



Verified Carbon Standard

GRID CONNECTED WIND POWER PROJECT IN TAMIL NADU

Document Prepared By Apraava Renewable Energy Private Limited¹

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¹ Previous name CLP Wind Farm (India) Private Limited

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project is being implemented by Apraava Renewable Energy Private Limited (AREPL)² (formerly known as CLP Wind Farm (India) Private Limited) in the state of Tamil Nadu. The Wind Turbine Generators (“WTG”) or Wind Energy Generators (WEG) have been supplied by Vestas Wind Technology India Private Limited (“Vestas”). Vestas will be responsible for technology and equipment supply, as well as the operation and maintenance of the WTGs.

The project activity involved the generation of electricity using WTG. The objective of the project activity was to commission and operate a wind farm of 24.75 MW (“the Project”) in the Indian state of Tamil Nadu. The electricity generated from the wind farm will be exported to the Integrated Indian electricity grid. Distribution Licensee thereby marginally contributing towards reduction in the energy demand supply gap in the state of Tamil Nadu, diversification of grid supply and reduction of greenhouse gas emissions. Initially, the Indian electricity system is divided into two regional grids, the synchronous Northern, Eastern, Western, and North Eastern (NEWNE) grid and the Southern grid. Each grid covers several states. However, Govt. of India has decided to integrate all the regional grid systems and thus, regional grids are not existed now. Thus, now the project activity is connected to Integrated Indian Grid system.

The Project activity helps to reduce the demand- supply gap in the country and also helps in contributing to the sustainable development by using wind energy as the source of power generation and reduction of GHG emissions. The Commissioning and other relevant dates for each WEG are provided in table below:

Sr. No.	Location No.	HTSC No.	TNEB Invoice Serial Number	Date of Commissioning
1	CLPTHV-23	T110	59224760295	29-Jul-10
2	CLPTHV-28	T123	59224760308	29-Jul-10
3	CLPTHV-14	T124	59224760309	29-Jul-10
4	CLPTHV-02	T125	59224760310	29-Jul-10
5	CLPTHV-03	T126	59224760311	02-Jul-10
6	CLPTHV-07	T127	59224760312	29-Jul-10
7	CLPTHV-09	T128	59224760313	29-Jul-10
8	CLPTHV-10	T129	59224760314	29-Jul-10
9	CLPTHV-22	T130	59224760315	29-Jul-10

² The name of the company has been changed from the CLP Wind Farm (India) Private Limited to Apraava Renewable Energy Private Limited (AREPL) with effect from 31/12/2021.

10	CLPTHV-15	T131	59224760316	29-Jul-10
11	CLPTHV-18	T132	59224760317	29-Jul-10
12	CLPTHV-16	T133	59224760318	29-Jul-10
13	CLPTHV-17	T134	59224760319	29-Jul-10
14	CLPTHV-19	T135	59224760320	29-Jul-10
15	CLPTHV-20	T136	59224760321	29-Jul-10

During this monitoring period the project activity has exported 42.788 GWh of net energy to the Southern Grid of India (same is now part of integrated Indian grid). The total emission reductions achieved during the monitoring period from 01/01/2022 to 31/12/2022 (both days inclusive) is 39,756 tCO₂.

The audit history of the project is provided below:

Audit Type	Period	Program	VVB Name	Number of years
Validation and Verification	02/07/2010 - 10/06/2012	VCS	URS VERIFICATION PRIVATE LIMITED	1 year, 11 months,
Verification	11/06/2012 - 03/10/2012	VCS	URS VERIFICATION PRIVATE LIMITED	3 months
Verification	04/10/2012 - 10/05/2015	CDM	Bureau Veritas Certification	2 years, 7 months
Verification	11/05/ 2015 - 10/02/2016	CDM	URS VERIFICATION PRIVATE LIMITED	9 months
Verification	11/02/2016 - 10/07/2017	CDM	LGAI Technological Center	1 year, 5 months
Verification	11/07/2017 - 03/10/2019	CDM	Earhood Services Private Limited	2 year, 3 months
Joint Validation and Verification	01/01/2021- 31/12/2021	VCS	LGAI Technological Center	1 year
Verification	01/01/2022 to 31/12/2022	VCS	Earhood Services Private Limited	1 year
Total	02/07/2010 - 31/12/2022			12 years, 6 months

1.2 Sectoral Scope and Project Type

The project activity is considered under “grid-connected electricity generation from renewable sources” (Sectoral Scope) that generates electricity in excess of 15 MW (limit for small scale project). Therefore, as per the scope of the project activity enlisted in the “list of sectoral scopes and related approved baseline and monitoring methodologies”, the project activity is categorized in Scope Number 1. Details of the same are listed below:

Scope Number : 1

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

Methodology: “Grid-connected electricity generation from renewable sources”

Reference: ACM0002, Version 20

The Project is neither a grouped nor an AFOLU project.

