



WIND ENERGY PROJECT IN HARAPANAHALLI, KARNATAKA

Document Prepared by Apraava Renewable Energy Private Limited
(AREPL)¹

Project title	Wind Energy Project in Harapanahalli, Karnataka
Project ID	VCS 1482
Monitoring period	01-Jan-2024 to 31-Dec-2024 (both days inclusive)
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¹ The name of the company has been changed from the CLP Wind Farm (India) Private Limited to Apraava Renewable Energy Private Limited (AREPL) with effect from 31/12/2021.

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Apraava Renewable Energy Private Limited (AREPL) has implemented a wind power project of capacity 39.6 MW comprising of 24 number of Wind Turbine Generators (WTGs), each with rated capacity of 1650 kW. The project area is spread across 4 villages - Harakanalu, Arsanahalu, Hyarada, Dasanahalli which are part of Harapanahalli Taluk of Davangere District in the State of Karnataka. The electricity generated from the Project activity is sold to the local electricity distribution company in the state.

To generate electricity by utilizing the wind power potential using WTGs at a site located in Harapanahalli taluk of Davangere district in the State of Karnataka. The Project activity is contributing towards reduction of the Green House Gas (GHG) emissions thereby contributing to sustainable development. The electricity generated from the wind farm exported to the Integrated Indian electricity grid. Distribution Licensee thereby marginally contributing towards reduction in the energy demand supply gap in the state of Karnataka, diversification of grid supply and reduction of greenhouse gas emissions. Initially, the Indian electricity system was divided into two regional grids, the synchronous Northern, Eastern, Western, and North Eastern (NEWNE) grid and the Southern grid. Each grid covers several states. However, both the grids have now merged and termed as Integrated Indian Grid.

The project activity involved installation of Vestas make V82- 1650 kW WTGs. The specification for the WTGs is provided in section 3.1.

During this monitoring period the project activity has exported 78,299 MWh of net energy to the Integrated Indian Grid system. The total emission reductions achieved during the monitoring period from 01-01-2024 to 31-12-2024 (both days inclusive) is 67,436 tCO₂.

1.2 Audit History

Audit type	Period	Program	Validation/verification bodyname	Number of years
Gap Validation and Verification	21-Jan-2011 – 31-May-2013	VCS	Bureau Veritas Certification	NA
Verification	01-Jun-2013 – 31-May-2016	VCS	Bureau Veritas Certification	3 years
Verification	01-Jun-2016 – 01-Nov-2017	VCS	LGA Technological Center, S.A.	1 year 5 months
Verification	02-Nov-2017 – 01-Feb-2019	VCS	Earthood Services Pvt Ltd	1 year 6 months
Verification	02-Feb-2019 – 01-Feb-2020	VCS	LGA Technological Center, S.A.	1 year

Verification	02-Feb-2020 – 20-Jan-2021	VCS	Earthood Services Pvt Ltd	11 months 2 weeks
Validation and Verification	21-Jan-2021 – 30-Sep-2022	VCS	LGAI Technological Center, S.A.	1 year 8 months
Verification	01-Oct-2022 – 31-Dec-2023	VCS	EcoLance Private Limited	1 year 3 months
Verification	01-Jan-2024 – 31-Dec-2024	VCS	EcoLance Private Limited	1 year
Total	21-Jan-2011 – 31-Dec-2024			13 years 11 months

1.3 Sectoral Scope and Project Type

Sectoral scope ²	Energy (renewable/non-renewable)
Project activity type	The project activity is not a grouped project.

1.4 Project Proponent

Organization name	Apraava Renewable Energy Private Limited (AREPL)
Contact person	Jogendra Behera
Title	Head -Policy, Regulatory and Non-Utility Markets (Renewables)
Address	7th Floor, FULCRUM, Sahar Road, Andheri (East), Mumbai – 400 099. India
Telephone	+91-22 67588888
Email	carbongroup@apraava.com

1.5 Other Entities Involved in the Project

Organization name	Not Applicable
Role in the project	Not Applicable
Contact person	Not Applicable

²Projects, 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>

Title	Not Applicable
Address	Not Applicable
Telephone	Not Applicable
Email	Not Applicable

1.6 Project Start Date

Project start date	21-Jan-2011
Justification	It is the date of commissioning of the first WTG under first phase turbine installed under the project activity.

