



100 MW GRID CONNECTED WIND POWER PROJECT IN JAMNAGAR GUJARAT, INDIA

Document Prepared by EKI Energy Services Limited



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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity has been developed by M/s Verdant Renewables Pvt Ltd (VRPL). VRPL is an affiliate of EDF Renewables.

The project activity involves the establishment of a wind farm of 105 MW ¹installed capacity enabling generation of electricity by state-of-art 2.1 MW capacity each (50 WTGs * 2.1) Wind Turbine Generators (WTGs) (One of the latest available technologies in the country developed by Vestas) in the state of Gujarat. The electricity generation from this wind farm contributes to annual GHG reductions estimated at 363,796 tonnes of carbon dioxide equivalent. The project activity has generated approximately 335,965.35 MWh of renewable power annually to the Indian grid through regional GETCO grid substation of Jamnagar district.

In the absence of the project activity, the accordant amount of electricity has been delivered through the grid connected power plants, which to a large extent is fed by fossil sources, leading to carbon dioxide emissions.

Demand for electricity in Gujarat is growing quickly, therefore the additional capacities are necessary. There is a deficit in energy supply and in peak power demand in Gujarat. This supply demand gap is likely to be met through the fossil fueled power stations. PP do not have any prior experience of installation of similar wind mills.

The WTGs were commissioned in phased manner on 21-June-2019, 29-June-2019, 05-July-2019, 26-July-2019, 13-September-2019, 21-September-2019, 27-September-2019, 28- September-2019, 25-October-2019, 06-November-2019, 18-November-2019, 22-November-2019, 27-November-2019, 07-December-2019 and 18-December-2019. The details are presented in section 3.1 below.

Total GHG emission during current monitoring period (01-April-2022 to 31-March-2023) is 314,731 tCO₂ and 335,965.35 MWh of net electricity has been generated in this monitoring period.

Audit Type	Period	Program	VVB Name	Number of years
Validation	23-December-2019	VCS	Earthood Services Private Limited	-
Verification	21-June-2019 to 31-March-2021	VCS	Earthood Services Private Limited	1 year, 9 months, 11 days
Verification	01-April-2021 to 31-March-2022	VCS	Applus Certification	1 year

¹ As per commissioning certificate and PO. Commissioning Details provided under Appendix-1

Verification	01-April-2022 to 31-March-2023	VCS	Applus Certification	1 year
Total				3 years 9 months 11 days

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: ACM0002: Grid-connected electricity generation from renewable sources- Version 19²

Project is not a grouped project.

1.3 Project Proponent

Organization name	M/s Verdant Renewables Pvt Ltd
Contact person	Mr. Rohan Kale
Title	Authorized Signatory
Address	1st Floor, Eastern wing, Thapar House, 124, Janpath, New Delhi-110001, India
Telephone	+ 91 9731931011
Email	Rohan.Kale@edf-re.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Manish Dabkara
Title	CEO & MD

² <https://cdm.unfccc.int/UserManagement/FileStorage/58IAGB7SZUDEO2VN6LYM30K41HFPRQ>

Address	Office No. 201, Enking Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar, Indore-452001
Telephone	+91 7314289086
Email	manish@enkingint.org

1.5 Project Start Date

Project Start Date: 21-June-2019

The Project Start Date is the commissioning date of the first WTG.

1.6 Project Crediting Period

Total number of years: 10 years which shall be renewed twice.

Crediting Period Start date: 21-June-2019 (Commissioning date of first WTG).

Crediting Period End Date: 20-June-2029.

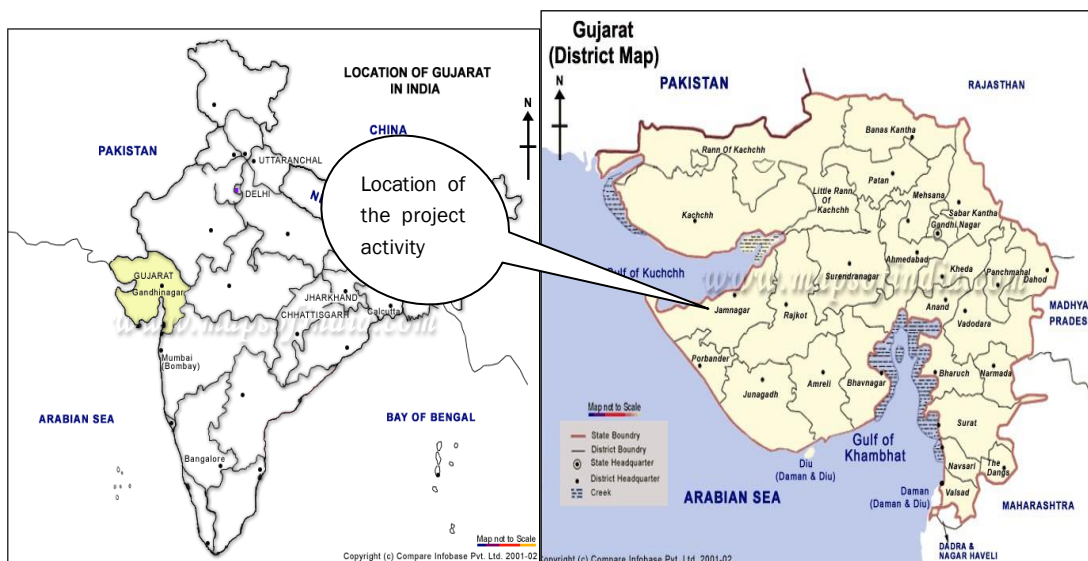
1.7 Project Location

The WTGs installed by the project proponent are distributed across the Jamnagar districts in the villages of Hajamchora, Bhensdad, Mota Garediya, Manekpar, Dudhai, Manamora, Mavapar, Bhadra, Lakhtar, Keshiya, Meghpar, Tarana, Balambha, taluk:Jodiya.