1.3 Project Proponent

Organization name	Apraava Renewable Energy Private Limited (AREPL)
Contact person	Navneet Kumar
Title	Head – Carbon Offsets
Address	7th Floor, Fulcrum, Sahar Road, Andheri (East), Mumbai – 400099, India
Telephone	+ 91 22 6758 8888
Email	carbongroup@apraava.com

1.4 Other Entities Involved in the Project

Organization name	Not Applicable
Role in the Project	Not Applicable
Contact person	Not Applicable
Title	Not Applicable
Address	Not Applicable
Telephone	Not Applicable
Email	Not Applicable

1.5 Project Start Date

02/07/2010, being the date of commissioning of first WTG installed under the project activity.

1.6 Project Crediting Period

The Project has started generating GHG emission reductions from 02/07/2010 i.e. from earliest date of commercial operations of wind project. Hence, first crediting period for VCS begins on 02/07/2010 and ends on 01/07/2020 i.e. 10 years. This is the second crediting period of the project activity.

Start date of the crediting period : 02/07/2020

End date of the crediting period : 01/07/2030

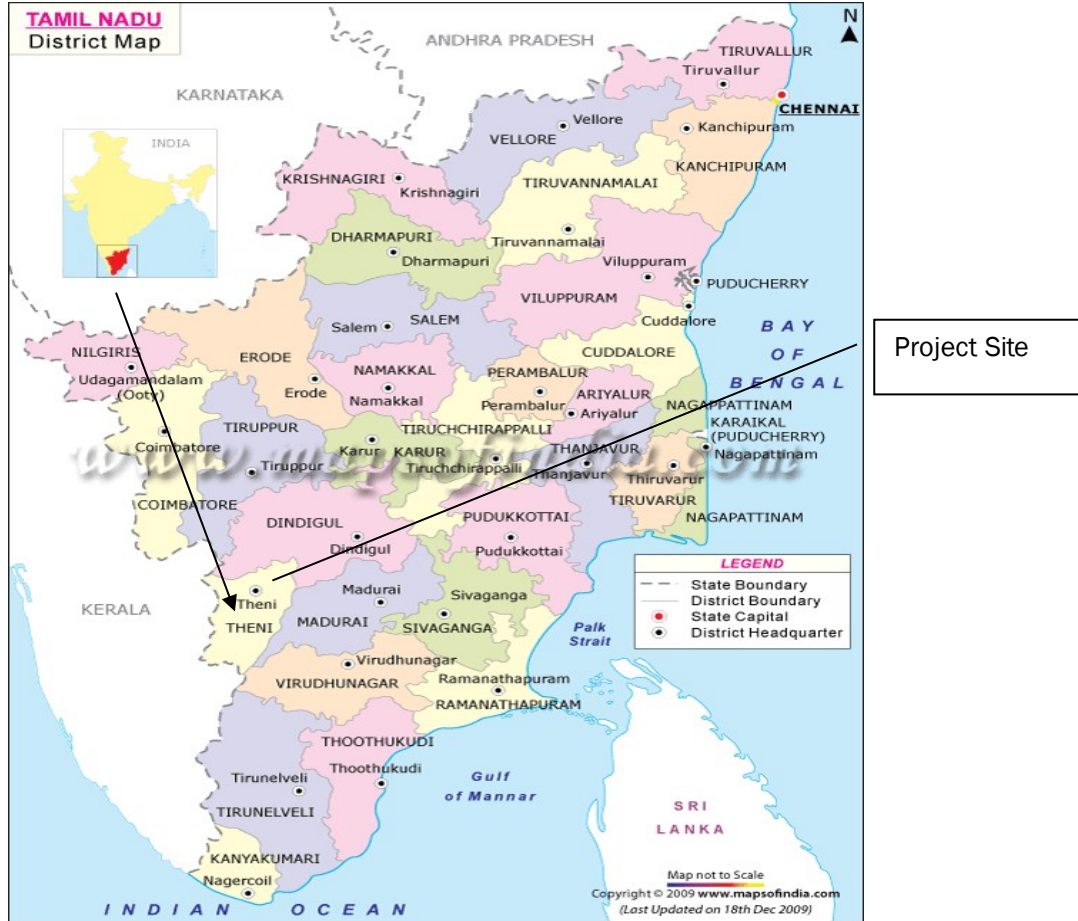
Project crediting period : 10 years 0 months (renewable)

Since the project activity is registered under both CDM and VCS mechanism, PP undertake that the project shall not claim credits for the same GHG emission reduction under CDM mechanism.

