



Verified Carbon Standard

“SATARA WIND POWER PROJECT IN MAHARASHTRA, INDIA”

Document Prepared by NSL Wind Power Company (Satara) Pvt. Ltd¹.

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¹ <https://registry.verra.org/app/projectDetail/VCS/1519>

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The VCS registered² project activity is a Greenfield wind power generation activity. The project activity involves installation of 30 MW capacity wind power generation project by NSL Wind Power Company (Satara) Pvt. Ltd. (Project Participant). The project activity generates clean electricity, which is exported to the Maharashtra State Electricity Distribution Company Limited (MSEDCL), which falls under the Northern, Eastern, Western and North-Eastern regional grids (NEWNE) grid of India. The spatial extent of the project boundary is the NEWNE grid³.

This activity involves installation and operations of 20 numbers of Wind turbine generators (WTGs) of rated capacity 1.5 MW. The WTGs are of Vensys V87 type, supplied by ReGen Power Tech Pvt. Ltd. The purchase order of the first WTG was placed on 09-July-2013 and start date of the project activity is 06-March-2014 which was the day of commercial production of the first machine. The entire project is in continuous operation since its date of commissioning of the respective machines.

In the current monitoring period, the project activity has exported **50,410 MWh** of electricity in this monitoring period (01-May-2022 to 31-December-2022) to the Grid, which contributes to GHG emission reduction of **49,235 tCO_{2e}**.

The audit history of the project is included in the prescribed table below:

Audit Type	Period (Inclusive of both the days)	Program	VVB Name	Number of years
Validation	06-March-2014 to 05-March-2024	<u>VCS</u>	<u>LGA Technological Center, S.A. (Applus+)</u>	NA
Verification	06-March-2014 to 31-December-2015	<u>VCS</u>	<u>LGA Technological Center, S.A. (Applus+)</u>	01 Year 09 months 26 days
Verification	01-January-2016 to 30-September-2017	<u>VCS</u>	<u>Earthood Services Pvt. Ltd.</u>	01 year 09 months 00 days
Verification	01-October-2017 to 31-August-2018	<u>VCS</u>	<u>Earthood Services Pvt. Ltd.</u>	00 Years 11 months 00 days

² <https://registry.verra.org/app/projectDetail/VCS/1519>

³ Before April 2016, the Indian electricity system was divided into two grids, the NEWNE and Southern Grid. These are now integrated as a single "Indian Grid" covering all the states.

Verification	01-September-2018 to 31-October-2019	<u>VCS</u>	<u>Earthood Services Pvt. Ltd.</u>	01 year 02 months 00 days
Verification	01-November-2019 to 31-October-2020	<u>VCS</u>	<u>LGAi Technological Center, S.A. (Applus+)</u>	01 year 00 months and 00 days
Verification	01-November-2020 to 31-August-2021	<u>VCS</u>	<u>LGAi Technological Center, S.A. (Applus+)</u>	00 Years 10 months 00 days
Verification	01-September-2021 to 30-April-2022	VCS	VKU Certification Pvt Ltd	00 Years 08 months 00 days
Current Verification	01-May-2022 to 31 December-2022	VCS	VKU Certification Pvt Ltd	00 Years 08 months 00 days
Total	06-March-2014 to 31 December-2022	-	-	08 Years, 09 months & 26 days

1.2 Sectoral Scope and Project Type

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

Project Type : Type I – Renewable Energy Projects

The project is not a grouped (but a bundled of 20 WTGs) or AFOLU project activity.

1.3 Project Proponent

Organization name	NSL Wind Power Company (Satara) Pvt. Ltd.
Contact person	A. Rajnikant.
Title	Head – Wind Projects & Operations
Address	Road No. 12, Banjara Hills #8-2-684/2/A, NSL ICON Hyderabad, Telangana.
Telephone	+91-040-3051 4444
Email	rajnikant.a@nslpower.com

1.4 Other Entities Involved in the Project

Not applicable

1.5 Project Start Date

The start date of the project activity has been considered as 06-March-2014, which is the day on commissioning of the first machine (WTG) under the project.

1.6 Project Crediting Period

Fixed crediting period has been considered under VCS is as follows:

First crediting period of : 10 years.
Start date of the crediting period : 06-March-2014
End date of the crediting period : 05-March-2024

1.7 Project Location

Project activity is located in the Mann village, in the district Satara, state of Maharashtra. The location maps are included below. The spatial extent of this project activity includes the project site and all the power plants connected physically to the electricity system that the project is connected to, i.e., the Indian Grid. Thus, the project boundary includes all the power plants physically connected to the NEWNE grid now Unified Indian Grid.

Geo-coordinates of the WTGs are provided in the below table:

WTG Ref. No.	Date of Commissioning	Geo-Coordinates			
		UTM (Universal Transverse Mercator) format		DD-MM-SS (Degree/minutes/Seconds) format	
		Easting (m)	Northing (m)	Latitude (N)	Longitude (E)
NSL-1	06-March-2014	469336	1934816	17 ° 29 ' 57.52 "	74 ° 42 ' 40.12 "
NSL-2		469066	1934960	17 ° 30 ' 2.19 "	74 ° 42 ' 30.96 "
NSL-10		467591	1935712	17 ° 30 ' 26.58 "	74 ° 41 ' 40.90 "
NSL-11		467555	1935467	17 ° 30 ' 18.61 "	74 ° 41 ' 39.69 "
NSL-12		467395	1935210	17 ° 30 ' 10.24 "	74 ° 41 ' 34.28 "
NSL-13		467477	1935008	17 ° 30 ' 3.67 "	74 ° 41 ' 37.07 "
NSL-14		467616	1934769	17 ° 29 ' 55.90 "	74 ° 41 ' 41.80 "
NSL-15		467758	1934607	17 ° 29 ' 50.64 "	74 ° 41 ' 46.62 "

