conducted and in both the cases equity IRRs are less than the benchmark. Thus, financial analysis predicts that if the O&M cost decrease by 275%, then only project would be financially viable. Further, decrease of O&M cost more than 100% is not possible. Thus, in any scenario project will not breach the benchmark return.

Outcome of Step 2:

This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark Equity IRR) for any of the projects. Thus, it can be easily concluded that project activity is additional & is not business as usual scenario.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice analysis

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

1. Applicable Geographical Area (Para 9): The host country, i.e. India has been considered as the applicable geographical area for this project.
2. Measure (Para 10): The project activity reduces greenhouse gas emissions by generating electricity using renewable energy source. Therefore, the project activity falls under the following measure:
 - (b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies
3. Output (Para 11): The project activity produces electricity. Therefore, electricity is considered as output of the project activity.
4. Different Technologies (Para 12): The project activity uses wind energy for producing electricity and hence as per Para 12(a), the technologies which use energy source/ fuel other than wind will be considered as the different technologies for the project activity.

The common practice analysis is carried out as per Stepwise approach for common practice. Stepwise approach for common practice as follows:

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

Range	Capacity	Unit
+50%	378	MW
Capacity of the proposed project activity	252	MW
-50%	126	MW

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

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

Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

- As the projects are located in India, therefore, the applicable geographical area is India and projects in the host country India have been chosen for analysis.
- The project activity is a green-field wind power project and uses measure (b) “Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies”.

Therefore, all projects applying same measure (b) as the proposed project activity are candidates for similar projects

- The energy source used by the project activity is Wind. Hence, only wind energy projects have been considered for analysis
- The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects

- e. The capacity range of the projects is within the applicable capacity range from 125.4 MW to 376.2 MW
- f. The start date of the project activity is 01/06/2021. As Kyoto Protocol was ratified by India on 26/08/2002⁸, therefore projects, which had started commercial operation between 26/08/2002 to till date, have been identified.

Numbers of Similar projects (CDM and non-CDM) identified, which fulfil above-mentioned conditioned are:

Particulars	No. of Projects	Source
N _{Wind}	14	Bloomberg NEF, UNFCCC and VERRA

Project Proponent	Capacity in MW	CDM Reference
Adani Renewable Energy (TN) Limited	300.0 MW	1x300MW Wind Power Project by M/s Adani Renewable Energy (TN) Limited at Dayapar, Lakhpat, Kachchh, Gujarat (https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html)
Adani Green Energy (MP) Limited	250.0 MW	1x250MW Wind Power Project by M/s Adani Green Energy (MP) Limited at Dayapar, Lakhpat, Kachchh, Gujarat (https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html)
Adani Saur Urja (KA) Limited	390.0 MW	1x390MW Hybrid (Wind+Solar) Power Project by M/s Adani Saur Urja (KA) Limited at Madhopura, Bamanwas, Sawai Madhopur, Rajasthan (https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html)
Torrent Power Limited	201.6 MW	201.6 MW Wind power project at Kutch and Bhavnagar districts, Gujarat (https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html)
Green Infra Wind Energy Limited	252.0 MW	252 MW Renewable Energy Project by Green Infra Wind Energy Limited (https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html)
Green Infra Wind Energy Limited	300.0 MW	300 MW Renewable Energy Project by Green Infra Wind Energy Limited (https://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html)