The project WTGs have been commissioned since 21-June-2019. All the WTGs have been commissioned fully by the end of Dec 2019. The details of the commissioned WTGs have been furnished in Section 3.

The coordinates for Jamnagar location are as follows; Latitude 22° 28' 14.52" N, Longitude 70° 3' 27.83" E.

The geographical location of the projects can be depicted from the maps below.



1.8 Title and Reference of Methodology

The approved consolidated baseline and monitoring methodology ACM0002 Version 19³ has been used. The title of the baseline and monitoring methodologies is “Grid-connected electricity generation from renewable sources”.

Methodology:

ACM0002: Grid-connected electricity generation from renewable sources — Version 19.0, Sectoral Scope: 01, EB 100, Annex 6⁴

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:

1. Tool for the demonstration and assessment of additionality — Version 07.0.0, EB 70, Annex 8⁵
2. Tool to calculate the emission factor for an electricity system — Version 07.0, EB 100, Annex 4⁶

³

https://cdm.unfccc.int/filestorage/5/8/1/58IAGB7SZUDEO2VN6LYM30K41HFPRO/EB100_repan06_ACM0002.pdf?t=OTB8cXZvZGc2fDAbdjeCut37-XA4d1R7UMMU

⁴ <https://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

⁶ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

1.9 Participation under other GHG Programs

This project activity is not registered in any other GHG Programs. The undertaking from PP has been submitted for no any 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

Not applicable as the project activity is not falls under Scope 3 emissions. Hence, this part has not completed on purpose.

1.11 Sustainable Development Contributions

The project activity has beneficial effect on the local environment and employment in the nearby region. Clean Electricity generation through Solar PV result in avoidance of consumption of fossil fuels which results in contribution to SDG 7. The emission avoidance through these activities results in contribution to SDG 13. All the workers at site are trained which results in increase of skills, which contributes to SDG 8. Detailed indicators are mentioned in table 1. 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.

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 335,965.35 MWh renewable electricity has been supplied to Indian grid during the reported period that helps to increase the renewable energy share in the energy mix.	Overall, 684,106.74 (348,141.39+ 335,965.35) MWh renewable electricity has been supplied to Indian grid that helps to increase the renewable energy share in the energy mix.
2)	8.6	8.6.1 Proportion of youth (aged 15-24 years)	Implemented activities to increase	Total 7 numbers of trainings conducted during the current monitoring period.	Overall, 7 trainings have been provided since during the current monitoring period.
3)	13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to increase	By supplying 335,965.35 MWh clean electricity (generated through Solar PV) to Indian grid, the project avoided release of 314,731 tCO ₂ e in to the atmosphere during the reporting period.	Overall prevented the release of 640,869 (326,138+314,731) tCO ₂ e into the atmosphere

2 SAFEGUARDS

2.1 No Net Harm

The project activity has no significant impact on the environment. wind power projects are not included in the Schedule I of the EIA notification S.O.1533 (E) dated 14-September-2006 and thus an EIA is not required. Ministry of Environment & forests & Climate Change vide their OM J-11013/41/2006 - IA II (I) dated 13-May-2011, has re-affirmed this and exempted wind power plants from EIA and Environmental Consent requirement.⁷

Hence, there are no significant environmental impacts due to implementation of the project activity.

2.2 Local Stakeholder Consultation

The local stakeholder meeting was carried out for the project activity and the details of the same can be referred from the registered VCS PD.

Project participant has engaged local stakeholders by serving a public notice for stakeholder meetings. Notices were served on 03-June-2021 and 17-November-2021. Meetings were held at site office on 10-June-2021 and 24-November-2021. Feedback was taken in grievance register and resolution have been taken for the same.

As a part of continuous feedback from stakeholders, the PP also placed a grievance register onsite where-in, the stakeholders can put down their complaint and the same if found genuine are addressed immediately. During the current monitoring period, following grievance has been Received which is mentioned below:-

Complaint	Date	Steps taken to resolve it	Resolution Date
HV 33 KV line tilted near farm due to air	26-August-2022	Taken Emergency Shutdown and adjusted pole	26-August-2022

2.3 AFOLU-Specific Safeguards

Not Applicable as the project is Non-AFOLU.

3 IMPLEMENTATION STATUS

⁷ [http://environmentwb.gov.in/pdf/EIA Notification, 2006.pdf](http://environmentwb.gov.in/pdf/EIA%20Notification,%202006.pdf)

3.1 Implementation Status of the Project Activity

The project activity entails installations of wind turbines having a total capacity of 105 MW Fifty wind turbines installed in this project activity.

