RENEWABLE POWER PROJECT BY SAIPURAM WIND ENERGIES PRIVATE LIMITED

Document Prepared by Infinite Solutions

Project Title	Renewable Power Project by Saipuram Wind Energies Private Limited
Version	03
Report ID	VCS 1788 (4th Monitoring Period)
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Project ID	1788
Monitoring Period	01-January-2021 to 31-December-2022 (Inclusive of both dates)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity involves installation of 50 WTGs with capacity of 102.5 MW wind power project in Andhra Pradesh state of India. Over the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 266,287 tCO_2e per year, thereon displacing 281,042 MWh/year amount of electricity from the generation- mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel-based power plant.

The details of the project and their location of installation are mentioned in the table below: -

Name of Investor	Capacity in MW	COD	Connection with Grid	State	Usage
Saipuram Wind Energies Private Limited	102.5 MW	31-March-2017	Indian Grid	Andhra Pradesh	Sale to State DISCOM (Southern Power Distribution Company of A.P. Limited)

The project was commissioned on 31-March-2017 and operating smoothly with schedule maintenance at regular intervals. No event occurred during current monitoring period which can alter the design of project. The details of the breakdown during current monitoring period are added in Appendix 2 of the MR.

Total emission reductions achieved in this monitoring period:
During the Current Monitoring Period from 01-January-2021 to 31-December-2022 (Inclusive of both dates), the project activity has supplied 377,929.11 MWh of electricity, and thus contributing to the GHG reductions 358,087 tCO_2e.

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification	(31-March-2017 to 03-August-2018) (Inclusive of both dates)	VCS	LGAI Technological Center S.A. (Applus+ Certification	1 year 4 months 4 days
Verification	(4-August-2018 to 03-October-2019) (Inclusive of both dates)	VCS	Earthood Services Private Limited	1 year 2 months 00 days
Verification	(04-October-2019 to 31-December-2020) (Inclusive of both dates)	VCS	TUV SUD South Asia Pvt. Ltd.	1 year 2 months 28 days
Verification	(01-January-2021 to 31-December-2022) (Inclusive of both dates)	VCS	VKU Certification Private Limited	2 years 00 month 00 days
Total	(31-March-2017 to 31-December-2022) (Inclusive of both dates)	VCS	-	5 years 9 months 01 day

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

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

Project Type: I - Renewable Energy Projects

Methodology: Grid-connected electricity generation from renewable sources ACM0002- Version 18.1.[1]

The project is not a grouped project nor an AFOLU project activity.

1.3 Project Proponent

Organization name	Saipuram Wind Energies Private Limited
Contact person	Murali Krishnam Raju M
Title	AGM - Commercial

[1] CDM: Grid-connected electricity generation from renewable sources --- Version 18.1 (unfccc.int)

Address	PLOT NO. #1131/A, ROAD NO. 36 JUBILEE HILLS, HYDERABAD – 500033.TELANGANA, INDIA
Telephone	+91 40 40300100
Email	muraliraju.m@greenkogroup.com

1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Project Consultant
Contact person	Mr. Jimmy Sah
Title	Head – Sustainability
Address	214-215 Milinda Manor, Opp. Next Treasure Island, 2 RNT Marg, Indore – 452001, India
Telephone	+91-9644130430
Email	jimmy@infisolutions.org

1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e., 31-March-2017. This is the date of commissioning of 102.5 MW Wind Project activity by Saipuram Wind Energies Private Limited.

1.6 Project Crediting Period

Crediting Period Start date: 31-March-2017

Crediting Period End date: 30-March-2027 (Inclusive of both dates)

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

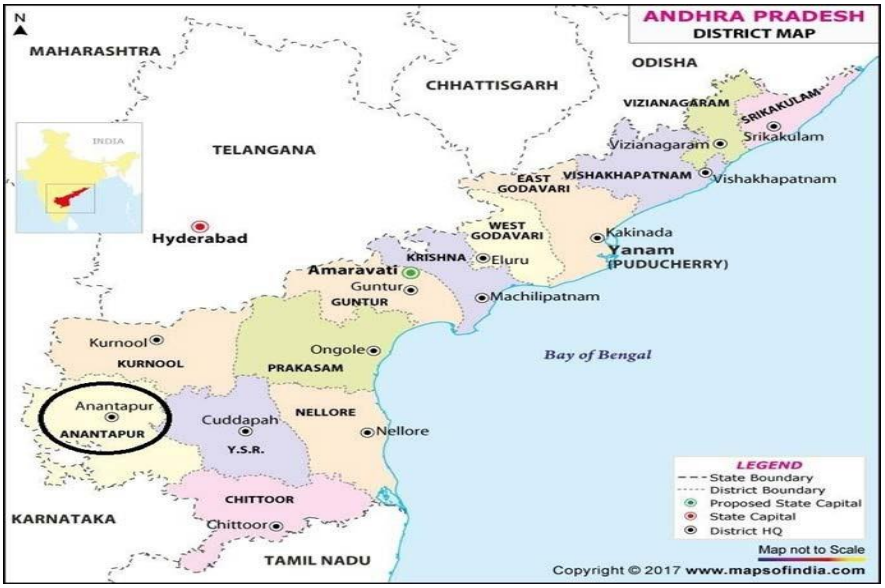
1.7 Project Location

The details of the project locations are mentioned in the table below:

Name of Investor	Capacity (MW)	Village(s)	District	State	Latitude (N)	Longitude (E)

Saipuram Wind Energies Private Limited	102.5	Rudrampalli, Borampalli, Elagalavanka & Basavapuram	Anantapuram	Andhra Pradesh	14°30' 37.00"	77° 12' 37.00"

The project locations have been shown in the map below:



The details of the all WTGs are mentioned in the table below:

S. No	WTG No	Commissioning date	Longitude (E)	Latitude (N)
1	WTG-001	31-March-2017	77°14'36.3"	14°30'6.3"
2	WTG-002	31-March-2017	77°14'37.1"	14°30'19.2"
3	WTG-003	31-March-2017	77°14'38.2"	14°30'32.9"
4	WTG-004	31-March-2017	77°14'13.1"	14°30'48.1"
5	WTG-005	31-March-2017	77°14'1.7"	14°30'57.3"
6	WTG-006	31-March-2017	77°14'7.2"	14°31'6.9"
7	WTG-008	31-March-2017	77°14'36.3"	14°31'50"
8	WTG-009	31-March-2017	77°14'34.7"	14°32'0.6"
9	WTG-010	31-March-2017	77°12'59"	14°31'27.7"
10	WTG-012	31-March-2017	77°12'30.93"	14°31'21.7"
11	WTG-013	31-March-2017	77°12'31.6"	14°31'34.3"
12	WTG-014	31-March-2017	77°12'38.6"	14°30'55.5"
13	WTG-015	31-March-2017	77°12'39.3"	14°30'42.7"
14	WTG-016	31-March-2017	77°13'2.9"	14°30'27.9"

15	WTG-022	31-March-2017	77°11'56.4"	14°31'37.7"
16	WTG-023	31-March-2017	77°11'49.2"	14°31'53"
17	WTG-025	31-March-2017	77°10'53.9"	14°32'10.4"
18	WTG-26A	31-March-2017	77°9'58.6"	14°32'3.6"
19	WTG-041	31-March-2017	77°15'40.7"	14°30'54.4"
20	WTG-042	31-March-2017	77°15'39.6"	14°31'7.2"
21	WTG-043	31-March-2017	77°15'42.8"	14°31'19.5"
22	WTG-045	31-March-2017	77°14'40.2"	14°29'32.7"
23	WTG-046	31-March-2017	77°15'25.2"	14°29'20.6"
24	WTG-049	31-March-2017	77°13'16.1"	14°31'43.7"
25	WTG-050	31-March-2017	77°13'15.6"	14°31'56.9"
26	WTG-007	31-March-2017	77°13'46.2"	14°31'20.6"
27	WTG-09A	31-March-2017	77°15'24.2"	14°32'14.1"
28	WTG-09B	31-March-2017	77°15'19.6"	14°32'24.5"
29	WTG-09C	31-March-2017	77°15'15"	14°32'36"
30	WTG-011	31-March-2017	77°13'8.5"	14°31'10.7"
31	WTG-16A	31-March-2017	77°13'7.8"	14°30'6.4"
32	WTG-017	31-March-2017	77°13'0.3"	14°29'55.8"
33	WTG-018	31-March-2017	77°13'3.9"	14°29'43.2"
34	WTG-019	31-March-2017	77°13'8.8"	14°29'31.6"
35	WTG-037	31-March-2017	77°9'37.52"	14°30'37.69"
36	WTG-036	31-March-2017	77°11'34.1"	14°30'58.1"
37	WTG-044	31-March-2017	77°10'55.0"	14°30'46.1"
38	WTG-021	31-March-2017	77°11'34.3"	14°31'22.9"
39	WTG-21A	31-March-2017	77°11'45.01"	14°31'17.07"
40	WTG-024	31-March-2017	77°12'13.7"	14°32'17.6"
41	WTG-026	31-March-2017	77°10'1.80"	14°32'13.6"
42	WTG-029	31-March-2017	77°10'52.31"	14°31'17.6"
43	WTG-030	31-March-2017	77°9'15.44"	14°29'55.43"
44	WTG-031	31-March-2017	77°9'20.3"	14°30'5.4"
45	WTG-032	31-March-2017	77°9'36.13"	14°30'20.3"
46	WTG-038	31-March-2017	77°9'8.5"	14°31'44.9"
47	WTG-039	31-March-2017	77°10'51.4"	14°31'38.7"
48	WTG-040	31-March-2017	77°10'7.1"	14°31'33.16"
49	WTG-19A	31-March-2017	77°13'23.66"	14°32'4.86"
50	WTG-25A	31-March-2017	77°11'16.5"	14°32'22.07"

1.8 Title and Reference of Methodology

Title : Grid-connected electricity generation from renewable sources

Reference : The project activity meets the eligibility criteria of large-scale project as it is more than 15 MW– CDM project standard for project activities clause 7.12.2 para 119.

Methodology : ACM0002: Grid-connected electricity generation from renewable sources - Version 18.1[2]

Type I : Energy industries (renewable / non-renewable sources)

Category: Approved Consolidated Methodology (ACM0002)

Tools referred with above methodology and applicable for project activity are:

- Tool to calculate the emission factor for an electricity system[3] - Version 07.0 (EB 100, Annex 04)
- Methodological Tool- Tool for the demonstration and assessment of additionality[4]- Version 07.0.0 (EB 70, Annex 08)

1.9 Participation under other GHG Programs

The project proponent hereby confirms that the project has not participated under other GHG Programs. The undertaking from PP has been submitted for no double accounting for current monitoring period and project activity is not participated any other GHG program other than VCS.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

Emission Trading Programs and Other Binding Limits: The project is not a part of any emission trading program as confirmed by the project proponent through the declaration of no double counting certificate.

Other Forms of Environmental Credit: The project activity has not availed any other form of environmental credit as confirmed by the project proponent through the declaration of no double counting. Furthermore, the project activity is not availing any benefits from CDM/ GS/ GCC/ UCR/ RECs - mechanism which can be confirmed from the link below:

https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

CDM: CDM-Home (unfccc.int)

[2] http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP

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

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

https://www.goldstandard.org/

https://projects.globalcarboncouncil.com/

https://www.ucarbonregistry.io/

Registries | I-REC Standard (irecstandard.org)

Supply Chain (Scope 3) Emissions: This section is not applicable, the section effective from 1-July- 2023.[5]

1.11 Sustainable Development Contributions

Contribution to sustainable development:

Ministry of Environment, Forests and Climate Change, GoI, 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 well-being:** The project helps in generating employment opportunities during the construction and operation phases. The project activity leads to development in infrastructure in the region like development of roads and may promote business with improved power generation.
- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity also helps to reduce the demand supply gap in the state. The project activity generates power using zero emissions wind energy-based power generation, which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.
- **Technological well-being:** The successful operation of project activity would lead to promotion of wind power generation and would encourage other entrepreneurs to participate in similar projects.
- **Environmental well-being:** Wind being a renewable source of energy, it 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.