NSL-3	30-March-2014	468573	1934832	17 ° 29 ' 58.01 "	74 ° 42 ' 14.25 "
NSL-6		468893	1934421	17 ° 29 ' 44.64 "	74 ° 42 ' 25.13 "
NSL-7		468559	1934585	17 ° 29 ' 49.97 "	74 ° 42 ' 13.79 "
NSL-20		466692	1936734	17 ° 30 ' 59.79 "	74 ° 41 ' 10.36 "
NSL-22		466784	1937215	17 ° 31 ' 15.45 "	74 ° 41 ' 13.45 "
NSL-17	31-March-2014	467652	1937233	17 ° 31 ' 16.08 "	74 ° 41 ' 42.89 "
NSL-23		466388	1937239	17 ° 31 ' 17.0 "	74 ° 41 ' 01.1 "
NSL-26		465839	1937687	17 ° 31 ' 30.76 "	74 ° 40 ' 41.37 "
NSL-28		465767	1938105	17 ° 31 ' 44.36 "	74 ° 40 ' 38.91 "
NSL-34		464907	1938830	17 ° 32 ' 7.90 "	74 ° 40 ' 9.7 "
NSL-36		464416	1939096	17 ° 32 ' 16.53 "	74 ° 39 ' 53.02 "
NSL-37		464263	1939245	17 ° 32 ' 21.37 "	74 ° 39 ' 47.83 "

The location map of the project activity:

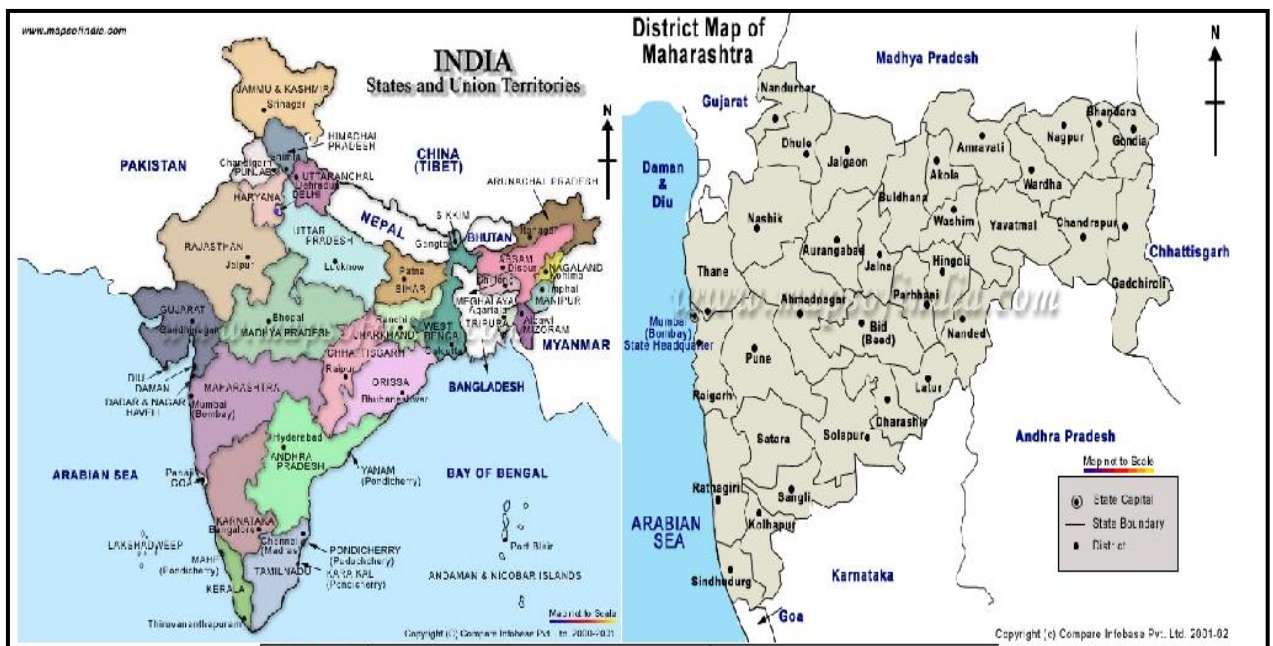


Figure 01: Map depicting the project location



Figure 1.1: Map depicting the project location

1.8 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources⁴

Reference: Approved consolidated baseline and monitoring methodology ACM0002, Version 16.0

Tools referenced in this methodology:

- Tool for the demonstration and assessment of additionality, Version 07.0.0⁵
- Tool to calculate the emission factor for an electricity system, Version 05.0.0⁶

1.9 Participation under other GHG Programs

Project has not been applied under any other GHG program neither included in any emissions trading program or any other mechanism that includes GHG allowance trading. Also, the project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period. PP has submitted the declaration confirming the same to the verifying VVB.

⁴<https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

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

⁶<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.0.pdf>

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

- **Emission Trading Programs and Other Binding Limits:**

Not Applicable. The GHG emissions generated from the project activity are not included in any other emissions trading program or any other mechanism that includes GHG allowance trading or other binding limits.

- **Other Forms of Environmental Credit:**

The project activity has not been applied under any other GHG or any related programs. Also, the project activity has not sought or received another form of GHG-related environmental credit, including renewable energy certificates (REC or iREC), during this monitoring period. Further, this is to be stated that project is not eligible under other GHG-related environmental credits due to start date definition, mode of power sale, etc, and is solely operational under VCS mechanism only. Hence no separate of list of other programs is applicable.

- **Supply Chain (Scope 3) Emissions:**

The project does not affect emissions associated with any good or service & hence no impact on the scope-3 emission associated with the supply chain. The project Activity is a wind power project and does not involve any supply chain in the project such as manufacturers, wholesalers, distributors and retailers. So, no indirect upstream and downstream GHG emissions are involved in the project activity. Thus, the Scope 3 emissions are not applicable in this project activity.