⁸ http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php

Project Proponent	Capacity in MW	CDM Reference
Orange Sironj Wind Power Pvt. Ltd.	200.0 MW	200 MW Wind Power Project in Tamil Nadu by Orange Sironj (https://cdm.unfccc.int/Projects/PriorCDM/notification_s/index.html)
Mytrah Vayu (Tungabhadra) Pvt. Ltd.	148.9 MW	Bundled Wind Power Project by Mytrah Group (https://www.vcsprojectdatabase.org/#/project_details/1728)
CLP Wind Farms (India) Pvt. Ltd.	192.8 MW	Tejuva-Chandgarh Wind Project (https://www.vcsprojectdatabase.org/#/project_details/1560)
Bothe Windfarm Development Pvt. Ltd.	199.7 MW	199.70 MW Wind Project in Maharashtra by BWDPL (https://www.vcsprojectdatabase.org/#/project_details/1447)
CLP Wind Farms (India) Pvt. Ltd.	193.6 MW	Wind Power Project of CLP Wind Farms (India) Private Limited (https://www.vcsprojectdatabase.org/#/project_details/1257)
DLF Limited	150.0 MW	150 MW grid connected Wind Power based electricity generation project in Gujarat, India (https://www.vcsprojectdatabase.org/#/project_details/292)
Tamil Nadu Spinning Mills Association	150.0 MW	Bundled Wind power project in Tamil Nadu, India, co-ordinated by Tamil Nadu Spinning Mills Association (TASMA-II) (https://www.vcsprojectdatabase.org/#/project_details/249)
Green Infra Wind Energy Limited	139.5 MW	Bundled Wind Power Project by Sembcorp Green Infra Limited in India (https://www.vcsprojectdatabase.org/#/project_details/1856)

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

All the projects identified in step-2 are either registered or project activities submitted for registration, or project activities undergoing validation in CDM /VCS scheme or informed UNFCCC about the intension to avail carbon benefit.

Thus $N_{all} = 0$

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

From the projects identified above, those projects which employ “**different technologies**” have been excluded and the number of such projects has been identified as N_{diff} .

As $N_{all} = 0$; thus $N_{diff} = 0$

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

Calculate $F = 1 - N_{diff}/N_{all}$

As N_{all} is zero thus, $N_{all} - N_{diff} = 0$; is less than 3

Outcome of Step 5:

As,

- i. $F = \text{Not defined}$
- ii. $N_{all} - N_{diff} = 0$; is less than 3

Thus, the proposed project activity is not a “common practice” within a sector in the applicable geographical area.

The above discussions show that this project development is not a common practice and the project activity is not financially attractive; hence the project activity is additional.

3.6 Methodology Deviations

Not applicable.

4 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

As per para 42 of ACM0002 version 19.0, 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 (tCO₂)

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

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/MWh)

Calculation of $EG_{PJ,y}$

The methodology ACM0002 (Version 19.0) has procedures for calculation of $EG_{PJ,y}$ for the following cases:

- (a) Greenfield plants,
- (b) Capacity addition to wind, solar, wave or tidal plant
- (c) Capacity addition to hydro or geothermal power plant
- (d) Retrofit or rehabilitation or replacement of an existing renewable energy power plant

As all the three projects included in the proposed project activity are Greenfield plants, option (a) as provided in the methodology ACM0002 (Version 19.0) shall be applicable and is described below:

“If the project activity is the installation of a new grid-connected renewable power plant”:

$$EG_{PJ,y} = EG_{facility,y} \tag{2}$$

Where:

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

$EG_{facility,y}$: Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

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

The methodology ACM0002 (Version 19.0) requires that the combined margin for the grid be calculated in accordance with the procedure provided in the “*Tool to calculate the emission factor for an electricity system*”, ver 7.0

As per version 7 of Tool to calculate emission factor for an electricity system, following steps are included in the calculation of the emission factor for the baseline scenario:

STEP 1: Identify the relevant electricity systems.

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

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

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

STEP 5: Calculate the build margin (BM) emission factor

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

The Central Electricity Authority (CEA) has published CO₂ baseline database in its version 14.0⁹ (December 2018). The values for OM, BM, CM are given excluding and including imports. For the present project activity, including imports are considered.

Step 1: Identifying the relevant electricity system

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

However, since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO₂ Baseline Database. As of 31 December 2018, the Southern grid has also been synchronized with the NEWNE grid, hence forming one unified Indian Grid. The project activity is located in the state of Gujarat which come under Indian grid system. 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.