The commissioning details of the WTGs are provided in the table below:

Sl. No.	Location	WTG ID	Commissioning Date	Feeder Detail
1	Keshiya	GUVNL-I/VERDANT/19-20/5573	21-June-2019	33 KV Feeder No. 2
2	Keshiya	GUVNL-I/VERDANT/19-20/5574	21-June-2019	33 KV Feeder No. 2
3	Keshiya	GUVNL-I/VERDANT/19-20/5575	21-June-2019	33 KV Feeder No. 2
4	Keshiya	GUVNL-I/VERDANT/19-20/5576	21-June-2019	33 KV Feeder No. 2
5	Meghpar	GUVNL-I/VERDANT/19-20/5577	21-June-2019	33 KV Feeder No. 2
6	Balambha	GUVNL-I/VERDANT/19-20/5578	21-June-2019	33 KV Feeder No. 2
7	Hajamchora	GUVNL-I/VERDANT/19-20/5579	21-June-2019	33 KV Feeder No. 2
8	Hajamchora	GUVNL-I/VERDANT/19-20/5580	21-June-2019	33 KV Feeder No. 2
9	Bhensdad	GUVNL-I/VERDANT/19-20/5581	21-June-2019	33 KV Feeder No. 2
10	Bhensdad	GUVNL-I/VERDANT/19-20/5582	21-June-2019	33 KV Feeder No. 2
11	Bhensdad	GUVNL-I/VERDANT/19-20/5583	21-June-2019	33 KV Feeder No. 2
12	Keshiya	GUVNL-I/VERDANT/19-20/5585	29-June-2019	33 KV Feeder No. 1
13	Mota Garediya	GUVNL-I/VERDANT/19-20/5587	26-July-2019	33 KV Feeder No. 1
14	Manekpar	GUVNL-I/VERDANT/19-20/5589	26-July-2019	33 KV Feeder No. 1
15	Manekpar	GUVNL-I/VERDANT/19-20/5590	26-July-2019	33 KV Feeder No. 1
16	Mota Garediya	GUVNL-I/VERDANT/19-20/5591	26-July-2019	33 KV Feeder No. 1
17	Mota Garediya	GUVNL-I/VERDANT/19-20/5592	26-July-2019	33 KV Feeder No. 1
18	Bhadra	GUVNL-I/VERDANT/19-20/5680	27-September-2019	33 KV Feeder No. 1
19	Bhadra	GUVNL-I/VERDANT/19-20/5682	27-September-2019	33 KV Feeder No. 1
20	Bhadra	GUVNL-I/VERDANT/19-20/5683	27-September-2019	33 KV Feeder No. 1
21	Dudhai	GUVNL-I/VERDANT/19-20/5684	21-September-2019	33 KV Feeder No. 1

Sl. No.	Location	WTG ID	Commissioning Date	Feeder Detail
22	Hajamchora	GUVNL-I/VERDANT/19-20/5685	21-September-2019	33 KV Feeder No. 1
23	Tarana	GUVNL-I/VERDANT/19-20/5686	13-September-2019	33 KV Feeder No. 1
24	Keshiya	GUVNL-I/VERDANT/19-20/5681	21-September-2019	33 KV Feeder No. 1
25	Hajamchora	GUVNL-I/VERDANT/19-20/5688	28-September-2019	33 KV Feeder No. 1
26	Manamora	GUVNL-I/VERDANT/19-20/5809	25-October-2019	33 KV Feeder No. 1
27	Manamora	GUVNL-I/VERDANT/19-20/5808	25-October-2019	33 KV Feeder No. 1
28	Hajamchora	GUVNL-I/VERDANT/19-20/5811	06-November-2019	33 KV Feeder No. 1
29	Kothariya	GUVNL-I/VERDANT/19-20/5817	22-November-2019	33 KV Feeder No. 2 (Tarana)
30	Manamora	GUVNL-I/VERDANT/19-20/5818	22-November-2019	33 KV Feeder No. 2 (Tarana)
31	Hajamchora	GUVNL-I/VERDANT/19-20/5819	27-November-2019	33 KV Feeder No. 2 (Tarana)
32	Hadatoda	GUVNL-I/VERDANT/19-20/5820	27-November-2019	33 KV Feeder No. 2 (Tarana)
33	Tarana	GUVNL-I/VERDANT/19-20/5608	26-July-2019	33 KV Feeder No. 2 (Tarana)
34	Tarana	GUVNL-I/VERDANT/19-20/5609	05-July-2019	33 KV Feeder No. 1
35	Tarana	GUVNL-I/VERDANT/19-20/5610	05-July-2019	33 KV Feeder No. 1
36	Tarana	GUVNL-I/VERDANT/19-20/5611	05-July-2019	33 KV Feeder No. 1
37	Tarana	GUVNL-I/VERDANT/19-20/5612	05-July-2019	33 KV Feeder No. 1
38	Tarana	GUVNL-I/VERDANT/19-20/5613	05-July-2019	33 KV Feeder No. 1
39	Dudhai	GUVNL-I/VERDANT/19-20/5614	26-July-2019	33 KV Feeder No. 2 (Tarana)
40	Dudhai	GUVNL-I/VERDANT/19-20/5615	05-July-2019	33 KV Feeder No. 1
41	Kothariya	GUVNL-I/VERDANT/19-20/5810	18-November-2019	33 KV Feeder No. 2 (Tarana)
42	Hadatoda	GUVNL-I/VERDANT/19-20/5821	27-November-2019	33 KV Feeder No. 2 (Tarana)
43	Bhadra	GUVNL-I/VERDANT/19-20/5848	07-December-2019	33 KV Feeder No. 2 (Tarana)
44	Hajamchora	GUVNL-I/VERDANT/19-20/5849	07-December-2019	33 KV Feeder No. 2 (Tarana)
45	Manamora	GUVNL-I/VERDANT/19-20/5850	07-December-2019	33 KV Feeder No. 2 (Tarana)
46	Dudhai	GUVNL-I/VERDANT/19-20/5851	07-December-2019	33 KV Feeder No. 2 (Tarana)