The wind Project is located at villages Rudrampalli, Borampalli, Elagalavanka & Basavapuram district of Anantapuram, Andhra Pradesh. The main purpose of this project activity is to generate

[5] https://verra.org/wp-content/uploads/2022/12/VCS-Summary-of-Effective-Dates-2022-Q4-FINAL2.pdf

clean form of electricity through renewable wind energy sources. The project activity involves installation of a 102.5 MW wind power project in Andhra Pradesh state of India.

The project is contributing in sustainable development by generating electricity and reduction of CO_2 emissions due to implementation of project activity and generates employment to the local stakeholders. Through Project activity economic development has been achieved in the project location by creating opportunities of employment during the project lifetime. Project owner monitors the carbon emission with help of the record of electricity generated. This is a voluntary project activity doesn't contribute to achieving any nationally stated sustainable development priorities. There is no compliance for monitoring and reporting the emission reduction and SDG contribution from the project activity.

The project is wind power project, it has generated 377,929.11 MWh electricity and avoided 358,087 tons of greenhouse gas emissions in the atmosphere during the current monitoring period. So, the project will contribute to the sustainable development, and it is fulfilling SDG 07 and SDG 13.

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 377,929.11 MWh, renewable electricity has supplied to INDIAN Grid during the reported period that helps to increase the renewable energy share in the energy mix	Since Commissioning, about 1,069,854.81 MWh (252,003.70+266,639+173,283+377,929.11)[6] renewable electricity has supplied to INDIAN Grid that helps to increase the renewable energy share in the energy mix.
2)	13.0	13.2.2 Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By installation of 102.5 MW wind Energy Power Plant, project has prevented the release of 358,087 tons of carbon into the atmosphere during the monitoring period	Prevented the release of 1,013,686 tons of carbon (238,773+252,640+164,185+358,087)[7] into the atmosphere in complete monitoring period.

[6] https://registry.verra.org/app/projectDetail/VCS/1788

[7] https://registry.verra.org/app/projectDetail/VCS/1788

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the WTGs, interfacing the generators with the State Electricity Board by setting upHT transmission lines and installation of other accessories.

The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013. This report clearly mentioned that wind power project activity operations do not result in direct air pollution, noise pollution. Pleaserefer below web link for the same[8]

There are no negative environmental and/or socio-economic impacts due to the project. Thus, there are no any significant impacts due to implementation of project activity on air, water,soil quality and ambience are envisaged due to the project activity.

2.2 Local Stakeholder Consultation

The details of the Stakeholder Meetings are as follows:

For 102.5 MW Wind Project at Vijayapur by Saipuram Wind Energies Private Limited

Date of invitation – 11-July-2016

Date of Meeting – 18-July-2016

Location of Meeting - Project site, Andhra Pradesh

In the introductory speech, the representative of Saipuram Wind Energies Private Limited (Project Investor), welcomed the gathering and given a brief about the climate mitigation project activity. Subsequent to the introductory speech, stakeholders were explained about the electricity generation from wind project is an environmentally friendly power generation technology contributing to reduction in GHG emissions. They were also explained about the benefits of the wind power projects like, increasing energy availability and improving quality of

[8] https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf

power and its assistance to the local population by providing employment opportunities to both skilled & unskilled labours.

As a part of continual improvement process, feedback from the associated stakeholders is vital, therefore a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments.

The stakeholders are requested to share their experiences and grievances on continuous basis. PP is open for the continuous stakeholder interaction and formed a grievance/suggestion register placed at the project site for the comments at any point of time during the project crediting period. PP has explained this mechanism for on- going communication to the local stakeholders and transparently kept the notice mentioning the grievance register at the project site. During the current monitoring period, no feedbacks had been received regarding site operation.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity involves the installation of Wind project. The project involves installation of 50 WTGs in total out of which 25 WTGs are of capacity 2 MW and rest 25 WTGs are of capacity 2.1 MW. Thus, the total installed capacity of the project is 102.5 MW Wind project located at Andhra Pradesh state in India. The project is promoted by Saipuram Wind Energies Private Limited which is part of Greenko Group As this project involves WTGs of Gamesa & Suzlon make, O&M contracts are also done accordingly with both parties. Later, in year 2022 Gamesa O&M contract is taken over by Greenko itself whereas Suzlon is taking care of O&M of WTGs of Suzlon make.

The Project activity is a new facility (Greenfield) and 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.The Project Proponent plans to avail the VCS benefits for the project.

In the Pre- project scenario, the entire 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. Hence baseline scenario of the project activity is the grid-based electricity system.

The electricity generated by the project activity is being supplied to the grid. The major contributor of electricity to the INDIAN grids is fossil fuel based thermal power plants. Fossil fuel-based electricity generation contributes to GHG emissions of carbon dioxide into the atmosphere. The project activity is wind energy generation which is a clean source of energy. In addition to contributing to the electricity generation to the state of Andhra Pradesh, the project activity also helps to displace electricity generated from fossil fuel based thermal power plants into the grid thereby reducing GHG emissions. Prior to the project activity the same amount of electricity would be supplied from the connected grid system. The project is commissioned on 31-March-2017 and running smoothly with several schedule maintenances.

The WTGs are under operation including scheduled shutdowns during the current monitoring period. The breakdown occurred is for a total of 0.56% of total hours of all WTGs and is beyond the control of PP. Therefore, due to this percentage variations of breakdown identified in the current monitoring period also it has no impact in the GHG emissions reductions. The summary of breakdown details in the current monitoring period has been described in the below table and detailed analysis of the same has been provided in Appendix 2 of the MR.

S.No.	Plant Site	Total Hours	Net operational Hours	Breakdown Hours
1	Saipuram Wind Energies Private Limited	876,000 hours[9]	871,092 hours/ 99.43% of total hours	4,908 hours/ 0.56% of total hours

The project is replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 266,287 tCO_2e per year, thereon displacing 281,042 MWh/year amount of electricity from the gird over the 10 years crediting period.

[9] Total hours = 17520 (i.e.,730*24) *Number of WTGs (i.e., 50). So, 17520*50 = 876,000

The nearest WGT-15 from PSS is at approx. 0.2 km, and the longest distance of WTG-43 from PSS is approx. 9.08 km. A total of 06 dedicated Feeders are Present in the substation and the energy generation is measured in respective feeder by use of Tri vector meters. Internal available automatic metering system recently installed.