As explained in above section the Project activity is not a registered under any other GHG program. PP ensures that there will not be any double counting of emission reduction also. Also, PP hereby confirms that credits generated in current monitoring period do not form part of any other national or international scheme including Renewable Energy Certificates. Also, the project does not affect emissions associated with any goods or service, hence the Scope 3 emission associated with the supply chain.

1.11 Sustainable Development Contributions

The project contributes in achieving nationally stated sustainable development priorities like providing direct & indirect employment generation during construction & operation phase. Also, helps in country energy security by generating electricity from renewable source etc. Since the project is continuation of activity as per the registered PD, it is a regulatory surplus activity. The green energy target of the Govt of India does not include green energy generated from wind turbines from private parties.

The project contributes in achieving the following indicators for sustainable development in the region:

- **Social well-being:** The project activity has led to generation of employment in the region thereby contributing towards social upliftment through direct and indirect benefits. The construction and operation phase has led to capacity building and empowerment in the rural section of the region.
- **Economic well-being:** During the construction and operation phases, the project activity would generate employment opportunities for the suppliers, manufacturers, local service providers and contractors.
- **Environmental well-being:** This project activity contributes to sustainable development through generation of eco-friendly power. Wind Power projects i.e., Installation of Wind Turbine Generators also aid in reducing GHG emissions and other pollutant (Sox, NOx, PM etc.)
- **Technological well-being:** The project activity helps in increasing the share of renewable energy power generation in the region. It also helps in reducing the dependency of using fossil fuels to generate electricity.

Note: As per the VCS Standard Version 4.5⁷ Page no 79, Appendix 03: Document History and Effective dates, For V4.2, serial number 04 states that “it is required by project proponents to demonstrate contributions to a minimum of three SDGs in all monitoring reports verified after the effective date. Effective immediately for all projects that request registration on or after 20-January-2023. Projects that request registration before 20-January-2023 shall demonstrate contributions to at least three SDGs by 20-January-2025”. This is project's 8th periodic verification of fixed crediting period for the Monitoring Period 01-May-2022 to 31-December-2022 (Inclusive of both start and end dates), Since this project is registered before 20-January-2023, so the Project Proponent (PP) must demonstrate contributions to sustainable development, as defined by and tracked against the United National Sustainable Development Goals (SDGs) at least three SDGs by 20-January-2025

In continuation, the project has achieved various SDGs during the current monitoring period which fulfills the requirement of minimum three SDG indicators.

⁷ <https://verra.org/documents/vcs-standard-v4-5/>

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 Renewable Energy grid connected Project to increase the RE share in total grid mix.	50,410 MWh delivered to the grid during the current monitoring period.	About $(28,034^8 + 50,410^9 = 78,444)$ MWh renewable electricity has supplied to Indian grid that helps to increase the renewable energy share in the energy mix. ¹⁰
2	8.5	8.5.1: Employment Generation from the project Activity	Implemented Renewable Energy power generation project activity has generated direct & Indirect employment	More than 10 numbers of people got direct employment.	Project is eligible to generate this SDG benefits. However, project is not claiming this SDG benefit. Hence, not quantifying the same here.

⁸ Contribution to the last i.e., 7th monitoring period 01-September-2021 to 30-April-2022 (Inclusive of both the days)

⁹ Contribution to the current monitoring period 01-May-2022 to 31-December-2022 (Inclusive of both the days)

¹⁰ As per VERRA's guidelines to claim SDGs for contributions Over Project Lifetime "The cumulative impact should be calculated by summing the current project contributions with all impacts included in previously approved VCS monitoring reports or Sustainable Development Contribution Reports, PP has only claimed the SDGs in last 7th verification hence in this Monitoring period, PP is only applying values of last verification along with current monitoring period.

3	13.2	13.2.1: Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase avoidance of emissions	49,235 tCO_{2e} has been prevented by the project activity during the current Monitoring Period.	Prevented the release of (27,381¹¹+49,235¹² = 76,616) tCO_{2e} into the atmosphere during the current & last monitoring period. ¹³
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¹¹ Contribution to the last i.e., 7th monitoring period 01-September-2021 to 30-April-2022 (Inclusive of both the days)

¹²Contribution to the current monitoring period 01-May-2022 to 31-December-2022 (Inclusive of both the days)

¹³ As per VERRA's guidelines to claim SDGs for contributions Over Project Lifetime "The cumulative impact should be calculated by summing the current project contributions with all impacts included in previously approved VCS monitoring reports or Sustainable Development Contribution Reports, PP has only claimed the SDGs in last 7th verification hence in this Monitoring period, PP is only applying values of last verification along with current monitoring period.

2 SAFEGUARDS

2.1 No Net Harm

Being renewable wind power generation project there is no negative environmental and socio-economic impacts. In fact, project activity contributes positively by providing environment friendly power generation leading to sustainable development of the region. Also, the generation of employment supports potential upliftment of socio-economic status of region.

As demonstrated in the registered VCS PD, as per the Schedule 1 of the EIA notification dated 14-September-2006 (<http://www.environmentwb.gov.in/pdf/EIA%20Notification,%202006.pdf>) given by the Ministry of Environment and Forests (Government of India) under the Environment (Protection) Act 1986, EIA is not a regulatory requirement in India for wind energy projects. Thus, the project activity doesn't fall under the list of activities requiring EIA. Also, the project has been successfully running from the date of its commissioning and regular monitoring and verification have been conducted. There is no any event observed that indicates negative environmental impacts due to the project activity.

Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

2.2 Local Stakeholder Consultation

The Project is already registered with VCS and registered VCS Project Description version 03 dated 08-February-2016, section 6 describes the Local Stakeholder Consultation Process as in-line with VCS requirement.

As a part of continuous feedback from stakeholders, there were no other major comments or protest raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

For ongoing communication, the PP has also placed a grievance register onsite where in the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately. However, being renewable wind power generation project there is no feedback/grievance has been reported within this monitoring period. Therefore, no action has been undertaken.