Sl. No.	Location	WTG ID	Commissioning Date	Feeder Detail
47	Manamora	GUVNL-I/VERDANT/19-20/5853	18-December-2019	33 KV Feeder No. 2 (Tarana
48	Bhinkata	GUVNL-I/VERDANT/19-20/5854	18-December-2019	33 KV Feeder No. 2 (Tarana
49	Manamora	GUVNL-I/VERDANT/19-20/5855	18-December-2019	33 KV Feeder No. 2 (Tarana
50	Kothariya	GUVNL-I/VERDANT/19-20/5856	18-December-2019	33 KV Feeder No. 2 (Tarana

The technical details of WTG are mentioned below:-

Parameter	Specifications
Model No.	V120-2.1MW HH 120m
Rotor	
Installed Electrical Output	2100 KW
Diameter	120 m
Cut-in-wind Speed	3 m/s
Rated Wind Speed	14 m/s
Cut-out Wind Speed	20 m/s
Rotor Swept Area	11310 m ²
Regulation	Pitch regulated with variable speed
Generator	
Type	Asynchronous, 4 Poles, doubly fed generator, slip rings
Rated output	2100 KW
Frequency	50 Hz
Gear Box	
Type	One planetary Stage and two helical stages
Yaw System	
Drive	Active electrical yaw motors
Bearing	Polyamide slide bearing
Safety System	
Aerodynamic Brake	3 independent systems with blade pitching
Mechanical Brake	Hydraulic disc brake
Technical Life	25 years

There was no major breakdown which would have impacted the emission reductions achieved from the project activity for the current monitoring period. The project activity has been functional continuously except for few minor breakdowns as details in appendix II. No any events has occurred till now from the commission date that may impact the GHG emission reductions or removals and monitoring.

There is a change in contact person name from project proponent side. As per the registered PD, Ms. Sweta Singh was the contact person from the PP side, also during the 2nd monitoring period Mr. Chnadresh Ohri was the contact person and now Mr. Rohan Kale is the authorized person from the project proponent side. Hence there is a change in PP contact person name and his contact details and the same has been mentioned in table 1.3.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

3.2.2 Project Description Deviations

During the first verification of the project activity, a deviation in meter calibration frequency was taken which is approved. The calibration frequency of the energy meter is once in 5 years as per Central Electricity Authority (CEA). Govt. of India requirement and same is now transparently clarified in the monitoring plan of the project activity. PP confirms that the deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

During the second verification period, PP has taken one more description deviation. There is a change in contact person name from project proponent side. As per the registered PD, Ms. Sweta Singh was the contact person from the PP side and now Mr. Chandresh Ohri is the authorized person from the project proponent side. Hence there is a change in PP contact person name and his contact details and the same has been mentioned in table 1.3. PP confirms that the deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

During the current verification period, there is a change in contact person name from project proponent side. During the 2nd verification period Mr. Chandresh Ohri was the contact person from the PP side and now Mr. Rohan Kale is the authorized person from the project proponent side. Hence there is a change in PP contact person name and his contact details and the same has been mentioned in table 1.3. PP confirms that the deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

3.3 Grouped Projects

This project activity is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculation from CEA Database, Version 14 ⁸
Value applied	0.9610(Indian Grid)
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 07.0” as 3-year generation weighted average using data for the years 2015-16, 2016-17 & 2017-18. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India
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 _{BM,y}
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA Database, Version 14 ⁹
Value applied	0.8644 (Indian Grid)
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 07.0” as 3-year generation weighted average using data for the years 2017-18. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
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 _{CM,y}
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y

⁸ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_14.zip

⁹ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_14.zip

Source of data	Calculated from CEA Database, Version 14 ¹⁰
Value applied	0.9368 (Indian Grid)
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 CO₂ emission factor in year y (tCO₂/MWh) $EF_{grid,CM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM} = Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG _y
Data unit	MWh
Description	Electricity supplied to GUVNL
Source of data	Certificate for share of electricity generated by the wind farm
Description of measurement methods and procedures to be applied	Net electricity generated is calculated at the main meter connected to the incoming feeder of GUVNL. The procedures for metering is as per the provisions of the power purchase agreement. The Project WTGs are connected to Keshiya and Tarana wind farm site substation which are further connected to GETCO substations Dhrol and Jamdudhai. Please Refer appendix 1 & 2 for details. The Main meter and Check meter have been installed by GETCO on outgoing 66 kV circuit lines of Keshiya & Tarana site substation. Data monitoring takes place at the individual WTGs through CMS and GETCO meter at the wind farm site substation. The electricity metered at the GETCO meter installed Keshiya and Tarana wind farm site substation is solely for the project WTGs. As no other WTGs (Non-Project WTGs) has been connected to this substation feeders as of now. The emission reduction calculations are done on the basis of the GETCO Main meter reading (net electricity exported to the grid) after deducting imports from the grid as mentioned in the share certificate issued on monthly basis. The electricity measurements at CMS and GETCO meter are continuous and recorded on monthly basis.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording

¹⁰ https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_14.zip

Value monitored	335,965.35
Monitoring equipment	Electricity Meters of 0.2s Class
QA/QC procedures to be applied	Calibration of all the meters is undertaken at required intervals (Once in 5 years) and faulty meters is duly replaced immediately. The data is cross checked with sales receipts/invoices. Kindly refer Appendix I for calibration meter details.
Purpose of the data	Calculation of Baseline emission
Calculation method	Not Applicable
Comments	The data will be archived electronically for two years after the end of the last crediting period or the last issuance of VCUs for this project activity, whichever occurs later.