The details are feeders are connected WTGs are as follows:

Feeder Number	WTG number
1	WTG-16A, WTG-017, WTG-018, WTG-019, WTG-037, WTG-036, WTG-044, WTG-030, WTG-031, WTG-032
2	WTG-021, WTG-21A, WTG-026, WTG-029, WTG-038, WTG-039, WTG-040, WTG-27
3	WTG-010, WTG-012, WTG-013, WTG-014, WTG-022, WTG-023, WTG-025, WTG-26A, WTG-049, WTG-050
4	WTG-007, WTG-09A, WTG-09B, WTG-09C, WTG-011, WTG-25A, WTG-19A
5	WTG-004, WTG-005, WTG-006, WTG-008, WTG-009, WTG-015, WTG-016
6	WTG-001, WTG-002, WTG-003, WTG-041, WTG-042, WTG-043, WTG-045, WTG-046

The Voltage generated at the generator is 690V and it is stepped up to 33 kV voltage and the same is connected to PSS. From PSS again, the 33 kV is stepped up to 220 kV and synchronized to the grid. ABT meters are available on 220kV side in PSS for Billing purpose.

The technical specification for 102.5 MW Wind project is provided below.

Technical specifications of WTGs	
WTG Make and Model No.	Gamesa G97[10]
Total number of WTGs	25 (2.0MW)
Generator Type & Rating	Doubly-Fed Induction generator, 2000 kW
WTG configuration	2000 kW
Rotor Diameter	97 m
Hub Height	90
Tower Type & Shape	Conical Tubular Steel
Cut-in-wind speed	3.0 m/s

[10] https://en.wind-turbine-models.com/turbines/764-gamesa-g97

Rated wind speed	11.0 m/s
Cut-out wind speed	25.0 m/s

WTG Make and Model No.	Suzlon S97
Total number of WTGs	25 (2.1 MW)
WTG configuration	2100 kW
Rotor Diameter	97 m
Hub Height	90
Tower Type	Tubular Steel
Cut-in-wind speed	3.5 m/s
Rated wind speed	11.0 m/s
Cut-out wind speed	20.0 m/s
Technical specification of Transformers (SGRE)	
Make	ABB
Voltage	33KV/690 V
Rated Power	2350 KVA
Technical specification of Transformers (Suzlon WTG)	
Make	ABB
Voltage	33KV/690 V
Rated Power	2330 KVA
Technical specifications Power Transformers	
Make	Prime Meiden
Voltage	220/33kV
Rated Power	1 X 80/100/110 MVA

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

Project deviation applicable:

The formula mentioned in the registered PDD for the quantity of net electricity generation supplied by the project plant to the grid was incorrect, so it has been corrected in line with JMR. This correction is considered a project deviation for the current monitoring period.

Net electricity supplied is calculated based on the difference between the calculated values of "export", "import" and "transmission loss" on the EB energy meter and at the substation". Transmission loss is calculated on a pro-data basis as per the readings of the 220KV substation and "primary metering Point". The apportioning is taken as the monthly generated JMR is of capacity 104.5 MW but the actual capacity of the plant is 102.5 MW.

The apportioned generation from the individual WTGs (50WTGs) for project activity (102.5 MW) has been used for ER calculation using following formula:

$$\text{Net electricity exported to the grid} = \frac{\text{Net electricity as per registered capacity of PDD (102.5 MW)}}{\text{Net electricity as per total capacity (104.5 MW)}}$$

The apportioned value of 0.98086 obtained from the above formula has been used to calculate the net electricity generation.

Net Electricity = Export – Import – Transmission Loss

The net electricity will be calculated by the state electricity board and provided in the monthly generation statement (JMR). Hence, the net electricity reading will be directly sourced from the monthly generation statement/JMR which is in line with the actual monitoring process.

The deviation is in line with the guidelines provided in VCS Standard Version 4.4[11] Section 3.20; however, it doesn't impact existing applicability conditions, methodology, baseline, and additionality.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid, OM, y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2e emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 13, June 2018[12]
Value applied	0.9726
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as 3-year generation weighted average using data for the years 2014-15, 2015-16 & 2016-17. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.

[11] https://verra.org/wp-content/uploads/2022/12/VCS-Standard-v4.4-FINAL.pdf

[12] https://cea.nic.in/old/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid, BM, y}$
Data unit	tCO_2/MWh
Description	Build margin CO_2 emission factor for the project electricity system in year y
Source of data	Central Electricity Authority (CEA) of India Database Version 07[13]
Value applied	0.8723
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as per the latest data available for the most recent year 2016-17. The data is obtained from "CO_2 Baseline Database for Indian Power Sector "version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

Data / Parameter	$EF_{grid, CM, y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2e emission factor for the project electricity system in yearly
Source of data	Calculated from CEA database, Version 13, June 2018[14]
Value applied	0.9475
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid, BM,y} * W_{BM}$ Where: $EF_{grid, BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2e/MWh) $EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2e/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75%

13 https://cea.nic.in/old/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

14 https://cea.nic.in/old/reports/others/thermal/tpece/cdm_co2/user_guide_ver13.pdf

	W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ, y}$
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)
Source of data	Monthly joint meter reading reports
Description of measurement methods and procedures to be applied	The difference of final value of export and import is used for monthly values of net electricity supplied to the grid by the project activity and same value will be considered for ER calculations and bulk meter is installed at 220 kV, and it is used to calculate transmission loss. Further apportioning is applied as the JMR generated is for 104.5 MW but in actual the installed capacity of the plant is 102.5 MW.
Frequency of monitoring/recording	Continuous measurement & monthly recording
Value monitored	377,929.11 MWh
Monitoring equipment	The electricity exported / supplied by the plant to pooling substation is measured by net meters at 33kV PSS Saipuram Wind Energies Private Limited substation end. This meter also measures electricity imported by the plant from the grid. Bulk meter is installed at 220kV and it is used to calculate transmission loss. The details including Meter serial number, Make, accuracy class and the calibration dates are mentioned in APPENDIX 1: Calibration Records
QA/QC procedures to be applied	The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years.[15] The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines will be applied appropriately to confirm the conservativeness of metering.