1.7 Project Location

The Project is spread across Jangalpatti, Poomalaikundu, Govindanagram & Seepalakottai villages in Theni & Uttamaplayamtaluka Taluk of Theni district of Tamil Nadu state in India. The nearest airport and railway station are in Madurai city, which is located at a distance of approximately 75 km from the project activity site.

Project Location Map:



The coordinates of individual WTGs of this site are as below:

SNo.	Location No.	HTSC No.	TNEB Invoice Serial Number	Village	Taluk	Longitude (E)	Latitude (N)
1	CLPTHV-23	T110	59224760295	Poomalaikundu	Theni	77° 26'10.50"	9° 52'46.15"
2	CLPTHV-28	T123	59224760308	Jangalpatti	Theni	77° 28'35.82"	9° 54'08.24"
3	CLPTHV-14	T124	59224760309	Poomalaikundu	Theni	77° 27'59.91"	9° 54'45.33"
4	CLPTHV-02	T125	59224760310	Poomalaikundu	Theni	77° 27'31.72"	9° 54'30.80"
5	CLPTHV-03	T126	59224760311	Poomalaikundu	Theni	77° 27'00.05"	9° 54'29.73"
6	CLPTHV-07	T127	59224760312	Poomalaikundu	Theni	77° 26'16.84"	9° 54'52.23"
7	CLPTHV-09	T128	59224760313	Poomalaikundu	Theni	77° 25'34.54"	9° 54'07.38"
8	CLPTHV-	T129	59224760314	Poomalaikundu	Theni	77° 25'37.12"	9° 53'52.07"

	10						
9	CLPTHV-22	T130	59224760315	Poomalaikundu	Theni	77°26'27.69"	9°52'59.62"
10	CLPTHV-15	T131	59224760316	Seepalakottai	Uttamaplayam	77°27'22.31"	9°52'36.71"
11	CLPTHV-18	T132	59224760317	Seepalakottai	Theni	77°28'10.93"	9°52'32.26"
12	CLPTHV-16	T133	59224760318	Jangalpatti	Theni	77°28'35.14"	9°52'32.08"
13	CLPTHV-17	T134	59224760319	Jangalpatti	Theni	77°28'51.89"	9°52'56.42"
14	CLPTHV-19	T135	59224760320	Jangalpatti	Theni	77°28'54.39"	9°53'19.14"
15	CLPTHV-20	T136	59224760321	Jangalpatti	Theni	77°29'16.57"	9°53'23.69"

1.8 Title and Reference of Methodology

The approved consolidated baseline and monitoring methodology ACM0002 (Version 2.0, EB105)³, has been used to determine the baseline emissions and emission reduction due to the project activity. The title of this baseline methodology is “Grid-connected electricity generation from renewable sources”. The other UNFCCC documents referred are as below:

- Tool for the demonstration and assessment of additionality, Version 06.0.0, EB 65, Annex 21 (<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v6.0.0.pdf>)
- Tool to calculate the emission factor for an electricity system (Version 7.0, EB 100)
- Guidelines on the assessment of Investment Analysis (Version 05, EB 62)
- Guidelines on demonstration of and assessment of prior consideration of the CDM (Version 04, EB 62)
- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (ver 3.0.1, Annex 47 of EB 66)

1.9 Participation under other GHG Programs

All the 15 WTGs of this project activity are part of registered CDM Project activity which has total 30 WTGs (49.5 MW) as follows:

Project Title: Grid Connected Wind Power Project in Tamil Nadu

³ <https://cdm.unfccc.int/methodologies/DB/HF3LP6041YY0JIP1DK6ZRJO9RSCX3S>

UNFCCC Registration Number: 7415,

(<https://cdm.unfccc.int/Projects/DB/RWTUV1348481875.12/view?cp=1>)

Crediting period: 04-10-2012 – 03-10-2019 (Renewable)