Additionally, the project team upholds continuous and open lines of communication with stakeholders through active participation in community meetings and other pertinent events. These interactions serve as platforms for fostering a two-way feedback exchange and evaluating any stakeholder requirements, ultimately ensuring the project's alignment with and responsiveness to the needs of the community.

2.3 AFOLU-Specific Safeguards

Not applicable to this project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The implementation status of the project activity includes the following information:

- The project activity has been in operation since its date of commissioning. The first WTG in the bundle was commissioned on 06-March-2014 and the last WTG was commissioned on 31-March-2014.
- There is no any event of break down or non-operational phase during the monitoring period.
- There are no any other changes related to the project proponent or project observed.
- Project is implemented and operational as per the VCS Project description submitted :

Technical Specification of WTGs:

ReGen Powertech	VENSYS 87
POWER	
Rated power	1500 kW
Cut-in wind speed (10 min. mean)	3 m/s
Rated Wind Speed (10 min. mean)	approx. 12 m/s
Cut-out wind speed (10 min. mean)	22 m/s
Survival wind speed	52.5 m/s
Generator	Variable Speed, Multi-pole Synchronous with Permanent Magnet Excitation
ROTOR	
Diameter	87
Swept area	5942 sq. m
Speed range (variable)	9 to 17.3 rpm
TOWER AND FOUNDATION	

Hub height	85 m
Design	Tubular, Four sections
Foundation type	Floating foundation
CONTROL AND SAFETY SYSTEMS	
Control of output	Pitch Regulation
Speed control	Variable, Micro-controller based
Low Voltage Ride Through (LVRT)	3 seconds
Primary brake system	Aerodynamic Brake, Single Pitch Control/triple redundant
Pitch System	Electromechanical, Maintenance Free Toothed Belt Drive (Patented)
Remote Monitoring	VPN, Visualization via web-browser
TYPE CLASSES	
Wind turbine type class	GL III B

The project activity has been in operation since its date of commissioning. No events have happened that may impact the GHG emission reductions or removals and monitoring during this monitoring period. There are no changes related to the project proponent or project observed. Project is implemented and operational as per the VCS Project description submitted.

During the current monitoring period, all the WTGs were operational. However, breakdown of **9786.10 hours** has occurred in this monitoring period due to non-availability of wind and some scheduled shutdown for the maintenance. This downtime is approx. **8.32%** of total available hours of operation of the WTGs, during the current monitoring period. The PP has provided in Appendix 03 of MR and evidences for the same to VVB. The project activity has supplied **50,410 MWh** of electricity, and thus contributing to **49,235 tCO_{2e}** GHG reductions.

For the current monitoring period estimated emission reduction is **34,458 tCO_{2e}**, whereas actual emission reductions achieved are **49,235 tCO_{2e}** (round down value), which is approximately **+42.89%** higher than the estimated emission reductions. The Project is in continued operation for **8th periodic verification** of 1st crediting period for which the monitoring period is from **01-May-2022 to 31-December-2022 (Inclusive of both the days)**. There has been downtime of equipment's, overhaul times or exchange of equipment's in the project activity during the current monitoring period. The details have been clearly described in the Appendix 3 of the monitoring report. This variation is majorly due to high plant load

factor (PLF¹⁴) Some other reasons for this are the variations in the wind flow pattern, and other parameters which are not in the control of the project proponent.

3.2 Deviations

3.2.1 Methodology Deviations

No methodological deviation is applied to the project activity during previous or current monitoring period.

3.2.2 Project Description Deviations

There are no Project description deviations applied during current monitoring period. There was a deviation requested in 2nd MP dated 01-January-2016 to 30-September-2017 (inclusive of both days).

However, as per section 3.21.2 Para 2 of VCS standard v.4.5 “Where the deviation does not impact the applicability of the methodology, additionality or the appropriateness of the baseline scenario, and the project remains in compliance with the applied methodology, the deviation shall be described and justified in the monitoring report.” Same has been explained and justified below.

A deviation has been taken on account of shifting of feeder load with in the substation & delay in meter calibration. Details of load shifting & respective feeder energy meter and delay in calibration has been explained transparently in Appendix 1 of the monitoring report of 2nd MP as per PD “The project adheres to all the mandatory regulatory and statutory requirements at the state as well as national level.”

The change of feeder load & meter calibration is not under the purview of the Project Participant (PP) and is performed by the MSEDCL, which is the sole authorized body for meter testing & any decision regarding the feeder load connection. The meters are tested, sealed and maintained by MSEDCL only in the presence of authorized representative of the PP who also signs the results. As per CEA order para 18 b, “all energy meter shall be tested once in five years.” In compliance to the CEA order, meter calibration was not conducted by MSEDCL within the three years of specified period. However, PP followed conservative approach and hence, an error factor equating the maximum permissible limit of error for the meters was applied for the delayed period, (+0.2% for energy imported and -0.2% for energy exported). Hence, it can be confirmed from the above explanation that the deviation does not have an impact on the applicability of the methodology, additionality or the appropriateness of the baseline scenario.

The change of feeder load or load reshuffling are not under the purview of Project Participant (PP) completely under jurisdiction of the state utility (MSEDCL) which is the sole authorized body for any decision regarding the feeder load connection. PP has submitted the Power Purchase Agreement to the VVB for the verification of the same. It is to also note that in

¹⁴ The estimated PLF as per registered PD is 20% whereas actual PLF achieved during this MP is 28.58% & **Actual PLF for year 2022 for year (01-January-2022 to 31-December-2022) is 23.52%** Calculation can be referred under the ER sheet.

current MP there is no delay in calibration and frequency is as per registered PD i.e., Once in three years.

Hence, it can be confirmed from the above explanation that the deviation does not have an impact on the applicability conditions of the methodology¹⁵, additionality or the appropriateness of the baseline scenario.

3.3 Grouped Projects

Not applicable as the project is not a grouped project.