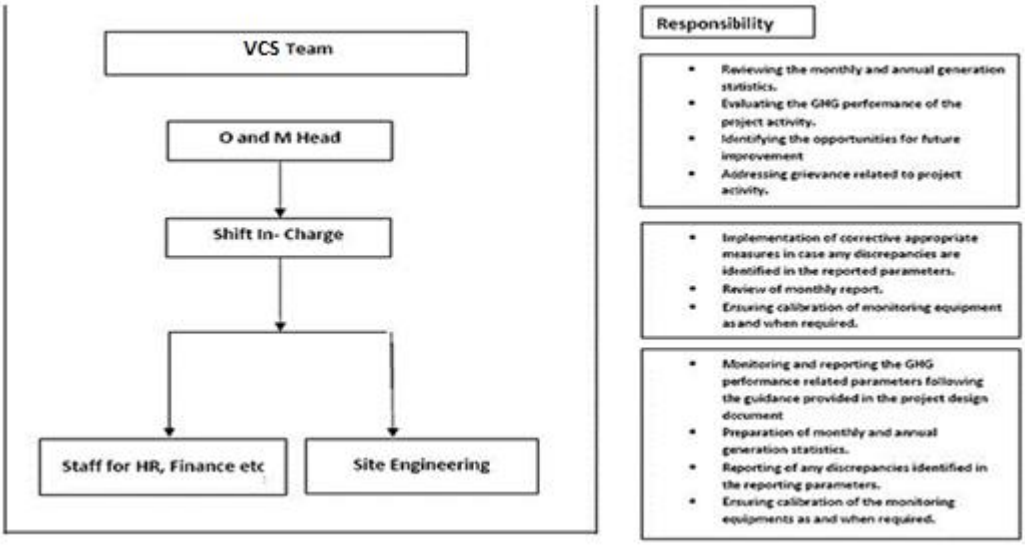
[15] https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf

	The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered the monitoring parameter. The billing is raised based on substation meters.
Purpose of the data	Calculation of baseline emissions
Calculation method	Net electricity supplied will be calculated based on the difference between calculated values of "export", "import" and "transmission loss" on the Electricity Board (EB) energy meter and at substation". Transmission loss is calculated on pro-rata basis as per the readings of 220KV substation & "primary metering Point". (Net Electricity = Export – Import – Transmission Loss) The net electricity will be calculated by State electricity board and provided in the monthly generation statement/JMR. The apportioning is also applied as JMR generation is for 104.5 MW but in actual the capacity of the plant is 102.5 MW. Hence, the net electricity reading will be directly sourced from the monthly generation statement/JMR.
Comments	Data will be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan is developed in accordance with the modalities and procedures for VCS project activities for grid-connected wind power project being implemented. The monitoring plan, implemented by the project participant describes about the monitoring organization, 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 the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipment for this project activity. The team comprises of the following Members.



Data Measurement

The export and import energy are measured continuously using above mentioned Main and Check meters located at the substations. Readings of meters are taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices are raised. These invoices are being used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

Readings from meters are collected in the presence of the plant in-charge. Export and Import data are recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of VCUs for the project activity whichever occurs later.

Emergency preparedness

The project activity does not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter will be used for readings and in the event that the Main meter and check meter both are not in service as a result of maintenance, repairs or testing, the Standby

meter is used for readings. During the monitoring period the main meter and check meter were operating in the acceptable limits of accuracy and there were approximately 4,908 hours of breakdown identified during the monitoring period and the details have been described in Appendix 2 of monitoring report.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff is trained. The plant helpers are trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

QA/QC procedures

The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. Calibration of all the meters is undertaken at required intervals and faulty meters are duly replaced immediately based on CEA guidelines which specifies calibration, and the frequency of calibration is once in 5 years.[16] The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines will be applied appropriately to confirm the conservativeness of metering.

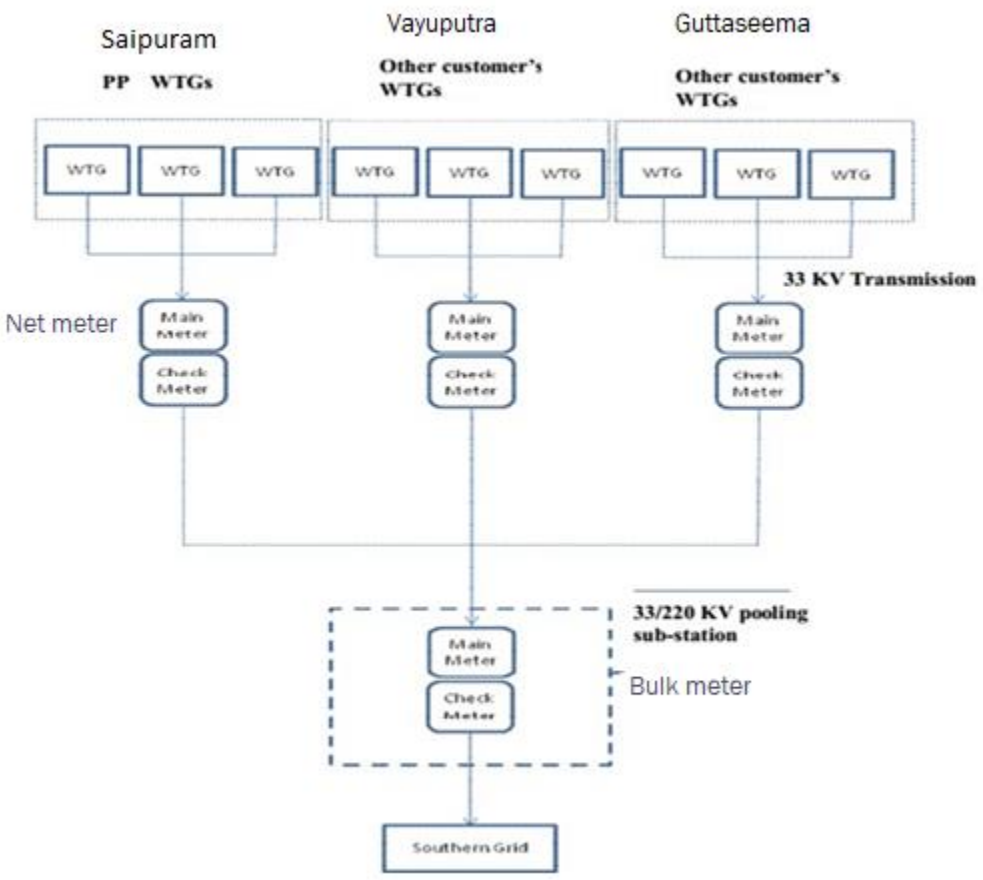
The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered in the monitoring parameter. The billing is raised based on substation meters.