1.7 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) The project was registered under VCS 2007.1 which allowed crediting period of a maximum of 10 years which may be renewed at most two times. As per VCS standard 4, the second crediting period was renewed for duration of 10 years from 21-Jan-2021 to 20-Jan-2031.
Start and end date of first or fixed crediting period	21-Jan-2021 to 20-Jan-2031(both days inclusive).

1.8 Project Location

The project activity is located at Karnataka State of India. The project is implemented in Villages Harakanalu, Arsanahalu, Hyarada, Dasanahalli of Taluka Harapanahalli in District Davangere of Karnataka State in India. The geo- coordinates and commissioning date of WTG under the project activity are provided below:

Serial No	WTGID	Commissioning date	Latitude	Longitude
1	H28	21-Jan-2011	14° 50'00.1"N	75° 48'46.3"E
2	H29	21-Jan-2011	14° 50'17.2"N	75° 48'37.5" E

Serial No	WTGID	Commissioning date	Latitude	Longitude
3	H30	21-Jan-2011	14°50'26.2"N	75°48'44.1" E
4	H31	21-Jan-2011	14°50'37.6"N	75°48'37.3" E
5	H32	21-Jan-2011	14°50'42.2"N	75°48'22.1" E
6	H33	21-Jan-2011	14°50'50.3"N	75°48'17.2" E
7	H34	21-Jan-2011	14°50'47.4"N	75°48'35.7" E
8	H35	21-Jan-2011	14°51'00.5"N	75°48'33.2" E
9	H15	25-Feb-2011	14°48'20.5"N	75°50'36.5" E
10	H16	25-Feb-2011	14°48'31.6"N	75°50'25.8" E
11	H17	25-Feb-2011	14°48'42.6"N	75°50'21.2" E
12	H18	25-Feb-2011	14°48'50.1"N	75°50'24.4" E
13	H19	25-Feb-2011	14°48'36.9"N	75°49'47.5" E
14	H20	25-Feb-2011	14°48'47.8"N	75°49'43.2" E
15	H21	25-Feb-2011	14°49'07.4"N	75°49'42.0" E
16	H22	25-Feb-2011	14°49'16.4"N	75°49'46.1" E
17	H23	25-Feb-2011	14°49'24.1"N	75°49'42.5" E
18	H24	25-Feb-2011	14°49'19.3"N	75°49'22.7" E
19	H25	25-Feb-2011	14°49'37.0"N	75°49'14.7" E
20	H26	25-Feb-2011	14°49'50.4"N	75°49'12.6" E
21	H27	25-Feb-2011	14°49'43.7"N	75°48'50.4" E
22	H36	25-Feb-2011	14°51'13.9"N	75°48'08.0" E
23	H37	25-Feb-2011	14°51'24.7"N	75°47'59.6" E
24	H38	25-Feb-2011	14°51'33.0"N	75°47'54.5"E

1.9 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	21
Tool	NA	Tool to calculate the emission factor for an electricity system	07.0
Tool	NA	Tool for the demonstration and assessment of additionality	07.0.0
Guideline	NA	Methodological tool for Investment analysis	05.0

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

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

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☒ Yes ☐ No

All the 24 WTGs of this project activity are registered under CDM Project activity as follows:
Project Title: Wind Energy Project in Harapanahalli, Karnataka

UNFCCC Registration Number: 63901

Crediting period: 01-Jun-2013 – 31-May-2020 (Renewable)

Renewal Status: Renewal of crediting period of the CDM has been successfully registered

Duration of 2nd crediting period: 01-Jun-2020– 31-May-2027

There is no issuance of CERs from any crediting periods mentioned above.

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

1.11.1 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

1.11.2 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

1.11.3 Supply Chain (Scope 3) Emissions

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

☐ Yes ☒ No

1.12 Sustainable Development Contributions

The main purpose of this project activity is to generate clean electricity through renewable wind energy source. The project is a wind project which is located at Davangere District in the State of Karnataka India. The capacity of the project is 39.6 MW. The Project activity is a new facility (Greenfield) and the electricity generated by the project is 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. The project activity is expected to supply 81,200 MWh/year of energy to the NEWNE Grid of India each year, which is mainly dominated by thermal/fossil fuel-based power plant. This is expected to result in emission reductions of 75,597 tCO_{2e} per year of operation.