Data / Parameter	EG _{WTG}
Data unit	MWh
Description	Electricity generated by each WTG
Source of data	Monthly generation reports provided by Vestas
Description of measurement methods and procedures to be applied	Each WTG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through communication cables. The generation data of individual WTG are monitored as a real-time entity at CMS. This data for each individual WTG is recorded daily and reported monthly.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value monitored	This data is not used for the calculation of emission reductions per say but would act as a backup data for the net electricity generated. In case there may be addition of Non-project WTGs in Wind farm site.
Monitoring equipment	The meter is a software-based meter integrated with the control panel of the WEG.
QA/QC procedures to be applied	The meter is a software-based meter integrated with the control panel of the WEG. In case of any fault in the system, the control panel is shutdown the WTG until the error is rectified. So there is no meter calibration is required either the machine will run or will be shutdown

Purpose of the data	This data is not used for the calculation of emission reductions per say but would act as a backup data for the net electricity generated from the project activity.
Calculation method	Not Applicable
Comments	The data will be archived electronically for two years after the end of the last crediting period or the last issuance of VCUs for this project activity, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan is being devised as per approved consolidated monitoring methodology ACM0002 - “Grid-connected electricity generation from renewable sources”.

The methodology requires monitoring of the following parameters:

- Electricity generation from the project activity;

Data needed to recalculate the operating margin emission factor, if needed, based on the choice of the method to determine the operating margin (OM), consistent with “Grid-connected electricity generation from renewable sources” (ACM0002);

- Data needed to recalculate the build margin emission factor, if needed, consistent with “Grid-connected electricity generation from renewable sources” (ACM0002);

For the project activity to establish its creditable emission reduction, it has to record the actual electricity generation, which would displace equivalent units of electricity at the operating and build margin of the grid. Since the simple OM emission factor is calculated based on a 3-year average, based on the most recent statistics available at the time of PDD preparation, it’s up-dation based on ex-post monitoring is not required. For BM calculation, option 1 (refer ACM0002) has been chosen, which is calculated ex-ante based on the most recent information, hence its monitoring is also not required.

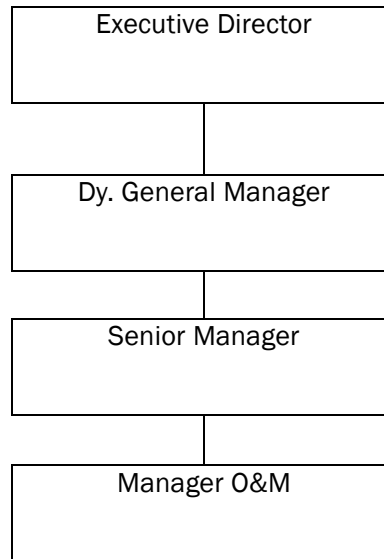
Hence, under the monitoring protocol for the project it is required to: Monitor and record the electricity generated and exported by the project WTGs to the National grid.

To ensure trouble free operations and efficient generations through all the wind turbines, PP has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a period of 25 years. The contractor Vestas, under the O&M contract with PP would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The authority and responsibility of project management as well as registration, monitoring, measurement and reporting lies with PP.

PP has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power.

The same has been outlined as follows:



(a) Responsibilities

Executive Director: To be responsible for overall project management.

Dy. General Manager: To be responsible for generation data VCS related monitoring, internal verification and presenting the same to the Executive director. To verify if the monitored data is normal. To calculate the emission reductions regularly and write the monitoring report.

Chief Manager: To conduct the monitoring task strictly based on the monitoring manual and registered PDD. To record required monitored parameters. To report the monitoring results to the Dy. General Manager.

Manager O&M. For O&M monitoring and coordinate with the O&M contractor for smooth functioning of the wind farm. To assess regular maintenance of monitoring equipment.

The O&M personnel of are qualified engineers and are well trained.

(b) Metering layout

a) The pooling meters at Keshiya & Tarana Wind farm site substation of GETCO main meter (M) and check meter (M') are installed at 66 KV side at the substation.

- b) The meters at WTG (m) are bidirectional meters recording the electricity export and import to the grid. The net electricity exported to the grid is calculated as difference of electricity exported minus the electricity imported and reported as net electricity delivered to grid in the share certificate issued by Gujarat Discom.
- c) Data monitoring takes place at the GETCO main meter at substation (M), GETCO Check meter at substation (M'), and WTGs (m1, m2, m3...m50).
- d) As per general practice, GETCO follows the procedure in which the electricity metered at the GETCO meter (M) is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the individual WTG meter (m). However, in this project activity meters are installed at Wind farm site substation where no other PPs WTGs and non-project WTGs of same PP is connected as of now. The energy meter solely accounts the energy generation from the project WTGs. Hence, apportioning is not required as of now.

As per standard practice, there is a transmission loss between the individual WTGs and the substation. This loss is proportionally divided among the WTGs connected to the meter on the basis of the prorata readings taken at the individual WTG meter (m). The final share certificate issued to the project proponent is based on the electricity generated minus the line losses by GETCO. However, the process of share certificate preparation is solely under control of Gujarat DISCOM and PP has no control over the government proceedings. Hence, the metering and monitoring related procedures is governed as per the PPA.