¹⁵ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid, OMsimple, y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor of NEWNE grid
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA <u>CO₂ Baseline database Version 10</u> ¹⁶
Value applied	0.9857
Justification of choice of data or description of measurement methods and procedures applied	The operating margin emission factor is a 3-year generation-weighted average data, based on the most recent data available on CEA database at the time of submission of the VCS-PDD to the VVB for validation. Data compiled in CEA CO ₂ CDM database is in line with the requirements Version 05.0.0 of “Tool to calculate the emission factor for an electricity system”.
Purpose of Data	Calculation of baseline emissions
Comments	This parameter is calculated ex ante and remains fixed during the crediting period.

Data / Parameter	EF _{grid, BM, y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor of NEWNE grid
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA <u>CO₂ Baseline database Version 10</u>
Value applied	0.9495
Justification of choice of data or description of measurement methods and procedures applied	The build margin emission factor is the most recent data available from CEA CO ₂ Baseline database. Data compiled in CEA CO ₂ CDM database is in line with the requirements Version 05.0.0 of “Tool to calculate the emission factor for an electricity system”.
Purpose of Data	Calculation of baseline emissions
Comments	The build Margin would be calculated ex ante and fixed during the crediting period.

¹⁶ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver10.pdf

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor of NEWNE grid
Source of data	Central Electricity Authority: CO ₂ Emission Database CEA CO ₂ Baseline database Version 10
Value applied	0.9767
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$ The following default values should be used for w_{OM} and w_{BM}: For Wind power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ for the selected crediting period Data compiled in CEA CO₂ CDM database is in line with the requirements Version 05.0.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of Data	Calculation of baseline emissions
Comments	The Combined Margin would be calculated ex ante and fixed during the crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG_{facility, y}
Data unit	MWh
Description	Quantity of Net Electricity exported to the grid by the project WTGs to the grid during the year y.
Source of data	Calculated
Description of measurement methods and procedures to be applied	This parameter is calculated based on the measured parameters those are continuously measured and monthly recorded. Metering at common metering point: The electricity generated by the project activity WTGs along with non-project WTGs are metered at feeder-wise common metering point. The metering point consists of a main meter & check meter, having accuracy of 0.2s. The meters measures parameters like export & import for all the connected WTGs. The export reading for a given metering point for a given billing month is obtained by subtracting initial reading (taken in previous month) from the final reading (taken in billing month). The difference is multiplied by the applicable meter multiplication factor. Similar procedure is followed to arrive the import reading. The monitoring & measurement¹⁷ of electricity at project metering point is being done on continuous basis; while recording is being done on monthly basis as Joint Meter Reading by the representatives of State Utility & PP. Calculation of net electricity export to the grid by project activity WTG: The export & import by the project activity WTG connected to the metering point is calculated by apportioning of the electricity at feeder level by the state utility. The apportioning of the electricity is based on the controller reading of project activity WTGs, controller reading for all WTGs connected at the given metering point and the electricity reading (export, import

¹⁷ The meters are capable of measuring the electricity parameters (export, import etc.) on real time basis. It complies the hourly measurement requirement as per the monitoring methodology

	etc.) recorded by the main meter at the given metering point on monthly basis. It gives monthly values of export & import for project activity WTG. The net export for any given month by the project activity WTG to the grid is then obtained by subtracting import from export. Thus: $EG_{\text{facility},y} = EG_{\text{JMR, NSL, export}} - EG_{\text{JMR, NSL, import}}$ The value of the monthly net electricity delivered to the Grid by the project activity WTG is aggregated annually to get quantity of net electricity supplied by the project plant/unit to the grid in year y i.e. ($EG_{PJ,y}$). Note: The apportioning of the electricity is the responsibility of the state utility & same is beyond the control of the PP.
Frequency of monitoring/recording	Monthly recording.
Value monitored	50,410 MWh
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	The quantity of net electricity supplied can be cross-verified from the invoices raised on MSEDCL by the project proponent. The main and check meters are calibrated and maintained by the state utility as the frequency of meter testing is once in 3 years¹⁸. Data Recording: Electronic/ Paper Energy Meter accuracy Class: 0.2s.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Calculation method is described in detail in section 4.3 of Registered VCS PD version 03 dated 08/02/2016.
Comments	Data will be archived for crediting period plus two years after the end of Crediting period.

¹⁸ Meter Details & meter calibration has been provided in Appendix 1.

Data / Parameter	EG_{JMR, NSL, export,y}
Data unit	MWh
Description	Quantity of Electricity exported by the Project WTGs connected to the feeder i to the grid during the year y.
Source of data	Monthly statements/credit notes issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL).
Description of measurement methods and procedures to be applied	Quantity of electricity export would be calculated using the apportioning procedure as described in section 4.3 of Registered VCS PD version 03 dated 08-February-2016.
Frequency of monitoring/recording	Continuous measurement and monthly recording
Value monitored	50,428.27
Monitoring equipment	Calculated parameter, hence no monitoring equipment is required.
QA/QC procedures to be applied	The value is calculated and can be cross checked from the invoices raised on the state utility. The monitoring frequency of the data parameter is monthly basis.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Calculation method is described in section 4.3 of Registered VCS PD version 03 dated 08-February-2016.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	EG_{JMR, NSL, import,y}
Data unit	MWh
Description	Quantity electricity imported by the Project WTGs connected to the feeder i from the grid during the year y.
Source of data	Monthly statements/credit notes issued by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL).
Description of measurement methods and procedures to be applied	Quantity of electricity import would be calculated using the apportioning procedure as described in section 4.3 of Registered VCS PD version 03 dated 08-February-2016.