The project activity has resulted in various contributions towards the SDGs has been given below:

SDG 7.2.1: Renewable energy share in the total final energy consumption: The Project activity is a new facility (Greenfield) and the electricity generated by the project is exported to the Indian electricity grid. The project therefore displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. During the current monitoring period 78,299 MWh electricity has supplied to Indian grid.

SDG 8 Quality of Employment: The implementation of the project activity has led to increase in the Quality of Employment and skill upliftment. During the current monitoring period, 1 Training has been organized for staff on RA, JSA documents review and explanation, PTW procedure explanation, WTG pole climbing do and don't, PPE use and inspection, BOP activity SOP discussion, and Role of AP and CP explanation.

SDG 13 Climate Action: The main purpose of this project activity is to generate a clean electricity through renewable wind energy sources. The project is a wind project which is located at Davangere District in the State of Karnataka India. The capacity of 39.6 MW has been installed at Indian state of Tamil Nadu. The project supplies clean electricity from the wind power plants to the Indian Grid, hence displacing the electricity generated from grid connected fossil fuel power plants and thereby avoiding the equivalent Carbon dioxide which is a greenhouse gas. By supplying 78,299 MWh clean electricity to Indian grid, the project avoided release of 67,436 tCO_{2e} into the atmosphere during the current monitoring period.

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 78,299 MWh renewable electricity has been supplied to Indian grid during the reported period that helps to increase the renewable energy share.	Overall, 1,251,212.25 MWh renewable electricity has been supplied to Indian grid throughout the project lifetime that helps to increase the renewable energy share in the energy mix
2)	8	Quality of Employment	Implemented activities to increase	Training has been provided during verification period, The training was organized for staff on RA, JSA documents review and explanation, PTW procedure explanation, WTG pole climbing do and don't, PPE use and inspection, BOP activity SOP discussion, and Role of AP and CP explanation.	Overall, Training has been provided, the training was organized for staff on RA, JSA documents review and explanation, PTW procedure explanation, WTG pole climbing do and don't, PPE use and inspection, BOP activity SOP discussion, and Role of AP and CP explanation.

3)	13	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By supplying 78,299 MWh of clean electricity to Indian grid, the project avoided release of 67,436 tCO₂e in to the atmosphere during the reporting period.	Overall, prevented the release of 1,190,332 tCO₂e into the atmosphere since project commissioning.
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1.13 Commercially Sensitive Information

The project activity is a greenfield wind power project. Hence, there is no commercially sensitive information so this section is not applicable.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	Following stakeholders have been identified for this project activity 1. Representatives from Vestas India 2. Employees of Apraava Renewable Energy Private Limited (AREPL) 3. Villagers from nearby villages
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	Stakeholders identified for this project activity are diverse in nature – in terms of socio-economic status, age and gender wise and the diversity is unlikely to change over time.
Expected changes in well-being	Expected changes 1. Economic well-being – the project activity is likely to provide employments to the locality thus economic well beings are expected 2. Environmental well-being – as this project activity reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in

	avoiding significant amount of GHG emissions and specific pollutants like SO _x , NO _x , and SPM associated with the conventional thermal power generation facilities.
Location of stakeholders	Location of stakeholders Village: Harapanahalli Substation State: Karnataka
Location of resources	Not applicable.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing 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.
Date(s) of stakeholder consultation	01-Feb-2011
Communication of monitored results	The meeting was outlined towards making aware local stakeholders including local community, local administration representatives, NGOs working for environmental cause etc., about the project activity that involves waste water treatment and electricity generation with the primary objective of reducing emissions of GHG emission in compared to pre-project or baseline scenario. The feedbacks/comments received from stakeholders were quite positive and no negative comments were received. The questions asked by stakeholders were only on process and these ere explained by PP representatives.
Consultation records	Stakeholder consultation documents/MoM/Grievance register
Stakeholder input	Local villagers from nearby village appreciated the project activity. They expressed their gratitude towards the project developers and project proponents for providing different facilities. They also anticipating such positive initiatives would be taken by PP in the region. Other villagers mentioned about the job opportunities in local area due to

	the project activity. They also expecting positive development in their villages in terms of infrastructure, employment and environment in near future.
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2.1.3 Free, Prior, and Informed Consent

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 is greenfield wind power project which has not encroached any kind of land from the local and government authorities.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
No grievance received during the current monitoring period.	The project has not received any negative or discouraging comments from the stakeholders.