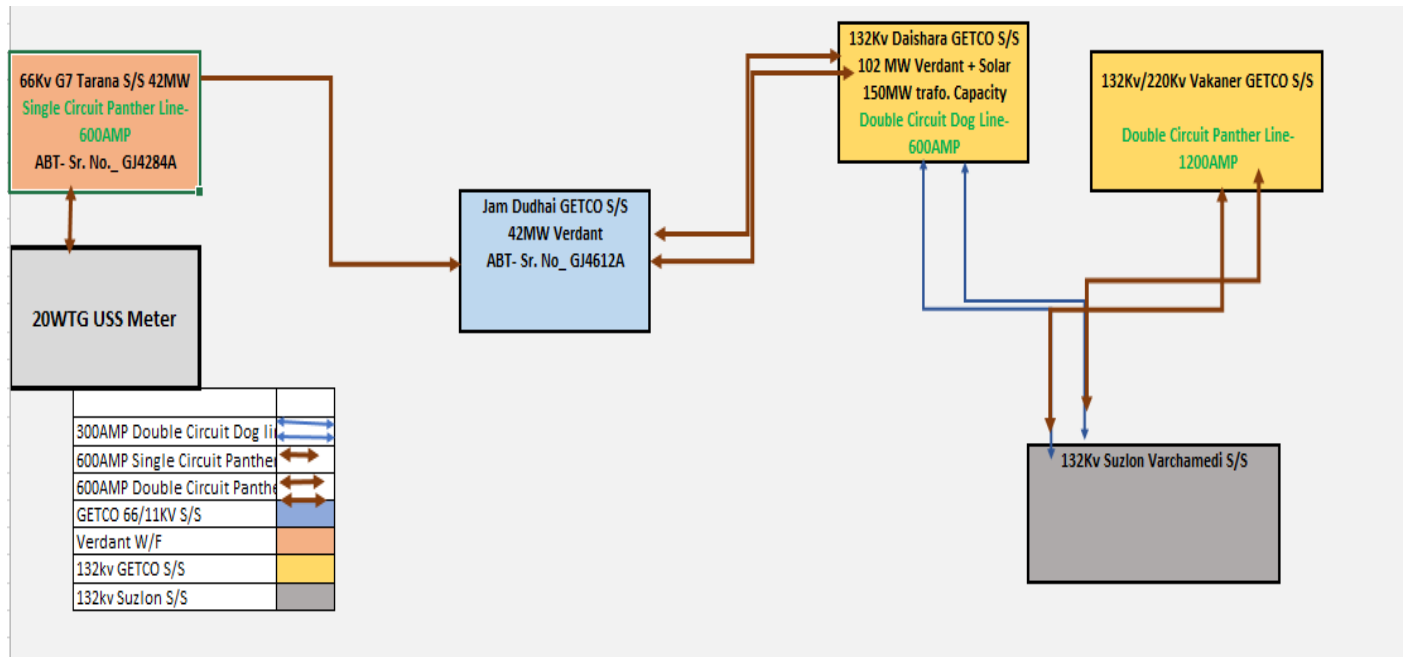
1. The procedures for metering is as per the provisions of the power purchase agreement. The WEGs of a single customer (PP in this case) at a particular site are connected to a feeder that ultimately leads to the main GETCO meter at the site substation maintained by O&M provider. Data monitoring takes place at the CMS for Individual WTGs and GETCO meter at the substation. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the prorata readings taken at the individual WTGs end. The emission reduction calculations are done on the basis of the GETCO Main meter reading (net electricity exported to the grid) after deducting imports from the grid as mentioned in the share certificate issued on monthly basis.
2. In case of conspicuous failures like burning of meter and erratic display of metered parameters and when the error found in testing of meter is beyond the permissible limit of error provided in the relevant standard, the meter is immediately replaced with a correct meter.
3. Sealing and maintenance of meters:
 - i. The GETCO meter is sealed in the presence of representatives of PP / O&M provider, GEDA and GETCO.
 - ii. Any meter seal(s) are broken only by the GEDA /GETCO/ representative in the presence of PPs representative whenever the main metering system or the 66kV metering system is to be inspected, tested, adjusted, repaired or replaced.
 - iii. The GETCO meter at the substation is calibrated once in 5 years.

4. Records: PP maintains an accurate and up-to-date operating log at the project site with records of:
 - a. 24 Hours logs of real and reactive power generation, frequency, transformer tap position, bus voltage(s), Main meter and other meter readings and any other data mutually agreed.
 - b. Any unusual conditions found during operation/inspections
 - c. All the records will be kept for two years after the end of the crediting period or the last issuance of VCUs for this project activity, whichever occurs later.
5. The billing is done on monthly basis. PP raises invoice and submit to GUVNL for payment based on joint meter reading as certified at the end of each month for the energy supplied
6. The electronic data is archived for 2 years or up to the end of the crediting period, whichever late.