Frequency of monitoring/recording	Continuous measurement and monthly recording
Value monitored	18.23
Monitoring equipment	Calculated parameter, hence no monitoring equipment is required.
QA/QC procedures to be applied	The value is calculated and can be cross checked from the invoices raised on the state utility. The monitoring frequency of the data parameter is monthly basis.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Calculation method is described in section 4.3 of Registered VCS PD version 03 dated 08-February-2016.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	EG Controller, gen
Data unit	MWh
Description	Quantity electricity generated by the project activity WTGs recorded at respective controller meters
Source of data	Monthly operating logs recorded in electronic format by O&M contractor
Description of measurement methods and procedures to be applied	The value is recorded continuously by the online monitoring station. This reading can also be seen in the electronic panel installed inside the WTG tower. The LCS meter (Controller meter) do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the Panel meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report. The operations and maintenance staff will attend to the problem immediately in order to identify and correct the error.
Frequency of monitoring/recording	Continuous measurement and monthly recording
Value monitored	53,002.59 (Roundoff Value)
Monitoring equipment	LCS meter (Controller Meter)

QA/QC procedures to be applied	This data parameter will be logged electronically on a monthly basis by O&M contractor on its online portal. The value of this parameter shall be compared with the value of $EG_{PJ,y}$ and the conservative approach would be taken by the PP for estimating the net electricity supplied value for the calculation of emission reduction.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Not applicable
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

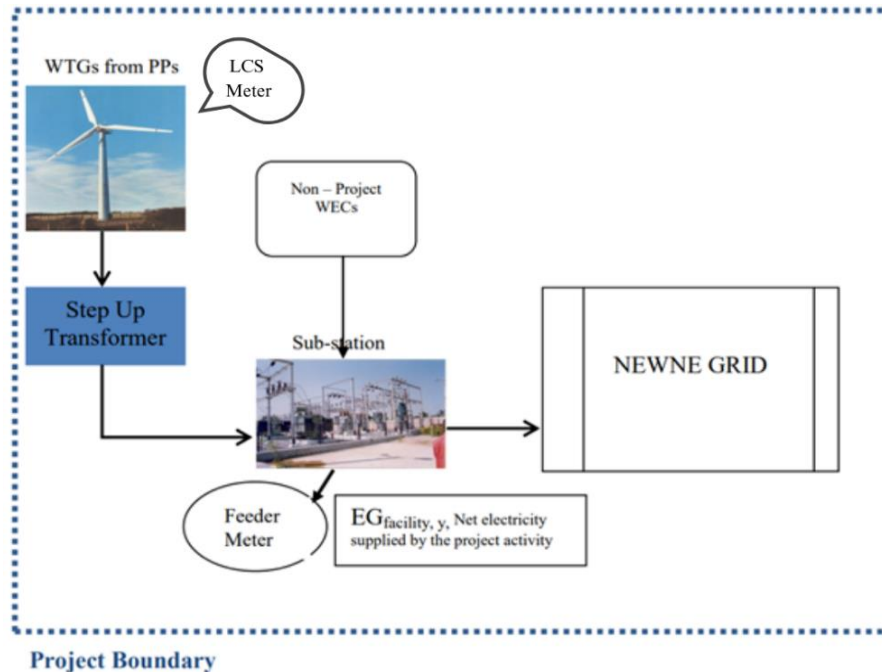
4.3 Monitoring Plan

As per approved monitoring methodology ACM0002 / Version 16.0, 'Net electricity generation from the project activity' is required to be monitored.

As the emission reductions from the project are determined by the number of units exported to the grid by the project activity it is mandatory to have a monitoring system in place and ensure that the project activity produces and supplies the rated power at the stipulated norms.

The purpose of the monitoring plan, is to define the organizational structure of the monitoring supervisor, monitoring practices, QA and QC procedures and archiving procedures. The monitoring plan will ensure that the emission reductions from the project activity are reported accurately and transparently.

Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required. Further, wind-based electricity generation is not associated with any kind of leakages. Hence, the sole parameter for monitoring is the electricity generated by the project and supplied to the grid.



Monitoring at common metering point:

Quantity of electricity generated and supplied to the grid by all the WTGs (project activity WTGs and non-project WTGs) connected to the particular feeder will be measured through the energy meters (Main Meter and Check Meter) installed at the substation. The meter readings at the substations are taken jointly by the representatives of Project participant representative and Maharashtra State Electricity Distribution Company Limited (MSEDCL) representative and recorded in the JMR.

The metering equipment is duly approved, tested and sealed by MSEDCL. The metering equipment (consisting of the Main Meter and the Check Meter) is identical in make and technical standards and is of 0.2% accuracy class. They comply with the requirements of the Electricity Rules.

The MSEDCL carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of PPs representative. The frequency of meter testing is once in 05 years¹⁹. All meters are tested only at the Metering Point.

Metering Equipment and Metering Arrangement Information and Emergency preparedness:

- The meters are two-way meter and measure the electricity import and export and give the net electricity.
- As per the Power Purchase Agreement entered into with the electricity distribution utility, there will be two meters, one main meter and one backup meter. Both meters

¹⁹ Meter Details & meter calibration has been provided in Appendix 1.

would be two-way export import meters that measure both export and import of electricity and provide net electricity exported to the grid.

- In case the meters are found to operate outside the permissible limits, the meters will be either replaced immediately or calibrated. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred.
- If main as well as back up metering system becomes defective, the details of the malfunctioning along with date and time and snaps shot parameters along with load survey will be retrieved from the main meter. The exact nature of the malfunctioning will be determined after analysing the data so retrieved and the consumption recorded by the main meter will be adjusted accordingly.
- The main meter readings are apportioned based upon the LCS meter readings from the individual WTGs to compute net electricity supplied from individual WTGs. The LCS meter readings of project activity WTGs are archived electronically on continuous basis. Joint meter reading at the DISCOM substation is noted each month. Therefore, cumulative LCS meter reading for each month is used for purpose of allocation of net electricity supplied to the grid from the project activity. Both main and check meters will be **calibrated once in 3 years**.