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

⁹ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

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.

Only grid power plants are included in the calculation of OM & BM.

Step 3: Selection of an Operating Margin method

The calculation of the operating margin emission factor ($EF_{grid, OM, y}$) is based on one of the following methods: which are described under step 4 (Refer “Tool to calculate the emission factor for an electricity system”, version 05.0)

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

The simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The Share of Low Cost / Must-Run (% of Net Generation) in the generation profile of the different grids in India in the last five years is as follows:

Grid	2013-14	2014-15	2015-16	2016-17	2017-18
Indian Grid NEWNE	18.6%	16.8%	15.1%	14.6%	14.3%

Source : CEA Baseline Carbon Dioxide Emission Data Base Version 14

In Indian Grid, the low-cost/must run resources vary from 18.6% to 14.3% of the total net grid generation (From Year 2013-14 to Year 2017-18). The calculation above shows that the generation from low-cost/must-run resources constitute less than 50% of total grid generation, hence usage of the Simple OM method in the project case is justified.

The Simple OM emission factor can be calculated using either of the two following data vintages for years(s) y:

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period,
Or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to

calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

The project proponents choose the Ex ante option for estimating the simple OM emission factor wherein as described above a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period will be undertaken.

As observed in the CEA database, (Version 14, Dec'18) 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 only 18.3% which is much lesser than 50% of the total generation. Thus, Simple OM method has been used for calculating the emission factor.

The project proponent has chosen the ex-ante option for the calculation of the OM with a 3-year generation-weighted average, based on the most recent data available at the time of submission of the VCS-PD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

Step 4: Calculation of the OM according to the Simple OM method

The simple OM method has been selected as justified above. The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units using the following formula:

$$EF_{grid,OM,simple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO_2,i,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OM,simple,y}$	=	Simple operating margin CO ₂ emission factor of in year y (tCO ₂ /MWh)
$FC_{i,m,y}$	=	Amount of fuel type i consumed by power unit m in year y (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fuel type i in year y (GJ / mass or volume unit)

$EF_{CO_2,i,y}$	=	CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ)
$EG_{m,y}$	=	Net electricity generated and delivered to the grid by power unit m in year y (MWh)
m	=	All power units serving the grid in year y except low-cost / must-run power units
i	=	All fuel types combusted in power plant / unit m in year y
y	=	Either the three most recent years for which data is available at the time of submission of the CDM-PD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

In India, the Central Electricity Authority (CEA) has estimated the baseline emission factor for the power sector. This data has also been endorsed by the DNA and is the most authentic information available in the public domain. The details of same can be found on CEA website at http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf.

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

Net Generation in Operating Margin (MWh) (incl. imports)		
2015-16	2016-17	2017-18
871,753	916,278	960,693

Simple Operating Margin Emission Factors (tCO ₂ /MWh) (incl. Imports)		
2015-16	2016-17	2017-18
0.96553	0.96363	0.95434

Therefore, weighted OM average for Indian grid comes out to be 0.9610 tCO₂/MWh

i.e. $EF_{grid,OM,y} = 0.9610 \text{ tCO}_2/\text{MWh}$

In this PD ex-ante vintage has been fixed and will not be changed during the crediting period.

Step 5: Calculate the build margin emission factor

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

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.

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 has been considered for this project activity.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5-units}$) and determine their annual electricity generation ($AEG_{SET_{5-units}}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total} , in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET_{\geq 20\%}}$, in MWh);

(c) From $SET_{5-units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin.

In India, the installed capacity and corresponding annual generation from power plants is quite high. The Central Electricity Authority (CEA) has estimated the annual electricity generation from $SET_{\geq 20\%}$ to be larger than the generation from $SET_{5-units}$. The details of same can be found on CEA website at http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf.

Further, none of the power units in $SET_{\geq 20\%}$ started to supply electricity to the grid more than 10 years ago.