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

Duration of 2nd crediting period: 04-10-2019 – 03-10-2026

The details of issuance of CERs for the previous monitoring periods are as follows:

Monitoring Period Number	Monitoring Period	Issuances
1	04-10-2012 to 10-05-2015	1,89,782
2	11-05-2015 to 10-02-2016	62,357
3	11-02-2016 to 10-07-2017	164,494
4	11 -07-2017 to 03-10-2019	233,674
5	04 -10-2019 to 31-12-2020	88,221
6	01-01-2021 to 31-12-2021	45,378

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

- Emission Trading Programs and Other Binding Limits: The project has not participated in any Emissions Trading Programs. The emission reductions generated for this duration of periodic verification would not be claimed under any other GHG programs
- Other Forms of Environmental Credit: AREPL hereby confirms that the project has not sought or received any other GHG related environmental credit and submitted a declaration to DoE that AREPL wouldn't claim any form of environmental credit except VCU for the said duration.
- Supply Chain (Scope 3) Emissions: The project activity is a registered Wind Power Project. Hence supply chain (scope 3) emissions are not applicable. The project has been exclusively taken up as VCS project and has not been applied for any other form of environmental credit.

1.11 Sustainable Development Contributions

The National CDM Authority (NCDMA) which is the Designated National Authority (DNA) for the Government of India (GoI) in the Ministry of Environment, Forest and Climate Change (MoEFCC) has stipulated four indicators for sustainable development in the interim approval guidelines for

Clean Development Mechanism (CDM) projects from India⁴. The contribution of this project activity towards in terms of these four indicators is provided below:

1. Social Well Being:

- The project activity has led to the development of supporting infrastructure such as road network etc., in the wind park location, which also provides access to the local population.
- The project activity leads to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
- Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading increased energy security.

2. Environmental Well Being:

- The project activity involves use of renewable energy source for electricity generation instead of fossil fuel based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

3. Economic Well Being:

- The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; thus, project activity has created additional employment opportunities.
- The generated electricity is being fed into the Integrated Indian grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which has provided new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

4. Technological Well Being:

Increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

⁴ http://cdmindia.nic.in/host_approval_criteria.htm

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Not Applicable</i>	<i>Since PP did not monitor SDG activities during current or previous monitoring period, No SDG indicator and its impact has been reported.</i>	<i>Not Applicable</i>	<i>Not Applicable</i>

2 SAFEGUARDS

2.1 No Net Harm

According to Indian regulations, the implementation of the wind project does not require an environmental impact assessment. The Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India notification S.O. 1533 (E) dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 19862 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) MINISTRY OF ENVIRONMENT AND FORESTS) states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. Wind power projects are not included in this list and thus an EIA is not required. Further, the project activity does not have any significant impact on the environment.

2.2 Local Stakeholder Consultation

The project proponent organized a stakeholder meeting to clarify any queries or misgivings the local inhabitants in the region may have about the project.

CLP invited the local stakeholder for the local stakeholder meeting by inviting local stakeholders through notices 15 days in advance to the date of the meeting. The notices were sent to the stakeholders on 03-02-2010. The stakeholder meeting was organized on 18-02-2010 from 4:30 pm onwards at Middle school in the village nearby to the project site, in presence of representatives of Vestas and project proponent CLP as per the requirements of the CDM modalities.

Around 35 stakeholders from nearby villages were present for the meeting. No adverse comment was received from the local stakeholders. The local stakeholder meetings were carried out at site of the project activity and the details of the same can be referred from the registered VCS PD. As a part of continuous feedback from stakeholders, along with the 3rd party O&M contractor, CLP has also appointed independent Asset Managers at every site. These assets managers are responsible for site supervision and continuous day-to-day interaction with the local stakeholders e.g. local villagers, local govt. authorities and others. Based on the local requirements, CLP has initiated several CSR/sustainable development activities in the project catchment area. Further, CLP has also placed a grievance register onsite where-in, the stakeholders can put down their request/complaint/requirements. Same is continuously monitored and appropriate action are also being taken by management. Furthermore, CLP has also placed a notice board on site to communicate any necessary information/updates to local stakeholders. CLP has found this two-way communication with local stakeholders is very effective towards sustainability of the project in long run.