Project proponent has signed an “Operation and Maintenance” contract with the supplier, ReGen Power Tech Private Limited to operate the wind mills for a period of ten years from the date of commissioning of each WTG. The performance of the mills, safety in operation and scheduled /breakdown maintenances are organized and monitored by the contractor. ReGen monitors the generation of the WTG daily on a regular basis and maintains a log book recording daily generation details for each WTG comprising the project, as metered at the wind farm.

Apportioning Procedure followed:

The allocation of the net electricity supplied to the grid by the project activity is done based on the joint meter readings taken at the DISCOM substation & LCS meter readings of individual WTGs. Apportioning procedure is applied is explained in below:

$EG_{JMR, Export}$ = Electricity exported by all the WTGs (project WTGs & non-project WTGs), as recorded by the main meter at the substation

$EG_{JMR, Import}$ = Electricity imported by all the WTGs (project WTGs & non-project WTGs), as recorded by the main meter at the substation

$EG_{Controller, gen}$ = Electricity exported by a project WTG, as measured at the controller

$EG_{Controller, gen, total}$ = Electricity exported by all the WTGs (project activity & non project activity) connected to the main meter at the grid substation, measured at the controller of each WTG

$\sum EG_{Controller, gen}$ = Summation of electricity generated by the project activity WTGs recorded at respective LCS meters.

$EG_{JMR, NSL, export}$ = Electricity exported by a WTG to the grid, calculated

$EG_{JMR, NSL, import}$ = Electricity imported by a WTG from the grid, calculated.

Electricity exported by each WTG is apportioned on the basis of electricity exported recorded at the controller of each WTG and the electricity exported at the main meter and mentioned in the JMR. The export multiplication factor is calculated as follows-

$$\text{Export Multiplication Factor} = EG_{JMR, Export} \div EG_{Controller, gen, total} \dots\dots\dots (1)$$

Thus, the energy exported by a WTG to the grid is given by the equation-

$$EG_{JMR, NSL, export} = \text{Export Multiplication factor} \times \sum EG_{Controller, gen} \dots\dots\dots (2)$$

As the controller meter doesn't record import, the apportioning of energy imported by each WTG is also done on the basis of electricity exported recorded at the controller of each WTG and the electricity imported at the main meter and mentioned in the JMR. The import multiplication factor is calculated as follows-

$$\text{Import Multiplication Factor} = EG_{JMR, Import} \div EG_{Controller, gen, total} \dots\dots\dots (3)$$

Thus the energy imported by a WTG to the grid is given by the equation-

$$EG_{JMR, NSL, import} = \text{Import Multiplication factor} \times \sum EG_{Controller, gen} \dots\dots\dots (4)$$

The net electricity exported by the WTGs of the project is given by the equation-

$$EG_{facility, y} = \sum EG_{JMR, NSL, export} - \sum EG_{JMR, NSL, import} \dots\dots\dots (5)$$

$$\sum EG_{JMR, NSL, export} = EG_{JMR, NSL, export, y}$$

$$\sum EG_{JMR, NSL, import} = EG_{JMR, NSL, import, y}$$

Based on the above calculation, a monthly statement/credit note is prepared and signed by the representatives of PP and endorsed by the state utility (MSEDCL). The statement mentions the total electricity exported to grid, total electricity imported from the grid and the net electricity supplied. The net electricity supplied is calculated as the difference of the total electricity exported to grid and total electricity imported from the grid by the project activity.

Upon receipt of the "Monthly Statement/credit note", Project participant generates invoices on sale of electricity and sends to respective district level MSEDCL office and MSEDCL makes payments against the invoices. The value of net electricity supplied can be cross checked with the monthly invoices.

Mismatch in Monitoring Period and the Billing Period

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

$$D = (A/B) \times C$$

Where,

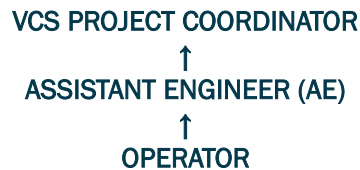
A= Difference of number of days which are not matching of billing period and monitoring period.

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

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

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

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



The day-to-day operation of the WTGs at the ground level is looked after by the operator. The operator reports to the Assistant Engineer (AE) - Wind Farm, who is responsible for collecting the required information from the operator. The AE – Wind Farm records the generation on a daily basis for each service connection point and reports the cumulative generation to the Management. VCS Project coordinator will be responsible for assessment of emission reduction achieved every year and documentation of the same.

Personnel training: The training for operating and maintaining the plant is provided by the technology supplier twice a year.

Data collection and archiving:

The daily data at the site is collected in electronic form. Monthly data is collected and maintained in hard copies. The project proponent shall keep complete and accurate records of all the data as a part of monitoring for at least a period of 2 years after the end of the crediting period or the last issuance of VERs for the project activity, whichever occurs later.

NOTE:

As per the monitoring plan, the monitoring parameters $EG_{JMR, NSL, export, y}$, $EG_{JMR, NSL, import, y}$ and $EG_{facility, y}$ to be calculated based on the generation data of other project activities connected to the same substation. Since the generation data of other project activities is only available with the O&M contractor, apportioning cannot be done by PP and hence the other parameters $EG_{JMR, Export}$, $EG_{JMR, Import}$ and $EG_{Controller, gen, total}$ is not included in section 4.2 of the PD.