Therefore, SET_{sample} is selected as $SET_{\geq 20\%}$ for the estimation of build margin.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid, BM, y} = \frac{\sum_m EG_{m, y} \cdot EF_{EL, m, y}}{\sum_m EG_{m, y}}$$

Where:

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

Calculations for the Build Margin emission factor $EF_{grid, BM, y}$ is based on the most recent information available on the plants already built for sample group m at the time of PD submission. The sample group m consists of the power plant capacity additions in the electricity system that comprise 20 % of the system generation and that have been built most recently ($SET_{\geq 20\%}$). PP has sourced the data from CEA website at http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf and same is inline with the Tool to calculate the emission factor of the electricity system.

Build margin emission factor is calculated, ex-ante as per the most recent data available. So, build margin emission factor for Indian grid for 2017-18 is $0.8644 tCO_2/MWh$

$$EF_{grid, BM, y} = 0.8644 tCO_2e/MWh$$

The build margin emissions factor is the generation-weighted average emission factor (tCO_2e/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

Where:

- EF_{grid, BM, y}: Build margin CO₂ emission factor in year y (tCO₂e/MWh)
- EG_{m, y}: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
- EF_{EL, m, y}: CO₂ emission factor of power unit m in year y (tCO₂e/MWh)
- m: Power units included in the build margin
- y: Most recent historical year for which power generation data is available

As described above, the Build Margin would be calculated annually during the entire crediting period. For the purpose of ex-ante emission reduction calculations, the most recent data available (from CEA for 2017-18) has been used and the build margin thus calculated is 0.8644 (tCO₂e/MWh)

Therefore, EF_{grid, BM, y} = 0.8644 (tCO₂e/MWh)

Step 6: Calculation of the combined Build Margin emission factor

The combined margin emission factor will be calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (5)$$

Where,

- EF_{grid, BM, y} = Build margin CO₂ emission factor in year y (tCO₂e/MWh)
- EF_{grid, OM, y} = Operating margin CO₂ emission factor in year y (tCO₂e/MWh)
- w_{OM} = Weightage of operating margin emissions factor (%)
- w_{BM} = Weightage of build margin emissions factor (%)

As per the 'Tool to calculate the Emission Factor for an electricity system' version 07, the default values for w_{OM} and w_{BM} are taken as 0.75 and 0.25 respectively as per the guidance provided for wind project activities for the first crediting period and subsequent crediting periods.

Hence, the Baseline Emission Factor is calculated using the formula stated below:

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

$$EF_{grid, CM, y} = 0.75 * 0.9610 + 0.25 * 0.8644 \text{ (tCO}_2\text{/MWh)}$$

$$EF_{grid, CM, y} = 0.9368 \text{ tCO}_2\text{/MWh}$$

Thus, as per the equation 11 of the methodology ACM 0002 (Version 19.0),

$$BE_y = EG_{PJ, y} * EF_{grid, CM, y} \quad (1)$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr)

$EG_{PJ, y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of

the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid, CM, y}$: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂e/MWh)

This project activity is expected to generate 858,725.28 MWh of energy to the Indian Grid each year.

$$\begin{aligned} \text{Thus, } BE_y &= 858,725.28 \text{ MWh} * 0.9368 \text{ tCO}_2\text{/MWh} \\ &= 804,485 \text{ tCO}_2 \end{aligned}$$

4.2 Project Emissions

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

Hence $PE_y = 0$

4.3 Leakage Emissions

As per ACM0002, no Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

4.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

Baseline Emissions

As per the equation 11 of the methodology ACM 0002 (Version 19.0),

$$BE_y = EG_{PJ, y} * EF_{grid, CM, y} \quad (1)$$

Where:

BE_y : Baseline emissions in year y (tCO₂e/yr)

$EG_{PJ, y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of

the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid, CM, y}$: Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂e/MWh)

Project Emissions

As per the para 34 of methodology ACM0002 (Version 19.0), “For most renewable power generation project activities, $PE_y = 0$.”