2.3 AFOLU-Specific Safeguards

This section is not applicable for this project activity

3 IMPLEMENTATION STATUS

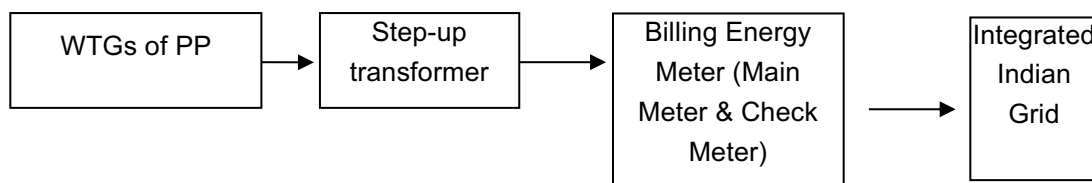
3.1 Implementation Status of the Project Activity

All the WTGs of the Project are commissioned and the Project is fully implemented. The commissioning dates of the individual WTGs have been provided in section 1.7.

Events that may impact the GHG emission reductions or removals and monitoring:

No such events took place during this monitoring period that may impact the GHG emission reductions for the project activity. Regular O&M activities were conducted but barring them the project activity has been exporting electricity continuously since commissioning. There were neither major breakdowns nor other events for the project activity during the monitoring period that may impact the GHG emission reductions for the project activity.

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



3.2 Deviations

2.1.1 Methodology Deviations

There are no deviations related to methodology.

2.1.2 Project Description Deviations

There are no deviation considered during current monitoring period for project activity. However, below deviations were considered during previous monitoring periods:

- During registration, calibration frequency has been considered once in three year. However, in actual practice, state utility conducted the accuracy check of all interface meters once in five years. These meters also tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Same is in line with para 18.1.b of the notification dated 17/03/2006 published by Central Electricity Board, Govt. of India (www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf). Testing and calibration has been done by state utility which is beyond the control of Project Participant.

• During project commissioning state utility has installed energy meters with 0.5s accuracy class as energy meters are connected to grid at 33 kV. In this project activity, project WTGs are generating electricity at 690 V which is then stepped up to 33 kV through 3 phase transformers located near to the WTG and dedicated energy meters are also connected to these transformers to monitor the electricity export and import by the WTGs. In accordance with Standards on Installation and Operation of Meters (pg no 15 of 20) of the notification dated 17/03/2006 published by Central Electricity Board, Govt. of India (www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf), interface meters with 0.5s or better accuracy class needs to be installed if energy meter is connected to above 650 volts and up to 33 kV. TNEB (state utility) has decided to upgrade accuracy class of all energy meters from 0.5s to 0.2s. Thus, being a project developer under TNEB jurisdiction, AREPL has to replace all interface energy meters at site and same is beyond the control of AREPL.

The above-mentioned 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 i.e. ACM0002 version 20.

3.3 Grouped Projects

Not Applicable

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ e/MWh
Description	Weighted average (net electricity generation) Operating Margin (OM) Emission Factor of Southern Regional Electricity Grid
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 17.
Value applied:	0.9522

Justification of choice of data or description of measurement methods and procedures applied	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with "Tool and BM values as per Version 7.0 of methodological tool to calculate the emission factor for an electricity system" and using data base of CEA. Computed once during PDD finalization.
Purpose of Data	Baseline Emission For the calculation of Emission Factor of the grid
Comments	Operating margin emission factor is fixed ex-ante. The data will be archived for two years beyond the crediting period

Data / Parameter	EF _{grid, BM, y}
Data unit	tCO ₂ e/MWh
Description	Build Margin (BM) Emission Factor of Integrated Indian Grid
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 17.
Value applied:	0.8653
Justification of choice of data or description of measurement methods and procedures applied	The Build Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with "Tool to calculate the emission factor for an electricity system"
Purpose of Data	Baseline Emission calculation
Comments	Build margin emission factor is fixed ex-ante

Data / Parameter	Ratio OM:BM
Data unit	-
Description	Ratio of Operating margin to build margin used for calculation of combined margin for wind energy project
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 17.