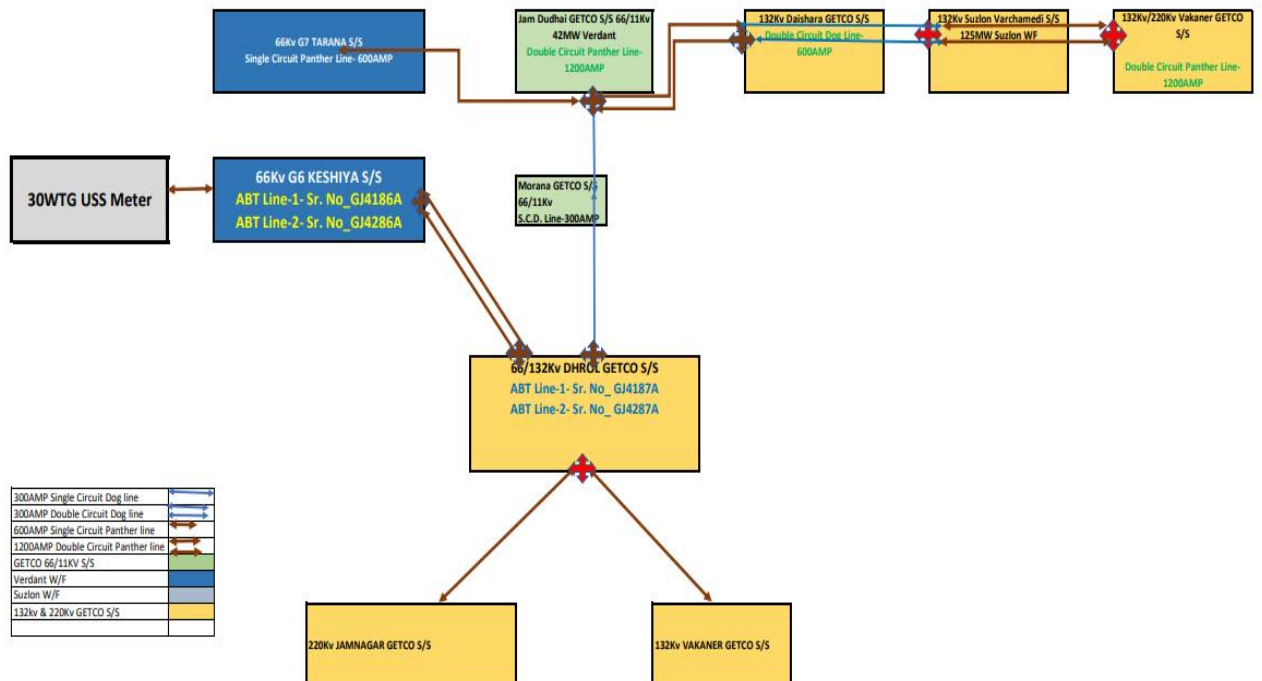
(f) Billing and meter failure related issues:

- a) The billing is done on monthly basis. PP raises invoice and submit to GUVNL for payment based on joint meter reading as certified at the end of each month for the energy supplied
- b) Billing for the failure period:
 - i. In the event that any GETCO meter fails to register or upon being tested is found not to be accurate within ± 0.2 s of the energy injected in the grid, is for the period be measured on the basis of the value registered by the corresponding meter at the feeder end.
 - ii. In the event that both GETCO meter and the corresponding check meter at the substation fail to register, or upon being tested, be found not to be accurate within ± 0.2 / 0.5 s the energy injected in the grid, is for the period be adjusted by immediately restoring and recalibrating the GETCO meter and the corresponding check meter at the substation end and the correction applied to the consumption registered by the GETCO meter.
 - iii. The period referred to in the two points above is the actual period during which inaccurate measurements were made if such period can be determined or, if not readily determinable, the shorter of:
 - a) The period since the immediately preceding test of the relevant Main meter; or
 - b) One hundred and eighty (180) days immediately preceding the test at which the relevant Main meter was determined to be defective or inaccurate.

Project activity electricity evacuation SLD is as mentioned below.



66KV Jamudhai GETCO



132 KV Dhrol GETCO

4.4 Baseline Emissions

As per the various baseline scenarios identified in approved methodology ACM0002 version 19, the emission reductions have been identified using the following steps:

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

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{-Equation (11)}^{11}$$

Where:

BE_y	=	Baseline emissions in year y (tCO ₂ e/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 "TOOL07: Tool to calculate the emission factor for an electricity system" (t CO ₂ /MWh)

$$\begin{aligned} BE_y &= 335,965.35 \text{ MWh} * 0.9368 \text{ tCO}_2/\text{MWh} \\ &= 314,731 \text{ tCO}_2 \end{aligned}$$

4.5 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence, according to the methodology ACM0002, Version 19.0, there will be no project emissions, i.e. PE_y = 0.

4.6 Leakage

As per the methodology ACM0002, Version 19.0, no leakage has been considered, therefore, LE_y = 0.

4.7 Net GHG Emission Reductions and Removals

The procedure for quantification of net GHG emission reductions and removals including all relevant equations has mentioned in the above section 3.3.

¹¹ <https://cdm.unfccc.int/UserManagement/FileStorage/58IAGB7SZUDEO2VN6LYM30K41HFPRQ>

As per para 61 of ACM0002 version19; Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{-Equation (17)}^{12}$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$$ER_y = 314,731 - 0 - 0 = 314,731 \text{ tCO}_2$$

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2022 (From 01-April-2022 till 31-December-2022)	254,170	0	0	254,170
2023 (From 01-January-2023 till 31-March-2023)	60,561	0	0	60,561
Total	314,731	0	0	314,731

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 363,796 tCO₂e, whereas actual emission reductions achieved are 314,731 tCO₂e, which is approximately 13.49% lower than the estimated emission reductions.

¹² <https://cdm.unfccc.int/UserManagement/FileStorage/58IAGB7SZUDEO2VN6LYM30K41HFPRQ>

<u>Ex-ante emissions reductions/re movals</u>	<u>Achieved emissions reductions/re movals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
363,796	314,731	13.49 %	The lower emission reduction achieved is justified due to lower generation in the current monitoring period. The generation of electricity depends upon many other climatic conditions, which are not within the control of the project participant.