Leakage Emissions

As per para 5.6 of the methodology ACM0002 (Version 19.0) does not consider any leakage emissions.

Emission reductions

As per equation number (17) of the applied methodology, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (17)$$

Where:

ER_y : Emission reductions in year y (tCO₂e/yr)

BE_y : Baseline emissions in year y (tCO₂e/yr)

PE_y : Project emissions in year y (tCO₂e/yr)

Vintage period	Estimated baseline emissions (tCO ₂ e)	Estimated project emissions (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated reduction VCUs (tCO ₂ e)	Estimated removal VCUs (tCO ₂ e)	Estimated total VCUs (tCO ₂ e)
07-Apr-2023 to 31-Dec-2023	572,342	0	0	572,342	0	572,342

01-Jan-2024 to 31-Dec-2024	804,485	0	0	804,485	0	804,485
01-Jan-2025 to 31-Dec-2025	804,485	0	0	804,485	0	804,485
01-Jan-2026 to 31-Dec-2026	804,485	0	0	804,485	0	804,485
01-Jan-2027 to 31-Dec-2027	804,485	0	0	804,485	0	804,485
01-Jan-2028 to 31-Dec-2028	804,485	0	0	804,485	0	804,485
01-Jan-2029 to 31-June-2029	804,485	0	0	804,485	0	804,485
01-Jan-2030 to 31-June-2030	804,485	0	0	804,485	0	804,485
01-Jan-2031 to 31-June-2031	804,485	0	0	804,485	0	804,485
01-Jan-2032 to 31-June-2032	804,485	0	0	804,485	0	804,485
01-Jan-2033 to 06-Apr-2033	2,32,143	0	0	2,32,143	0	2,32,143
Total	8,044,850	0	0	8,044,850	0	8,044,850

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,CM,y}
Data unit	t CO ₂ /MWh

Description	Combined margin emission factor for Indian grid connected power generation in year y calculated using the latest version of “Tool to calculate the emission factor for an electricity system”
Source of data	CO ₂ baseline database (Version 14.0) published by CEA on Dec-2018 (http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf)
Value applied	0.9368
Justification of choice of data or description of measurement methods and procedures applied	This value is calculated using OM and BM values as per Version 7.0 of methodological tool to calculate the emission factor for an electricity system and using data base of CEA.
Purpose of data	For the calculation of Emission Factor of the grid
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,OM,y}
Data unit	t CO ₂ /MWh
Description	Simple operating margin emission factor for Indian grid
Source of data	CO ₂ baseline database (Version 14.0) published by CEA on Dec-2018 (http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf)
Value applied	0.9610
Justification of choice of data or description of measurement methods and procedures applied	This value is calculated by taking weighted average of Simple Operating Margin of recent three years for Indian grid as per the “Tool to calculate the emission factor for an electricity system”, version 07.0.0
Purpose of data	For the calculation of Emission Factor of the grid
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid,BM,y}
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Data unit	tCO ₂ /MWh
Description	Simple build margin emission factor for Indian grid
Source of data	CO ₂ baseline database (Version 14.0) published by CEA in Dec-2018 (http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf)
Value applied	0.8644
Justification of choice of data or description of measurement methods and procedures applied	This value is calculated by taking weighted average of Simple build Margin of recent three years for Indian grid as per the “Tool to calculate the emission factor for an electricity system”, version 07.0.0
Purpose of data	For the calculation of Emission Factor of the grid
Comments	This parameter is fixed ex-ante for the entire crediting period.