The grievance mechanism process could be illustrated as below:

PP has placed a grievance register onsite where-in; the stakeholders can put down their request/complaint/requirements. Same is continuously monitored and appropriate action are also being taken by management. Furthermore, PP has also placed a notice board on site to communicate any necessary information/updates to local stakeholders. PP has found this two-way communication with local stakeholders is very effective towards sustainability of the project in long run.

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. 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.

2.1.5 Public Comments

Summary of comments received	Actions taken
No comments from stakeholder during current monitoring period.	No action is required

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

	Risk 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 consider 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	Safety of employees at project site	PP has a health and safety policy, and procedure manual in place to ensure favorable working condition.
Safety of women and girls	Sexual harassment at workplace	PP has Health, Safety, Security and Environment (HSSE) Policy and Prevention of Sexual Harassment at Work policies are stated as per the safety of both women and girls (Apraava Energy HSSE Policy, https://www.apraava.com/getmedia/cd8c962d-c86b-42db-8976-15c1d494b54d/Apraava-Energy-

		HSSE-Policy.pdf Prevention of Sexual Harassment at Workplace https://www.apraava.com/getmedia/b485f4e1-aaf3-49ae-9864-ea38aefbb18e/Handbook-on-Prevention-of-Sexual-Harassment-at-Workplace-Oct-2023.pdf)
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. (Ref Apraava Energy Annual Integrated Report FY 2022-23)
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. The waste/used oil from the turbines and transformer oil is disposed as per applicable laws. No waste water generation is envisaged from operation of wind farm. There will be only a marginal increase in noise levels due to operation of wind farm and there will be no significant impact on the noise levels due to the Project.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified ³	Mitigation or preventative measure(s) taken
Discrimination	Discrimination on the basis of individual's race, gender, age, disability, ethnicity or cultural affiliation, sexual orientation, belief, educational background, or any other basis.	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. (Ref Human Rights Policy, https://www.apraava.com/getmedia/c5d64657-fa1d-4fad-a803-a8ca9727c2fa/Human-Rights-Policy.pdf) Prevention of Sexual Harassment at Workplace https://www.apraava.com/getmedia/b485f4e1-aaf3-49ae-9864-ea38aefbb18e/Handbook-on-Prevention-of-Sexual-Harassment-at-Workplace-Oct-2023.pdf
Sexual harassment	Unwelcome acts or behavior (whether directly or by implication)	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,

³The 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.

		contractors, and third parties.
Gender equity in labor and work	Biasness in hiring, promotions or terminations	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.
Forced labor	No risk identified	PP complies with the core labour standards for the ADB financed portion of the Project by engaging those contractors and other providers of goods and services who do not employ forced labour
Child labor	No risk identified	PP complies with the core labour standards for the ADB financed portion of the Project by engaging those contractors and other providers of goods and services who do not employ child labour
Human trafficking	No risk identified	The PP works with ethical suppliers as per code of conduct policy and no such scenario is envisaged for the project activity.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	The project activity is a greenfield Wind power project and wind mills are installed in approved/permitted areas. The project does not affect the indigenous people and their

	cultural heritage.
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2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified	The project activity is a greenfield Wind power project and wind mills are installed in approved/permited areas. 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
No risk identified	The project activity is a greenfield wind power project. 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.

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	Project activity is a greenfield wind power project where the benefit sharing is not applicable.
Benefit sharing during the monitoring period	Not applicable because the project activity does not have any impacts property right.