All the data items monitored under the monitoring plan will be kept for 2 years after the end of crediting period or till the last issuance of VCUs for this project activity, whichever occurs later. The data will be archived both electronically and manually, and kept in safe storage by PP.

Metering Arrangement

Line diagram with metering arrangement for the wind project activity is shown below.

[16] https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf



The wind plants have their own dedicated metering arrangement at the substation end. The metering arrangement is under control of state electricity board and may change in future.

Apportioning Procedure for (Wind) Power Project

Net electricity supplied to the grid is calculated based on the difference between the calculated values of "export", "import" and "transmission loss" on the EB energy meter and at the substation". Transmission loss is calculated on a pro-data basis as per the readings of the 220KV substation and "primary metering Point". The apportioning is taken as the monthly generated JMR is of capacity 104.5 MW but the actual capacity of the plant is 102.5 MW.

The apportioned generation from the individual WTGs (50WTGs) for project activity (102.5 MW) has been used for ER calculation using following formula:

$$\text{Net electricity exported to the grid} = \frac{\text{Net electricity as per registered capacity of PDD (102.5 MW)}}{\text{Net electricity as per total capacity (104.5 MW)}}$$

The apportioned value of 0.98086 obtained from the above formula has been used to calculate the net electricity generation.

Net Electricity = Export – Import – Transmission Loss

The electricity export and import data are monitored via main, check and standby meters connected to feeders at the respective sub-station.

Data Adjustment in case of monitoring period different from billing period:

In case of Indian grid, multiple WTGs would be connected to the feeder, one of which would be part of the project activity and rest of which would not be part of the project activity and 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

O&M Contractor follows an apportioning procedure to account for electricity generation from daily generation individual WTGs sheet based on data from individual WTGs controllers to cross check the generation.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 18.1) para 42:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO_2e/yr)

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

$EF_{grid, CM, y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

If the project activity is the installation of a Greenfield power plant, then:

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

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 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).

Vintage-wise calculation Year	Saipuram Wind Energies Private Limited Generation (MWh)
2021	190,557.27
2022	187,371.83
Total	377,929.11

Thus, $EG_{PJ, y}$ = 377,929.11 MWh

Grid Emission Factor

The GEF is fixed ex-ante in the PD as given below:

Parameter	Value
OM	0.9726
BM	0.8723
CM	0.9475

Therefore,

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

= 377,929.11 x 0.9475

= 358,087 tCO_2e (Rounded Down)

5.2 Project Emissions

Not Applicable, since emissions from the project activity is zero as per ACM0002 methodology.

$PE_y = 0$

5.3 Leakage

Not Applicable, since emissions from the project activity is zero as per ACM0002 methodology.

$LE_y = 0$

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity.

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO_2/year

BE_y = Baseline emission in tCO_2/year

PE_y = Project emissions in tCO_2/year

For the project activity during the current monitoring period, as per section 5.1

BE_y = 377,929.11 tCO_2e

PE_y = 0 tCO_2e

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01-January-2021 to 31-December-2021	180,553	0	0	180,553
01-January-2022 to 31-December-2022	177,534	0	0	177,534

Total	358,087	0	0	358,087

The actual achieved GHG emission is 32.76% is lower than the estimated than the estimated value. This is due to the low wind flow pattern at the site which is not in the control of the project proponent. Therefore, the lower GHG accounting is acceptable.

Ex-ante emissions reductions /removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
266,287 tCO_2e (For vintage year 2021)	180,553 tCO_2e (For vintage year 2021)	-33.20%	It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 532,574 tCO_2e, whereas actual emission reductions achieved are 358,087 tCO_2e. Thus, the actual achieved GHG emission is approximately 32.76% is lower than the estimated than the estimated value. This is due to the lower PLF because of lesser wind velocity at the site and the generation was low for the months October to March which is not in the control of the project proponent. Therefore, the lower GHG accounting is acceptable.
266,287 tCO_2e (For vintage year 2022)	177,534 tCO_2e (For vintage year 2022)	-33.33%	
532,574 tCO_2e (For total for monitoring period)	358,087 tCO_2e	-32.76%	

APPENDIX 1: CALIBRATION DETAILS

Meter and Calibration details[17] of 102.5 MW Wind power project by Saipuram Wind Energies Private Limited

Saipuram Wind Energies Private Limited (33KV Substation)			
Meter Details	**Main Meter**	**Check Meter**	**Standby Meter**
Meter Serial Number	0018054216	0016196382	0016196426
Model	ER300P	ER300P	ER300P
Meter Make	L & T	L & T	L & T
Accuracy Class	0.2s	0.2s	0.2s
Date of Calibration	17-November-2021	17-November-2021	17-November-2021
Due date of Calibration	16-November-2026	16-November-2026	16-November-2026

[17] As per registered PDMR & CEA guideline the calibration frequency is once in 5 years however DISCOM is carrying out calibration once in a year which is not under the control of PP.

Certificate number – TC7867

APPENDIX 2: BREAKDOWN DETAILS

The breakdown details of Saipuram Wind Energies Private Limited has been described in the below table.