Value applied:	75:25
Justification of choice of data or description of measurement methods and procedures applied	Same ratio has been selected in accordance with "Tool to calculate the emission factor for an electricity system"
Purpose of Data	Baseline Emission calculation
Comments	Ratio is fixed ex-ante.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ /MWh
Description	Combined Margin Emission Factor
Source of data	The CO ₂ Baseline Database for the Indian Power Sector - Ministry of Power: Central Electricity Authority (CEA) Version 17.
Value applied:	0.9305
Justification of choice of data or description of measurement methods and procedures applied	The Combined Margin Emission Factor has been calculated using the simple OM approach in accordance with "Tool to calculate the emission factor for an electricity system"
Purpose of Data	Baseline Emission calculation
Comments	Combined margin emission factor is fixed ex-ante

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y

Source of data	The electricity supplied to the grid would be taken from the Joint Meter Reading Report / Energy Generation Statement issued by TNEB for each WTG. TNEB issues this report / statement based on the generation recorded by meters located near each WTG
Description of measurement methods and procedures applied	The net electricity supplied to the grid is measured by the main meters and check meters (export and import values) installed by TNEB at the metering point near each WTG. The Total Net Electricity supplied to the grid by the project activity is the summation of Net Electricity supplied by individual 15 WTG of the project activity. For details monitoring equipment refer appendix 1.
Frequency of monitoring/recording	Monthly
Value applied:	42,726.07 MWh
Monitoring equipment	Accuracy of meters: 0.5s or higher Frequency of calibration: Once in five year The quantity of net electricity supplied will be cross-verified from the invoice raised to TNEB by the project proponent. The meter details and calibration are provided in the appendix-1 of MR.
QA/QC procedures applied	Accuracy of meters: 0.5s or higher-class Frequency of calibration: Once in five years. The quantity of net electricity supplied has been cross verified from the invoice raised to TNEB by AREPL.
Purpose of data	Calculation of baseline emissions or baseline net GHG removals by sinks
Calculation method	Not Applicable
Comments	The data will be archived for two years after the end of the last crediting period or till the last issuance of CERs for the project activity, whichever is later.

4.3 Monitoring Plan

The approved large-scale methodology ACM0002 (version 20), stipulates the monitoring of the net electricity generation supplied by the project plant/unit to the grid. Project proponent has signed an “Operation and Maintenance” contract with Vestas for operation & maintenance of WTGs. The performance of the WTGs, safety in operation and scheduled /breakdown maintenances are organized and monitored by the Vestas and their activities are supervised by AREPL through their site staff. Vestas also provides daily generation data to AREPL through website.

A power purchase agreement has been signed with TNEB. AREPL has installed two identical energy meters – main meter and check meters of 0.5s or more accuracy class (0.2s) at each WTG's 33kV outgoing feeder (metering point). All the energy meters are duly approved, tested and sealed by TNEB. The main meter readings at the metering point are undertaken every month jointly by the representatives of the TNEB officials and representative of AREPL for the previous month. The meter readings are jointly certified by representatives of the TNEB officials and AREPL.

During registration, calibration frequency has been considered once in three years. However, in actual practice, state utility conducted the accuracy check of all interface meters once in five years. These meters also tested whenever the energy and other quantities recorded by the meter are abnormal or inconsistent with electrically adjacent meters. Same is in line with para 18.1.b of the notification dated 17/03/2006 published by Central Electricity Board, Govt. of India (www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf). Testing and calibration has been done by state utility which is beyond the control of Project Participant. Therefore, the frequency of meter testing is once in five years. All meters are tested at the Metering Point.

Metering procedure

The metering is carried out at TNEB meter located near to each WTG (30 TNEB dedicated meters for 15 WTGs of the project activity). This is the metering point wherein the Joint Meter Reading (JMR) is carried out every month in presence of the representatives of the project proponent & the state electricity utility (TNEB). This JMR is used for calculation of the amount of electricity supplied to the Integrated Indian grid against which the utility makes the payment to the project proponent. The JMR document contains “export”, “import” and “net export” of the electricity to/from the Integrated Indian Grid. In case of failure of main meter reading, check meter will be used for the purpose of JMR and billing.

The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication are as per the PPA (power purchase agreement) with TNEB. Metering: The electricity supplied to the Integrated Indian grid is metered through the two way export meter installed by TNEB at the high voltage side of the step up transformer installed at the project Site.

Metering Equipment: The metering equipment is an electronic trivector meter of accuracy class 0.2s required for the project. The meters are owned, maintained and operated by TNEB. The metering equipment is maintained in accordance with the electricity standards prevalent in Tamil Nadu. The meter details (serial no, type, make etc) and calibration are provided in the appendix-1 of MR.

Meter Readings: The monthly meter readings are taken jointly by the TNEB and representative of AREPL for the last month. At the conclusion of each meter reading appointed representative of the TNEB and AREPL, sign the document indicating the number of kWh injected by the main meter. AREPL has also installed the check meter. The check meter reading shall only be considered when main meter is found to be defective or stopped. However, in this monitoring period same incident has not reported by TNEB representative.