5.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project to the grid in year y
Source of data	Electricity Share Certificate issued by state utility
Description of measurement methods and procedures to be applied	Data Type : Measured Monitoring equipment : Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: 5 years Accuracy class: 0.2s Electricity exported/imported to the grid is in kWh. However, for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid and

	electricity imported from the grid obtained from joint meter reading report notes issued by state utility as per below equation: $EG_{PJ,y} = EG_{Export} - EG_{Import}$ The calculation is done by state utility and AEPL has no say in the calculation. Based on the joint meter reading report, AEPL will raise the invoice. Export readings of Main and Check meters shall be taken on monthly basis by authorized officer of state utility in the presence of AEPL or representative of AEPL. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the AEPL to the SECI.
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and monthly recording
Value applied	858,725.28 MWh
Monitoring equipment	Energy meters of accuracy class 0.2s
QA/QC procedures to be applied	- The energy meter reading would be taken on monthly basis - Energy meters will be calibrated once in a five year in line with guidance stipulated by Central Regulatory Authority, Govt. of India and faulty meters will be duly replaced immediately - All the energy meters would be under the control of state utility and calibration/testing of energy meters would also be under the jurisdiction of state utility The Net electricity exported to the grid will be cross checked against the invoice raised by the AEPL towards the SECI
Purpose of data	Calculation of Baseline emissions
Calculation method	The net electricity generation is calculated based on Export – Import to the meters connected at the project sub-station. The generation details are directly submitted to RLDC (Regional Load Dispatch Center) by online mechanism. Based on this RLDC provides the REA Statement. The REA statement issued by WRPC contains the information of the Scheduled Power, Actual Power, and the Deviation between actual & scheduled power. Thus, value of net electricity supplied is directly sources from the REA statement. Hence, the actual value obtained in the REA

	statement is the value calculated based on the (export – import) value. The same has been used for the ER Calculations. The calculation of net electricity generation is in the hand of electricity board/CEA and the project owner has no role to play in the same.
Comments	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

5.3 Monitoring Plan

The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of monitoring of quantity of net electricity supplied to the grid in the year y. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity. Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required. The sole parameter for monitoring is the net electricity exported to the grid.

Suzlon is the O&M contractor for this wind project. Further, all the companies will be responsible for maintaining respective monitoring data in respect of the project activity.

The approved monitoring methodology requires monitoring of the following:

Net electricity supplied from the project activity: While emission factor of the project activity is fixed ex ante hence no further monitoring of this parameter is required. As per ACM0002 leakage need not be considered hence leakage has not been considered for the project activity. Hence, the sole parameter for monitoring is the net electricity supplied by the project activity to the grid.

The Project activity would be operated by WTG supplier and managed by AEPL. AEPL follow the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

Data Monitoring Procedure:

The net electricity exported to the grid by project activity WTGs will be ascertained by government agency – GETCO – on the basis of billing meter located at grid substation and meter readings at various transformer yard meters (near each WEG). The substation proposed for grid connectivity would be dedicated for this project only. Thus, the ABT meters would be installed at the sub-stations continuously monitor the electricity generated from this project activity only. These billing meters would continuously monitor, hourly measure and monthly record the electricity export to the Indian Grid.

As the grid sub-substation would be 100% dedicated for this project activity, thus, apportioning of the electricity would not be required for this project. Post receiving generation details from billing meter, the State Load Dispatch Centre (SLDC) (https://www.sldcguj.com/EnergyAccount/Energy_Block_New.asp) would issue certificate of electricity generated which would provide net electricity exported to grid by all WTGs of AEPL only

and this forms basis of emission reduction calculations. The net electricity supplied by the project activity would be taken directly from the certificate of share issued on monthly basis.

The values of the net electricity supplied to grid by project activity would be cross checked with invoices raised by the AEPL.