S. No.	Month	Hrs. of breakdown	Reason
1	January-2021	129.22 hrs.	Pitch Motor Brake1 Malfunction, Manual stop for tower torquing, Pitch Freq Conv Pitch1 Error stop, DFIG Inverter Fault Shutdown, Temp Closed Yaw Motor Brake, Pitch Emergency Run
2	February-2021	144.62 hrs.	Temp close yaw motor brake 3, DFIG Inverter Ring Line 2 Shutdown, DFIG Inverter Fault Shutdown, Temp Brake Blade1 High Stop, Temp cabinet top box high stop., Temp Cabinet Top High Stop, Pitch Emergency Run, Blade damage
3	March-2021	129.76 hrs.	Pitch Emergency Run, High temperature of coolant in the input of the cooling circuit, Excess current in S phase of the rotor, Temp Closed Yaw Motor Brake3, Blade damage, Low level hydraulic group refrigeration oil, Pitch Motor Brake3 Malfunction, Error in phase T of the inverter
4	April-2021	249.18 hrs.	UPS Tripped, Pitch Motor Brake2 Malfunction, High generator winding temperature, Manual stop for High temperature of coolant in the input of the cooling circuit error checking work, DFIG Inverter Fault Shutdown, Elec FB Yaw CW Error, Elec Nacelle Not aligned to wind Direction, Elec Lvrt UPS Battery Change, Pitch Motor Brake1 Malfunction, Pitch 230v Surveillance, Pitch Emergency Run, Elec FB Generator Heating, Rep Pitch emergency run
5	May-2021	195.58 hrs.	pitch motor brake2 malfunction, UPS Tripped, Mech Wind Speed 1 2 Def Stop, T-connector Failure, Pitch Motor Brake1 Malfunction, Temp Closed Yaw Motor Brake, Pitch Resolver Encoder Diff 2 Stop, Battery Voltage Blade 3 Low Stop
6	June-2021	281.10 hrs.	ACB failure, Mech Switch Twist CW End Stop, DFIG Inverter Fault Shutdown, Magneto thermic of the stator protection failure or door open, Pitch Battery Surveillance 2, Pitch motor brake 3 malfunction, Pitch Battery Surveillance 2, Elec safety Chain Stop, Sf6 Breaker Failure, pitch motor brake 2 malfunction, Temp Closed Yaw Motor Brake1
7	July-2021	122.33 hrs.	Battery charger dis-connector-1 error, Pitch Emergency Run, Battery Voltage Blade1 Low Stop, Pitch Motor Brake3 Malfunction, Battery Charger1 Disconnected, Battery Voltage

			Blade1 Low Stop, Pitch motor brake 3 malfunction, Pitch Motor Brake2 Malfunction, Battery Voltage Blade 3 Low Stop, Yaw motors error
8	August-2021	90.95 hrs.	Battery Voltage Blade1 Low Stop, T - connector failure, Heating/coolant thermal magnetic failure, Pitch Motor Brake 3 Malfunction, Pitch Break 1 Malfunction, Yaw North Sensor Not Detected, Pitch drive error
9	September-2021	99.45 hrs.	Temp closed yaw motor brake2, Pitch FreqConvPitch2 Error Stop, Battery Voltage Blade3 Low Stop, Temp Closed Yaw Motor Brake 1, Encoder synchronism error, Battery Voltage Blade 1 Low Stop, BUS error - INTERBUS failure
10	October-2021	116.35 hrs.	Elec Safety Chain Stop, Battery Charger1 Disconnected, Mech Switch Twist CW End Stop, Pitch Motor Brake 2 Malfunction, Temp Main Bearing High Stop, Temp Closed Yaw Motor Brake 1, BUS error - INTERBUS failure, Elec Test Pitch Time Out Stop
11	November-2021	60.13 hrs.	CLS Pitch Pinion Pump stop, Temp Closed Yaw Motor Brake 1, UPS Bypass mode Active Stop, Disconnection due to low temperature, CLS Pitch Pinion Pump stop, Elec VoltageU1 Low Stop, Pitch Emergency Run
12	December-2021	195.52 hrs.	Pitch Blade3 95 deg Limit Error, CCW feedback failure, Manual stop for pitch batteries replacement for blade 1&3, and fire ball modification, Manual stop for yaw motors inspection work, CLS Slew Ring Pump stop, Pitch Resolver Encoder Diff 1 Stop, Low pressure in gearbox, Pitch motor brake 2 malfunction, CLS Pitch Pinion Pump stop, Battery Voltage Blade2 Low Stop, Elec_ LVRT _UPS battery change.
13	January-2022	139.05 hrs.	CLS pitch Pinion pump Stop, Pitch Resolver Encoder Diff 1 Stop, Encoder synchronism error, DFIG Inverter Fault Shutdown, Mech Switch Twist CW End Stop, OGS, Battery Voltage Blade1 Low Stop, Difference between 2 Blades too High, Rep Pitch Emergency Run
14	February-2022	166.53 hrs.	Pitch emergency run auto resetting, Pitch Battery Surveillance, Pitch CAN 3 com fail, Encoder not OK, Temp Closed Yaw Motor Brake 2, Pitch Motor Brake 2 Malfunction, Battery Voltage Blade2 Low Stop, Pitch Emergency Run, Temp Closed Yaw Motor Brake 2, Yaw motor temp Brake_2 stop, Battery Voltage Blade 3 Low Stop
15	March-2022	167.32 hrs.	Preventive Check, Elec Safety Chain Stop, Wire Break Bottom Control Section, Manual Stop for repeated error work, Manual

			stop for automatic secondaries not ok warning checking work, Rep Pitch Emergency Run, Manual stop for Wear brushes generator triggered to load & yaw sensor warning error rectify cation work, Pitch Freq Conv Pitch1 Error Stop, Battery Charger 2 Disconnected, DFIG Inverter Fault Shutdown, Elec Safety Chain Stop
16	April-2022	256.18 hrs.	Pitch battery surveillance, Yaw sensor wiring error, SWEPL-26 A fb generator heating, Temp_Brake_Blade2_High Stop, Yaw sensor wiring error, Elec Fb Gear oil cooler stop, DFIG Ring line 2 shutdown, DFIG Inverter fault shutdown, Pitch Motor Brake3_Malfunction, Automatic unwinding, Temp Closed Yaw Motor Break 4, Battery charge disconnected
17	May-2022	245.12 hrs.	Battery charger 2 disconnected, Elec FB gear oil cooler stop, Elec safety chain stop, Pitch_ Battery Surveillance 2, Elec safety chain stop, Temp_ Closed_ Yaw Motor Brake 4, Pitch motor brake 3 malfunction, Yaw sensor wiring error, Pitch battery 2 voltage low stop, Pitch battery surveillance 2, Pitch Motor Brake3 Malfunction, Yaw contactor active, Wear brush generator warning, Pitch_ Motor_ Brake 2_ Malfunction, Rep Pitch emergency run stop, Slipping Rings Fan or Heating Resistor Failure
18	June-2022	69.12 hrs.	SWEPL-16 UPS By pass mode active stop, Pitch angle1 SP difference stop, UPS Bypass Mode Active Stop, Temp Closed Yaw Motor Brake 2, Temp Closed Yaw Motor Brake1, Yaw sensor wiring error, Temp closed yaw motor brake1 stop
19	July-2022	429.47 hrs.	Battery Voltage_ Blade 2_ Low Stop, Pitch emergency run, HU pump drive failure, PitchMotor_Break1_Malfunction, Pitch_ Freq Conv Pitch 3_ Err Stop, elec. FB gear oil cooler stop, Slipping Rings Fan or Heating Resistor Failure, Elec safety chain stop, Automatic Secondaries not OK too long, battery voltage blade 2 low stop, battery voltage blade 2 low stop, Pitch frequency conv error 3 stop error, DFIG_ Inverter_ Ring Line_ 2_ Shutdown, Wire Break Gen Bearing NDE, DFIG Inverter Ring Line 2 Shutdown, Wire Break Gen Bearing NDE, NDE bearing replacement work
20	August-2022	259.45 hrs.	Pitch Motor _Brake 2_ Malfunction, High generator winding temperature, Battery charge 2 disconnected, Pitch Emergency Run, Temp Closed Yaw Motor Brake 4, Battery Voltage Blade2 Low Stop, Pitch Motor_ Brake 3_ Malfunction, Heating/coolant thermal magnetic failure, Battery Charger 2 disconnected error, DIFG Inverter Ringline2 Shutdown, DFIG