Apart from the main meter and the check meter, every WTG is equipped with an inbuilt meter (called controller) which continuously records the electricity generated by each WTG.

Inspection of Energy Meters: The two-way revenue meters are of 0.2s class are installed at grid interconnection point. The meter is jointly inspected and sealed on behalf of the parties and is not to be interfered with by either party except in the presence of the other party or its accredited representative.

Meter Test Checking: The meter is tested for accuracy with reference to a portable standard meter owned by TNEB. The meter is deemed to be working satisfactorily if the errors are within specifications for meters of 0.2. The consumption registered by the main meter alone holds good for the purpose of metering electricity supplied to the grid as long as the error in the meter is within the permissible limits.

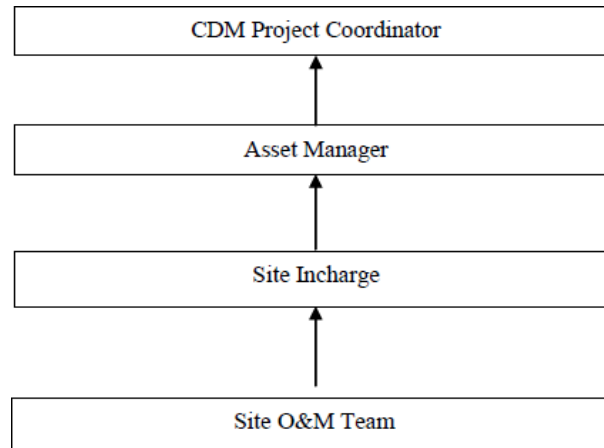
Readings of both Main and Check meters shall be taken every month and shall be compared with each other. Following QA-QC scenarios are planned to demonstrate accuracy of the metering equipment,

1. If the difference between the readings of both meters is lower than total permissible error of both the meters, reading of Main meter is considered for emission reduction calculation
2. If the difference between the readings of both meters is higher than total permissible error of both the meters then both the meters shall be tested.
 - a. During such test, if Main meter is found working within the permissible limits then, reading of Main meter will be considered for emission reduction calculation and Check meter will be calibrated
 - b. During such test, if Check meter is found working within the permissible limits then, reading of Check meter will be considered for emission reduction calculation and Main meter will be calibrated
 - c. During such test, if error of both the meters are found to be more than their individual permissible error limits, then error of Main meter will be applied in a conservative manner to its reading in emission reduction calculation. Such correction will be applied to entire generation record starting from the last calibration due date to the date of testing.

In this monitoring period, no such incident has reported by the TNEB representatives. The details of calibration for the current monitoring period are provided in Annexure 1 of this report.

Project management structure

The operation and maintenance team consist of representatives of technology supplier, Vestas, who records the readings and prepare daily generation reports of all the WTGs. The primary recording of the electricity fed to the electricity grid is carried out jointly at the TNEB meter located near each WTG. The organizational and management structure for the monitoring of the project activity is as follows:



The project team is delegated with the responsibility to monitor and document the electricity generated and also safe keeping of the recorded data. The project team is also responsible for calculation of emission reduction in the most transparent and relevant manner. All the monitoring data is stored/will be recorded and kept under safe custody. The organizational structure for the monitoring plan with responsibilities is provided below:

Designation	Responsibilities
CDM Project Coordinator	<ul style="list-style-type: none"> • Overall CDM project management • Ensures adherence to monitoring plan • Estimation of Emission Reductions • Holds complete control over monitoring aspects pertaining to the project
Asset Manager	<ul style="list-style-type: none"> • Verification of Data (Consistency & Completeness) • Storage of Data (Archiving) • Review / Corrective and preventive Actions • QA/QC procedures
Site Incharge	<ul style="list-style-type: none"> • Verification of Data (Consistency & Completeness) • Storage of Data (Archiving) • Operation & Maintenance
Site O&M team	<ul style="list-style-type: none"> • Recording of monitored data • Storage of Data (Archiving) • Operation & Maintenance

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{\text{Integrated grid,CM, y}}$$

Where:

BE_y = Baseline emissions in year y (tCO₂)

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

$EF_{\text{grid,CM,y}}$ = Combined margin CO₂ emission factor for Integrated Indian grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”

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

$$EG_{PJ,y} =$$

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

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)

Baseline emissions (BE_y) are calculated as follows:

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

Thus,

$$BE_y = 42,726.07 * 0.9305 \text{ tCO}_2\text{e}$$

$$= 39,756 \text{ tCO}_2\text{e}$$

5.2 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002 Version 20.0.0, there will be no project emissions in the project activity $PE_y = 0$

5.3 Leakage

As per ACM0002 Version 20.0.0, no leakage has been considered for the calculation of emission factor.