Training and maintenance requirements:

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

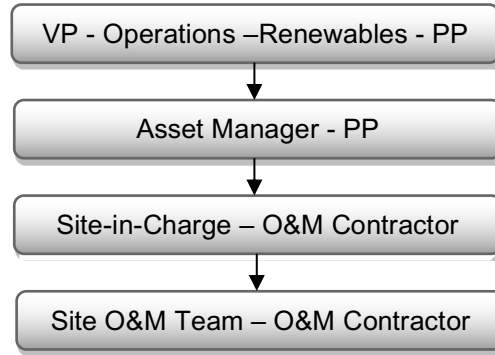
Monitoring roles and responsibilities

The operational and management structure implemented for data monitoring is as follows:

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

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with AEPL. AEPL has proposed the following structure for data monitoring, collection, data archiving and calibration of equipment's for this project activity. The Project activity would be operated by WTG supplier and managed by the AEPL and its representatives. AEPL would follow the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The data for the project is compiled and subsequently stored by the AEPL. The roles and responsibilities for the project are described as below;



The responsibilities of the team members comprise of the following members:

Responsibilities of VP – Operation:

- Overall supervision of the project and to meet yearly generation targets

Responsibilities of Asset Manager:

- Overall functioning and maintenance of the project activity and overall responsibility of compliance with the CDM Monitoring Plan.

Responsibilities of Shift In-charge:

- Responsible for maintaining the data records, ensures completeness of data, and reliability of data.
- Regularly verifying the monthly energy generation date with energy sales receipt or installed meters reading for identification of any discrepancies in data collection and taking suitable action to rectify them

Responsibilities of O&M Team:

- Responsible for day to day data collection and maintains day to day log book for monitored data
- Responsible for monthly and annual report generation and quality assurance of the data/reports and preliminary check of data for any discrepancies.

Data Recording

The state utility and representative of AEPL shall jointly read the metering system every month at the delivery point.

Meter readings taken jointly will be signed by the representatives of state utility and AEPL. If AEPL's representative would not present for joint meter reading then the meter reading would taken by state utility shall be considered as final; provided a signed copy of the meter reading is sent to the Power Purchase / Developer within twenty four (24) hours of such reading of the main metering system or back up metering system as the case may be.

AEPL would install main meter and check meter of static type 0.2s class accuracy of ABT Meters at the Interconnection Point as per the norms specified in the Metering Code by CEA. The main meter and check meter shall consist of a pair of export and import parameters with facility for recording meter readings using meter recording instrument.

Calibration Frequency

The main and check meters shall be calibrated once in a five year in line with notification issued by Central Electricity Authority, Govt of India dated the 17th March, 2006 (https://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf). The meters would be tested by any accredited laboratory in the presence of the parties (State Electricity Board, Project investor and the O&M Contractor) involved. Both parties shall seal main and backup meters. Defective meters shall be replaced immediately. As per the schedule, calibration of all energy meter, instruments and equipment will be carried out once in five year and recorded in calibration reports.

All the meters have installed shall be jointly inspected and sealed and shall not be interfered with, tested or checked except in the presence of representatives of both parties. The meter readings of the main meter shall form the basis of billing. If any of the meters installed at interconnection point are found to be registering inaccurately the affected meter shall be replaced immediately.

During meter test check of the main meter and check meter indicates an error in the main meter beyond the permissible limits of error provided in the relevant standards (as defined in the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006, but no such error is indicated in the corresponding check meter, billing for the month shall be done on the basis of the reading of the check meter and the main meter shall be replaced immediately. If main meter and check meter indicate an error beyond the limits, billing for the month shall form the basis of the readings of the standby meter, and the main meter and the check meter shall be replaced immediately.

Emergency Preparedness

In case of any abrupt breakdown, the fault will be immediately identified by the O&M personnel. All minor faults shall be taken care of by the O& M personnel, in case of any major faults, the grid personnel will be informed and replacement of the equipment shall be made within 24 hours

Sample apportioning procedure for Data Adjustment in case of monitoring period different from billing period:

In case the dates of a particular monitoring period do not match with the dates of the billing period, the net electricity exported to the grid would be calculated as follows:

$$D = (A/B)*C$$

A = Difference of number of days which are not matching of billing period and monitoring period.

B = Number of days of the billing period/ month which was not matched with the monitoring period.

C = Net Electricity supplied to the grid for that given billing period/ month

The calculated value after apportioning would be used for calculation of emission reductions during that period.

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

Not Applicable