			inverter fault shut down, Mech switch twist CW end stop error, Slipping Rings Fan or Heating Resistor Failure,
21	September-2022	24.07 hrs.	Transformer fan control failure, BUS error - INTERBUS failure, Heating/coolant thermal magnetic failure, HU pump drive failure
22	October-2022	1071.62 hrs.	DFIG inverter fault shut down, Battery Charger2 Disconnected, Battery Voltage_ Blade 2_ Low Stop, Elec FB Power Supply Pitch, Wire Break Gen Bearing DE (PTA I216 module failure), Mech Rpm Encoder Proximity Diff Stop, Wire Break speed Rot FR (AIO288 module failure), Elec FB Power Supply Pitch, Elec ACB Off Stop, Elec FB Power Supply Pitch, Battery Voltage_ Blade 2_ Low Stop, UPS Bypass Mode Active Stop, Wire Break Gen Bearing DE (PTAI 216 module failure), Mech Rpm Encoder Proximity Diff. Stop, Elec Safety Chain Stop, Wire Break Gen Bearing DE (PTAI216 module failure)(HT Yard PM Activity), Elec FB Power Supply Pitch, Elec FB Power Supply Pitch, Elec ACB Off Stop (CBM RPM Sensor Holding Plate fixing Work), Wire Break Gen Bearing DE (PTAI216 module failure), Pitch End switch3 Low stop error
23	November-2022	111.80 hrs.	Temp. measurement module fail, CLS main bearing grease level low, Temp Closed Yaw motor Break2, T-Connector Failure, pitch Brake 1 malfunction, pitch frequency conv Pitch1 error stop, Temp_ Closed_ Yaw Motor Brake 1, HU pump drive failure, Temp Closed yaw Motor Brake4, High brake temperature, Low level hydraulic group refrigeration oil, Elec Safety Chain Stop
24	December-2022	149.07 hrs.	DIFG INVERTER FAULT SHUTDOWN, DFIG Inverter Ring Line 2 Shutdown, Elec Safety Chain Stop, Low pressure of emergency accumulators, Battery Charger 2 Disconnected, pitch 230v surveillance error, Pitch 230v Surveillance, CLS Gen Bearing Lubrication Stop, Battery voltage blade 2 low stop, Elec Safety Chain Stop, Pitch emergency run, Rep Pitch Emergency Run.

Therefore, the total breakdown is approx. 4,908 hrs. and the breakdown occurred is for a total of 0.56% of total hours of all WTGs.

APPENDIX 3: SDG CONTRIBUTION

Billing Months	Total Net Generation (MWh)	Emission Factor(tCO_2/MWh)	Emission Reductions(tCO_2)
	SGD 7		SGD 13
01-January-2021 to 03-January- 2021	1081.61	0.9475	1024.83
03-January-2021 to 03- February-2021	9087.27	0.9475	8610.19
03-February-2021 to 03-March-2021	8865.20	0.9475	8399.78
03-March-2021 to 03-April-2021	13852.47	0.9475	13125.22
03-April-2021 to 03-May-2021	8670.26	0.9475	8215.07
03-May-2021 to 03-June-2021	17243.58	0.9475	16338.29
03-June-2021 to 03-July-2021	32299.48	0.9475	30603.76
03-July-2021 to 03-August-2021	31135.38	0.9475	29500.77
03-August-2021 to 03-September-2021	23820.76	0.9475	22570.17
03-September-2021 to 03-October-2021	24705.42	0.9475	23408.38
03-October-2021 to 03-November-2021	5381.66	0.9475	5099.12
03-November-2021 to 03-December-2021	6733.08	0.9475	6379.59
03-December-2021 to 03-Januray-2022	7681.11	0.9475	7277.85
Vintage 2021	**190,557.27**	**0.9475**	**180,553**
03-January-2022 to 03- February-2022	7017.16	0.9475	6648.76
03-February-2022 to 03-March-2022	8498.56	0.9475	8052.39
03-March-2022 to 03-April-2022	8871.68	0.9475	8405.92
03-April-2022 to 03-May-2022	10567.82	0.9475	10013.01
03-May-2022 to 03-June-2022	28699.19	0.9475	27192.49
03-June-2022 to 03-July-2022	26649.87	0.9475	25250.75
03-July-2022 to 03-August-2022	32708.88	0.9475	30991.66
03-August-2022 to 03-September-2022	26839.84	0.9475	25430.75
03-September-2022 to 03-October-2022	20762.76	0.9475	19672.72
03-October-2022 to 03-November-2022	4973.41	0.9475	4712.30
03-November-2022 to 03-December-2022	4787.26	0.9475	4535.93
03-December-2022 to 31-December-2022	6995.39	0.9475	6628.14
Vintage 2022	**187,371.83**	**0.9475**	**177,534**
Total	**377,929.11**		**358,087**