2.4 Ecosystem Health

Risk identified	Mitigation or preventative measure taken during the monitoring period
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Impacts on biodiversity and ecosystems	No risk identified	Since the project activity is wind power plant, there is no impact on biodiversity and ecosystem. (Refer: EIA Report by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, May 2015)
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. (Refer: EIA Report by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, May 2015)
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. (Refer: EIA Report by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, May 2015)

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	Since the project activity is greenfield wind power project, there is no ecosystem impact were identified during validation. (Refer: EIA Report by Sálim Ali Centre for Ornithology and Natural History, Coimbatore, May 2015)
Areas needed for habitat connectivity	Not Applicable

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	Since the project activity is greenfield wind power project, no ecosystem impact was identified	Not Applicable

	during validation	
Areas for habitat connectivity	Since the project activity is greenfield wind power project, no ecosystem impact was identified during validation	Not Applicable

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
Not Applicable	Not Applicable	Since the project activity is greenfield wind power project, it is not applicable as project activity does not introduce any species.	Not Applicable

Existing invasive species	Mitigation measures to prevent spread or continued existence of invasive species
Not Applicable	Not Applicable

2.4.3 Ecosystem conversion

The project activity is a greenfield wind power project. Hence, it is not applicable as project activity do not involve any ecosystem conversion.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Project Activity envisages implementation of a 39.6 MW wind power project consisting of 24 Wind Turbine Generators (WTGs) of individual capacity 1.65 MW in Karnataka state of India by Apraava Renewable Energy Private Limited (AREPL).

The project involves installation of 24 Vestas make WTGs of 1650 kW capacity each at Harapanahalli in Davangere district of Karnataka. Brief technical details of the WTGs used in the Project are as follows.

Model: V82- 1650 kW: The average lifetime of the wind turbine: 20 years

General Information:

Model: V82 - 1650 kW

Average Lifetime: 20 years

Turbine:

Cut-in wind speed: 3 m/s

Cut-out wind speed: 20 m/s

Rated wind speed: 13 m/s

Hub height: 78 m

Generator:

Type: Asynchronous, water-cooled

Capacity: 1650 kW

Speed: Single speed

Gearbox:

Design: Step planetary and B. step helical

Ratio: 1:70.2

Tower:

Type: Conical, Tubular

Material: S355 or ASTM A709 Grade 50

Rotor:

Number of blades: 3

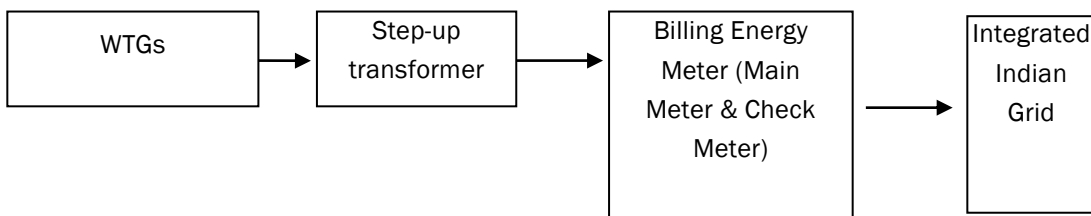
Rotor diameter: 82 m

Swept area: 5281 m²

The project has been under operation since commissioning without any major breakdowns. Though normal breakdowns due to O&M measures are continuously being worked upon by the dedicated O&M contractor for the project's WTGs. There have been no events that may have an impact on the GHG emissions or removals during the current monitoring period.

Further, there are no changes to the project participant for the project activity during the monitoring

Monitoring equipment line diagram at project Site is detailed as below: -



3.2 Deviations

3.2.1 Methodology Deviations

There are no deviations related to applied methodology.

3.2.2 Project Description Deviations

PP name has been changed from CLP Wind Farms (India) Private Limited to Apraava Renewable Energy Private Limited (AREPL) as mentioned in section 1.1.