5.4 Net GHG Emission Reductions and Removals

According to the approved methodology ACM0002 (Version 20.0.0) Emission Reductions are calculated as

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions in year y (tCO₂/yr)

BE_y Baseline Emissions in year y (tCO₂/yr)

PE_y Project Emissions in year y (tCO₂/yr)

Thus,

$$ER_y = 39,756 - 0 \text{ tCO}_2$$

$$= 39,756 \text{ tCO}_2$$

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 (01/01/2022 to 31/12/2022)	39,756	0.00	0.00	39,756
Total	39,756	0.00	0.00	39,756

The actual emission reductions achieved during this monitoring period is 29.17 % lower than the estimated value as per registered PD which is due to lower wind availability at site. Wind availability is a natural phenomenon which is beyond the control of AREPL.

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
56,132	39,756	29.17%	Availability of wind during low wind season is a natural phenomenon which is beyond the control of project proponent. Also, breakdown of wind turbines due to blade failure caused lower generation during current monitoring period.

APPENDIX 1: CALIBRATION DETAILS (ERROR FACTOR HAS BEEN APPLIED IN CASE OF CALIBRATION DELAY)

HTSC No.	Meter Details	Meter Serial Number	Previous Calibration Date	Latest Calibration Date	Valid Till	Accuracy Class	Make
T110	Main Meter	624921	05-04-2017	12-04-2023	11-04-2028	0.2s	HPL Electric
	Check Meter	3033736	08-12-2017	12-04-2023	11-04-2028	0.2s	HPL
T123	Main Meter	3033730	08-12-2017	24-01-2023	23-01-2028	0.2s	HPL
	Check Meter	5839971	29-05-2017	24-01-2023	23-01-2028	0.2s	Genus
T124	Main Meter	1379648	27-05-2017	11-04-2023	10-04-2028	0.2s	Genus
	Check Meter	3033750	08-12-2017	11-04-2023	10-04-2028	0.2s	HPL
T125	Main Meter	3033745	08-12-2017	24-01-2023	23-01-2028	0.2s	HPL
	Check Meter	HT 2180087	21-05-2020	24-01-2023	23-01-2028	0.2s	EDMI
T126	Main Meter	HT 2180279	20-01-2020	11-04-2023	10-04-2028	0.2s	EDMI
	Check Meter	3033747	08-12-2017	11-04-2023	10-04-2028	0.2s	HPL
T127	Main Meter	625156	03-04-2017	12-04-2023	11-04-2028	0.2s	HPL Electric
	Check Meter	3033728	08-12-2017	12-04-2023	11-04-2028	0.2s	HPL
T128	Main Meter	4321966	30-05-2017	12-04-2023	11-04-2028	0.2s	Genus
	Check Meter	3033714	08-12-2017	12-04-2023	11-04-2028	0.2s	HPL
T129	Main Meter	HT 2180305	29-10-2018	12-04-2023	11-04-2028	0.2s	EDMI
	Check Meter	3033713	08-12-2017	12-04-2023	11-04-2028	0.2s	HPL
T130	Main Meter	625093	05-04-2017	12-04-2023	11-04-2028	0.2s	HPL Electric
	Check Meter	3033739	08-12-2017	12-04-2023	11-04-2028	0.2s	HPL
T131	Main Meter	3033725	08-09-2017	10-04-2023	09-04-2028	0.2s	HPL
	Check Meter	3033726	08-12-2017	10-04-2023	09-04-2028	0.2s	HPL

T132	Main Meter	625097	04-04-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
	Check Meter	3033729	08-12-2017	10-04-2023	09-04-2028	0.2s	HPL
T133	Main Meter	624927	11-04-2017	10-04-2023	09-04-2024	0.2s	HPL Electric
	Check Meter	3033741	08-12-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
T134	Main Meter	624929	11-04-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
	Check Meter	3033721	08-12-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
T135	Main Meter	625096	04-04-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
	Check Meter	3033711	08-12-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
T136	Main Meter	625094	04-04-2017	10-04-2023	09-04-2028	0.2s	HPL Electric
	Check Meter	3033715	08-12-2017	10-04-2023	09-04-2028	0.2s	HPL Electric