APPENDIX I: CALIBRATION RECORDS

DHROL GETCO SS

Meter Sl. No.	Meter Make	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4187-A	Secure	Line-1 (Main)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
GJ4287-A	Secure	Line-2 (Main)				
XE 481376	Secure	Line 1(Check)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
XE481399	Secure	Line 2(Check)	0.2s	01-May-2019	30-April-2024	Once in 5 Years

JAMDUDHAI GETCO SS

Meter Sl. No.	Meter Make	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4285-A ¹³	Secure	Line-1 (Main)	0.2s	01-May-2019	30-April-2024	Once in 5 Years
GJ4612-A	Secure	Line-1 (New Main)		03-December-2020	02-December-2025	
XE481384	Secure	Line-1 (Check)		01-May-2019	30-April-2024	

TARANA SS

Meter Sl. No.	Make	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4284-A	Secure	Line-1 (Main)	0.2s	01-May-2019 18-March-2023	30-April-2024	Once in 5 Years

¹³ There was a change in main meter of Jamdudhai GETCO substation Line-1. The faulty meter GJ4285-A was replaced by GJ4612-A on 03-December-2020.

					17-March-2028	
GJ3571-A	Secure	Line-1 (Check)		01-May-2019 18-March-2023	17-March-2028	

KESHIYA SS

Meter Sl. No.	Make	Meter Type	Accuracy Class	Date of Calibration	Due Date of Calibration	Calibration Frequency
GJ4186-A	Secure	Line-1 (Main)	0.2s	01-May-2019 18-March-2023	30-April-2024 17-March-2028	Once in 5 Years
GJ4286-A	Secure	Line-2 (Main)				
GJ3572-A	Secure	Line-1 (Check)		01-May-2019 18-March-2023	17-March-2028	
GJ3573-A	Secure	Line-2 (Check)		01-May-2019 18-March-2023	17-March-2028	

APPENDIX II: BREAKDOWN DETAIL

Keshiya Substation							
Date	Loc.No	Intervention Type	Type Of Pm	Fault Description	Dur Downtime	Action Taken	Corrective Action
09-10-22	J07	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	16.55	Blade Internal Repair Work	Blade Internal Repair Work
10-10-22	J07	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
11-10-22	J07	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
12-10-22	J07	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	14.50	Blade Internal Repair Work	Blade Internal Repair Work
14-10-22	J27	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	16.23	Blade Internal Repair Work	Blade Internal Repair Work

15-10-22	J27	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
15-10-22	J39	Internal Grid Scheduled	Not Pm	Pause Over Rcs 13	12.18	Section Isolator Open For J39 & J58 Line Maintenance And Dp Pole Shifting Work By Nhi And Jumper Reconnecting Work	Section Isolator Open For J39 & J58 Line Maintenance And Dp Pole Shifting Work By Nhi And Jumper Reconnecting Work
15-10-22	J58	Internal Grid Scheduled	Not Pm	Pause Over Rcs 13	12.22	Section Isolator Open For J39 & J58 Line Maintenance And Dp Pole Shifting Work By Nhi And Jumper Reconnecting Work	Section Isolator Open For J39 & J58 Line Maintenance And Dp Pole Shifting Work By Nhi And Jumper Reconnecting Work
16-10-22	J27	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
17-10-22	J27	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	20.68	Blade Internal Repair Work	Blade Internal Repair Work
18-10-22	J14	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	13.68	Blade Internal Repair Work	Blade Internal Repair Work
19-10-22	J14	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
20-10-22	J14	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
21-10-22	J127	Scheduled Maintenance	Yearly Maintenance	Pause Pressed On Keyboard	13.85	Yearly Service Done As Per Sif	Yearly Service Done As Per Sif
21-10-22	J14	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
22-10-22	J14	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
23-10-22	J14	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	15.13	Blade Internal Repair Work Completed	Blade Internal Repair Work Completed

27-10-22	J127	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	16.37	Wtg Manully Stop For Blade Repairing Work	Wtg Manully Stop For Blade Repairing Work
28-10-22	J127	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Wtg Manully Stop For Blade Repairing Work	Wtg Manully Stop For Blade Repairing Work
29-10-22	J127	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Wtg Manully Stop For Blade Repairing Work	Wtg Manully Stop For Blade Repairing Work
30-10-22	J127	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Wtg Manully Stop For Blade Repairing Work	Wtg Manully Stop For Blade Repairing Work
31-10-22	J127	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Wtg Manully Stop For Blade Repairing Work	Wtg Manully Stop For Blade Repairing Work

Tarana Substation							
Date	Loc. No	Intervention Type	Type Of Pm	Fault Description	Dur Downtime	Action Taken	Corrective Action
07-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	15.78	Blade Internal Repair Work	Blade Internal Repair Work
08-Nov-22	J60	Scheduled Maintenance	Yearly Maintenance	Pause Pressed On Keyboard	12.13	3 Year Service Completed	3 Year Service Completed
08-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
09-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
10-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work

11-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
12-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	24.00	Blade Internal Repair Work	Blade Internal Repair Work
13-Nov-22	J08	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	15.72	Blade Internal Repair Work	Blade Internal Repair Work
21-Nov-22	J64	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	15.47	Blade Ut Scanning Work	Blade Ut Scanning Work
22-Nov-22	J64	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	14.58	Blade Ut Scanning Work	Blade Ut Scanning Done
26-Nov-22	J64	Predictive Maintenance	Not Pm	Pause Pressed On Keyboard	14.85	Blade Ut Scanning Work	Blade Ut Scanning Work

APPENDIX III: TRAINING DETAIL

SL. No.	Training Title	No. of People	Date
1	Site Induction	2	13-02-2023
2	Safety Meeting-ICB	9	11-02-2023
3	HSE Site Induction Training	5	06-09-2022
4	Site Induction Training	2	20-08-2022
5	SIT	5	11-10-2022
6	Site Induction	4	03-12-2022
7	SIT Program	1	22-08-2023