3.3 Grouped Projects

The project is not a grouped project; hence this is not applicable.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes

☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	W _{OM}
Data unit	%
Description	Weightage of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system"
Value applied	0.75
Justification of choice of data or description of measurement methods and procedures applied	Default values used as per the "Tool to calculate the emission factor for an electricity system"
Purpose of Data	Baseline Emission calculation
Comments	-

Data / Parameter	W _{BM}
Data unit	%
Description	Weightage of build margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system"

Value applied	0.25
Justification of choice of data or description of measurement methods and procedures applied	Default values used as per the “Tool to calculate the emission factor for an electricity system”
Purpose of Data	Baseline Emission calculation
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	EF _{grid,CM,y}	
Data unit	tCO ₂ /MWh	
Description	Combined CO ₂ emission factor of Indian Integrated Grid	
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA CO ₂ Baseline database Version 20.0	
Description of measurement methods and procedures to be applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07”. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 20.0 published by the Central Electricity Authority, Ministry of Power, Government of India.	
Frequency of monitoring/recording	Annually during the crediting period for the relevant year	
Value monitored	Operating margin CO ₂ emission factor (tCO ₂ /MWh)	0.964
	Build margin CO ₂ emission factor (tCO ₂ /MWh)	0.552
	Weighted Average (tCO ₂ /MWh)	= 0.964 * 0.75 + 0.552 * 0.25 = 0.861
Monitoring equipment	Not applicable	
QA/QC procedures to be applied	The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” Version 20.0, published by the Central Electricity Authority, Ministry of Power, Government of India.	
Purpose of the data	Calculation of Baseline emissions	
Calculation method	Calculated as per “Tool to calculate the emission factor for an electricity system”	
Comments	The data will be archived both in electronic and paper format for	

	crediting period + 2 years.
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Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor of Indian Integrated Grid
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA CO ₂ Baseline database Version 20.0
Description of measurement methods and procedures to be applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07”. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” Version 20.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Frequency of monitoring/recording	Annually during the crediting period for the relevant year
Value monitored	0.964
Monitoring equipment	Not applicable
QA/QC procedures to be applied	The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” Version 20.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of the data	Calculation of Baseline emissions
Calculation method	Calculated as per “Tool to calculate the emission factor for an electricity system” version 07
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor of Indian Integrated grid
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA CO ₂ Baseline database Version 20.0
Description of measurement methods and procedures to be applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 07”. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” 20.0, published by

applied	the Central Electricity Authority, Ministry of Power, Government of India.
Frequency of monitoring/recording	Annually during the crediting period for the relevant year
Value monitored	0.552
Monitoring equipment	Not applicable
QA/QC procedures to be applied	The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” Version 20.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of the data	Calculation of Baseline emissions
Calculation method	Calculated as per “Tool to calculate the emission factor for an electricity system” version 07
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.

Data / Parameter	EG _{facility,y}
Data unit	MWh/year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Form-B of Karnataka Power Transmission Corporation Limited (KPTCL)
Description of measurement methods and procedures to be applied	These values were monitored through the main meter readings at two outgoing feeders Archiving: Paper/Electronic Responsibility: The plant management was responsible for the regular recording of data. This parameter accounts for the project imports and export, hence showing the net (export-import) electricity supplied to the grid.
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value monitored	78,299 MWh
Monitoring equipment	The main and check meters have been calibrated and maintained by BESCOM as per their own schedule and this frequency of meter calibration is not within the control of the Project Proponent. Accuracy class of Main meter and Check meter:0.2

	Frequency of testing: Once in five years
QA/QC procedures to be applied	Cross check measurement results with records for sold electricity (Invoices raised by CLPWFIPL)
Purpose of the data	Baseline Emissions calculations
Calculation method	The net electricity generated by the project is calculated as the difference between export and import values as recorded at the metering points.
Comments	The data will be archived both in electronic and paper format for crediting period + 2 years.

4.3 Monitoring Plan

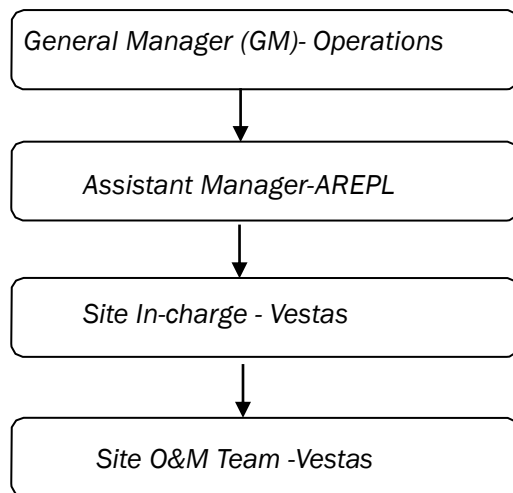
Vestas Wind Technology India Private Limited is the O&M contractor for the project activity. O&M contractor is responsible for maintaining all the monitoring data on behalf of state utility in respect of the project activity. The Monitoring and Verification procedures define a project specific standard against which the project's performance (i.e. GHG emissions) and compliance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and techniques for data interpretation, for monitoring and verifying GHG emissions with specific focus on technical/efficiency/performance parameters. It also allows scope for review, scrutiny and benchmarking against established norms for monitoring and verification.