The revised monitoring plan is complete, accurate and in line with actual metering and monitoring arrangement finalized by DISCOM in consultation with State Electricity Regulatory Commission

There is no delay in meter calibration identified during the current monitoring period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the methodology and VCS PD, Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year y (tCO _{2e})
BE_y	=	Baseline emissions in year y (tCO ₂)
PE_y	=	Project emissions in year y (tCO _{2e})

Baseline Emissions:

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:

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

Where:

BE_y	=	Baseline emissions in year y (tCO ₂)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for 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)

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

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

Where:

$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)
$EG_{\text{facility}, y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

$$\begin{aligned} BE_y &= 50,410 * 0.9767 \\ &= 49,235 \text{ tCO}_2\text{e (rounded down value has been considered)} \end{aligned}$$

5.2 Project Emissions

As per section 5.4.1 of para 37 of methodology²⁰ i.e., ACM0002 Version 16.0, This project activity is grid connected wind power generation. Hence there is no project emission from the project activity.

$$PE_y = 0 \text{ tCO}_2.$$

5.3 Leakage

As per the applicable methodology ACM0002, Version 16.0, no leakage emissions are considered.

$$LE_y = 0 \text{ tCO}_2.$$

5.4 Net GHG Emission Reductions and Removals

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)
Vintage 2022 (01-May-2022 to 31-December-2022)	49,235	0	0	49,235
Total	49,235	0	0	49,235

The comparison of actual ER with estimated ERs as per registered PD has been included under the ER sheet and also provided justification based on facts and information.

²⁰ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

The details of emission reduction calculations, monthly generation data, comparison of emission reductions with equivalent ex-ante estimated data etc. are submitted to VVB in the form of an emission reduction excel sheet.

Annual VCU as per the registered VCS-PD	51,335
Estimated VCU in VCS PD for the equivalent period of the current MP	34,458
Actual values achieved during this monitoring period	49,235
% change in actual VCUs with estimates in revised PDD	+42.88%

Estimated PLF as per registered PD-MR	20%
Breaching value of PLF as per Joint PD-MR	23.60%
Total generation	50,410 MWh
Total no. of days	245
Capacity	30 MW
Actual PLF (Achieved) (for current monitoring period)	28.58 %
Actual PLF for year 2022 (Achieved) (01-January-2022 to 31-December-2022)	23.52%
As per IRR sheet	
IRR as per registered PDD	11.51%
Benchmark is	17.75 %

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
34,458	49,235	+42.88%	The overall PLF of the monitoring months in the current MP are higher. This is because the period includes mostly the wind season and peak-season; hence the value is comparatively higher than the annualized average value of the projected generation. This is unpredicted and naturally not under in any control of PP. It however does not lead to any negative impact on additionality established at the time of registration. It is to note that the Breaching value of PLF as per Joint PD-MR is 23.60 whereas the Actual PLF for year 2022 (Achieved for year 01-January-2022 to 31-December-2022) is 23.52 which is lesser than the breaching value and hence doesn't affect the additionality of the project.

APPENDIX A: METER CALIBRATION

There is no delay in meter calibration as the meter calibration frequency during the current monitoring period. As per deviation taken in previous 2nd monitoring period no (i.e., 01-January-2016 to 30-September-2017 (Inclusive of both the days) deviation had been taken on account of delay in meter calibration. The energy meters are calibrated once every five years as per clause (18) of CEA (Installation and Operation of meters) Regulation, 2006 which states that “Calibration and periodical testing of meters. – All interface meters shall be tested at least once in five years at NABL accredited laboratories”.18.

However, the calibration frequency in registered VCS PD version 03 dated 08-February-2016, the calibration frequency is **ONCE IN THREE YEARS**.

WTG Ref No	Feeder No	Meter Details	Previous Calibration	Due Date	Current Calibration	Due Date
NSL-1 NSL-2 NSL-3 NSL-6 NSL-7 NSL-10 NSL-11 NSL-12 NSL-13 NSL-14 NSL-15	F-02	<u>Main Meter:</u> <u>Make: Elster,</u> <u>S. No:</u> <u>13277651</u> <u>Class: 0.2s</u> <u>Check Meter:</u> <u>Make: Elster,</u> <u>S. No:</u> <u>13277650</u> <u>Class: 0.2s</u>	20-August-2020	19-August-2023	03-February-2022	02-February-2025
NSL-20 NSL-22 NSL-17 NSL-23 NSL-26 NSL-34 NSL-36 NSL-37	F-01	<u>Main Meter:</u> <u>Make: Elster,</u> <u>S. No:</u> <u>13277649</u> <u>Class: 0.2s</u> <u>Check Meter:</u> <u>Make: Elster,</u> <u>S. No:</u> <u>02814525</u> <u>Class: 0.2s</u>	20-August-2020	19-August-2023	03-February-2022	02-February-2025
NSL-28	F-05	<u>Main Meter:</u> <u>Make: Elster,</u> <u>S. No:</u> <u>13277639</u> <u>Class: 0.2s</u>	20-August-2020	19-August-2023	03-February-2022	02-February-2025

		<u>Check Meter:</u> <u>Make: Elster,</u> <u>S. No:</u> <u>13277640</u> <u>Class: 0.2s</u>				
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There is no delay in the meter calibration as the meter calibration frequency during the current monitoring period.

APPENDIX B: FEEDER DETAILS

WTG Ref. No.	Old Feeder Number	New Feeder Number
NSL-1	Feeder Number- 01	Feeder Number- 02
NSL-2		
NSL-3		
NSL-6		
NSL-7		
NSL-10		
NSL-11		
NSL-12		
NSL-13		
NSL-14		
NSL-15		
NSL-20	Feeder Number- 04	Feeder Number- 01
NSL-22		
NSL-17		
NSL-23		
NSL-26		
NSL-34		
NSL-36		
NSL-37		
NSL-28	Feeder Number- 04	Feeder Number- 05

APPENDIX C: BREAKDOWN DETAILS

Month	Gen. Hrs.	Lull Hrs.	Total Breakdown Hours	Remarks
May-22	11241.9	323	3315.9	Generator Failure
Jun-22	13094	353.6	953.2	Generator Failure
Jul-22	13426.9	526.7	927.1	Generator Failure
Aug-22	13110.8	918.5	851.2	Transformer Failure
Sep-22	11998.6	1548.3	853.7	NA
Oct-22	12121.9	1946.4	812.2	NA
Nov-22	12417.3	910.8	1072.6	Generator Failure
Dec-22	11859.1	2018.9	1000.2	Generator Failure
Total	99,270.50	8,546.2	9,786.10	