The Monitoring & Verification protocol provides arrangement of data estimation, measurement and collection options and techniques, in each case indicating preferred options consistent with good practice to allow Asset Manager, Site In-charge and the Site O&M team to apply the most practical and cost-effective measurement approaches to the proposed project activity. The aim is to enable this project to have clear, credible and accurate monitoring, evaluation and verification procedures.

QA/QC Procedure

All the meters are calibrated/ tested once in five years. The calibration is done by the officials of the state utility. The accuracy of monitoring parameter is ensured by adhering to the calibration and testing of the metering equipment once in five years. QA/QC procedures have been as implemented by Discom/ State utility pursuant to the provisions of the power purchase agreement. Vestas Wind Technology provides the daily generation report to the Project participant. In case the main meter(s) is found to operate outside the permissible limits, the main meter will be either replaced or calibrated immediately. Whenever a main meter goes defective, the consumption recorded by the Check meter will be referred. The project participant, is monitoring the data for electricity generation and calibration reports post project implementation. Vestas Wind Technology is O&M contractor who has responsibility of maintaining electricity generation records, calibration records and maintenance of the WTGs (Wind Energy Convertors). The project participant also maintains the records of daily generation report and joint meter report.

The operation and management structure implemented by the project proponent for the purpose of the project activity is illustrated below:



In present project activity, the electricity being generated by 24 wind turbines is monitored at the dedicated Haraknal substation located at Harapanahalli. In the substation, there are two meters namely- Main Meter and Check Meter (static type Trivector meter, Accuracy class: 0.2). Every month BESCO Official visits the substation in the presence of O&M team of wind turbine supplier (Vestas) and the main meter reading is taken jointly and recorded by BESCO. The said meter readings are reported by the Field Officer to the concerned distribution circle who in turn in forms to the consumption circle, which is authorized to prepare the Bill and give the credit for the energy generated by the wind turbines.

Currently the Haraknal sub-station handles only 24WTGs which are owned by CLPWFL. The meter readings are taken at the sub-station every 24 hours. A 33kV reference meter is also present which is generally used by KPTCL for comparison. Since the capacity of the wind farm is higher, there is a possibility of more machines (WTGs) being installed and hence the bulk meter may have (in future) more machines connected to it. If this scenario occurs, the following apportioning mechanism will be used:

Apportioning Mechanism

The net electricity recorded at the substation is apportioned to individual WTGs based on the generation at the WTG as per the formula given below:

Electricity exported by WTG to Grid, $EGR_{exp,yR} = (\% \text{ generation of individual WTG connected to feeder}) \times (\text{Electricity Export recorded at substation}),$

Where,

$\% \text{ generation of individual WTG connected to feeder} = (\text{Controller reading @Individual WTG}) / (\text{Sum of Controller reading of all WTGs connected on feeder})$

Similarly, electricity imported by the WTG from the grid, $EGR_{imp,yR} = (\% \text{ generation of individual WTG connected to feeder}) \times (\text{Electricity Import recorded at substation})$

$$EGR_{facility,yR} = EGR_{exp,yR} - EGR_{imp,y}$$

Emergency Preparedness

In case of Main meter failure or errors, the grid officials would immediately replace the meter with a calibrated meter. There will be two meters provided at the pooling station (a Main Meter and a Check Meter).

Specific Calculation Procedure (For the time period during start and end of each crediting period): For the time period during start and end of each crediting period, the following apportioning formula would be used to estimate the electricity generation for calculating emission reductions:

X = No. of days between start/end date of crediting period and date of BESCO's billing cycle

Y = Total no. of days in a particular month for which Form Breeding has been taken

Z = No. of units as per Form B for that particular month

$$\text{Electricity Generation} = (X/Y) * Z$$

OR alternatively the daily readings taken by the technology supplier at the site will be referred for calculating the generation for X days.

Meter Test Checking:

All the main and check meters shall be tested for accuracy once in every five years with reference to a portable standard meter which shall be of an accuracy class of 0.1. The portable standard meter shall be owned by the BESCO at its own cost and expense and tested and certified at least once every year against an accepted laboratory standard meter in accordance with electricity standards. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The consumption registered by the main meters alone will hold good for the purpose of billing as long as the error in the main meter is within the permissible limits.

- i) If during the tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter shall however, be calibrated immediately.
- ii) If during the tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month up to the date and time of such test shall be as per the check meter. There will be a revision in the bills for the period from the previous calibration test up to the current test based on the readings of the check meter. The

main meter shall be calibrated immediately and billing for the period there after till the next monthly meter reading shall be as per the calibrated main meter.

- iii) If the during tests, both main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period there after till the next monthly meter reading shall be as per the calibrated main meter.
- iv) If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2% accuracy class, all the meters shall re-tested and calibrated immediately.

The O&M service provider would be responsible for maintenance of the necessary spare parts and consumables for the maintenance of the WTGs such as anemometers, wind vanes and sensors, oil filters, batteries, auxiliary motors and pumps, WTG controllers, slip rings, limit switches and sensors, detergents & solvents etc. The service provider would also be responsible for supply of necessary main components of the WTG such as main gear boxes, blades, generators, towers, hubs, main shafts & bearings, ground and top controller and hydraulic systems. The service provider would also ensure that occupational health and safety procedures are adhered to during the operation & maintenance activities. Calibration Details of billing meters for the project activity are provided in the Appendix 1.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{Integratedgrid,CM,y}$$

Where:

BE_y	=	Baseline emissions in year y (tCO ₂)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for Integrated Indian grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"

Since the project activity is the installation of a new grid-connected renewable power plant/ unit at a site where no renewable power plant was operated prior to the implementation of the project activity, therefore:

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

Where:

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

Baseline Emission (BE_y):

Baseline emissions (BE_y) are calculated as follows:

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

Baseline emissions for Project:

Vintage Period	Net Electricity Export (MWh)	Emission Factor (tCO ₂ /MWh)	Baseline Emissions (tCO ₂)
2024 (01-01-2024 to 31-12-2024)	78,299	0.861	67,436
Total	78,299		67,436

5.2 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002 Version 21.0.0, there will be no project emissions in the project activity $PE_y = 0$

5.3 Leakage Emissions

As per ACM0002 Version 21.0.0, no leakage has been considered for the calculation of emission factor.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

According to the approved methodology ACM0002 (Version 21) Emission Reductions are calculated as

$$ER_y = BE_y - PE_y$$

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)

Thus,

$$ER_y = 67,436 - 0 \text{ tCO}_2\text{e}$$

$$= 67,436 \text{ tCO}_2\text{e}$$

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU's (tCO ₂ e)	Removal VCU's (tCO ₂ e)	Total VCU's (tCO ₂ e)
2024 (01-01-2024 to 31-12-2024)	67,436	0	0	67,436	0	67,436
Total	67,436	0	0	67,436	0	67,436

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
2024 (01-01-2024 to 31-12-2024)	75,805	67,436	-11.04 %	The actual emission reductions for the current monitoring period are 11.04 % lower than estimated emission reductions. Wind availability is a natural phenomenon which is beyond the control of PP.

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

The project activity is greenfield wind power project, there are no commercially sensitive information so this section is not applicable

APPENDIX 2: CALIBRATION DETAILS

The calibration details of the relevant monitoring point of the project activity are as follows:-

Meter Identification No	Calibration Date	Calibration Validity
Main Meter: RR No: HARA-01; Sr. No: 21003426 Make - L & T Class - 0.2s Check Meter RR No: HARA-01; Sr. No: 21003446 Make - L & T Class - 0.2s	10-Jan-2023	09-Jan-2028