

WIND PROJECT IN MAHARASHTRA, INDIA BY KAYATHAR AND JATH.

Document Prepared By: NSL Wind Power Company (Kayathar) Pvt. Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity involves installation of 67.5 MW capacity wind power generation project out of which 37.5 MW by NSL Wind Power Company (Kayathar) Pvt. Ltd. (Project Proponent¹) and 30.0 MW capacity wind power generation project by Jath Wind Energy Private Limited. The project activity is generating 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.

This activity involves total installation and operations of following WTGs.

Project Developers	Number of WTG	Supplier of WTG	Rated Capacity	Total Installed Capacity	Location
NSL Wind Power Company (Kayathar) Pvt. Ltd.	25	ReGen Power Vensys V87	1.5 MW	37.5 MW	Taluka: Jath, District: Sangli, State: Maharashtra in India
Jath Wind Energy Private Limited	15	Inox Wind Ltd. WT- 2000 DF	2.0 MW	30.0 MW	Taluka: Jath, District: Sangli, State: Maharashtra in India
Total Project Capacity				67.5 MW	

The commissioning dates of the WTGs are listed in the Appendix 2

- The electricity generated by the project activity will be displacing the grid electricity which would have been otherwise generated through sources dominated by fossil fuel based power plants at NWENE grid. The project activity reduces the emission of GHG gases which would have been generated in the absence of the project activity and also help to reduce the supply demand gap in the state with contribution in the sustainable development.
- The project activity (i.e. total capacity of 67.5 MW) is exporting 197,054.64 MWh of electricity to the NEWNE Grid. The project activity is contributing in GHG emission reduction of about 192,463 tCO_{2e} in this monitoring period (01/02/2016 to 30/09/2017).

1.2 Sectoral Scope and Project Type

Sectoral scope : 01, Energy Industries (renewable- /non-renewable sources)
Project Type : I, Renewable energy projects

¹The project activity is a bundled project of total capacity 67.5 MW developed by two project developers and the bundle has been represented by only one project proponent, i.e. "NSL Wind Power Company (Kayathar) Pvt. Ltd."

The project is not a grouped project activity. It is bundled project activity of total 67.5 MW developed by two project developers and the bundle has been represented by only one project proponent, i.e. NSL Wind Power Company (Kayathar) Pvt. Ltd. This is in line with the registered PD.

1.3 Project Proponent

Organization name	M/s NSL Wind Power Company (Kayathar) Pvt. Ltd.
Contact person	Mr. A. Rajnikant
Title	DGM – Power Division
Address	#8-2-684/2/A, NSL ICON, Road No. 12, Banjara Hills, Town / City: Hyderabad, Andhra Pradesh, PIN: 500034, India.
Telephone	+91 40 3051 4444
Email	rajnikant.a@nslpower.com

1.4 Other Entities Involved in the Project

Organization name	Jath Wind Energy Private Limited
Contact person	Mr. A. Rajnikant
Title	DGM – Power Division
Address	#8-2-684/2/A, NSL ICON, Road No. 12, Banjara Hills, Town / City: Hyderabad, Andhra Pradesh, PIN: 500034, India.
Telephone	+91 40 3051 4444
Email	rajnikant.a@nslpower.com

1.5 Project Start Date

30-March-2014².

1.6 Project Crediting Period

The proposed crediting period under VCS is as follows:

Fixed crediting period : 30th March-2014 to 29th-March-2024.
Total number of years : 10.

² The start date of the project activity has been considered as the date of commissioning of the first WTG in the bundle, which is in accordance with the VCS standard.

1.7 Project Location

Project activity is located in the JathTaluka, Sangli district of Maharashtra State, India.

The location maps are included below. The details of geo-coordinates are as follows:

Location of 15 WTGs from INOX (By: Jath Wind Energy Private Limited):

S. No.	WTG No.	UTM (Universal Transverse Mercator) format		DD-MM-SS (Degree/minutes/Seconds) format		Location
		Easting (m)	Northing (m)	Latitude N	Longitude E	
1	MV T-5	533120	1889212	17° 5' 13.4"	75° 18' 40.67"	Village : ValsangTeshil : Jath District : Sangli
2	MV T-11	531602	1889817	17° 5' 33.16"	75° 17' 49.33"	Village : KarajangiTeshil : Jath District : Sangli
3	MV T-10	531476	1889319	17° 5' 16.96"	75° 17' 45.03"	Village : KarajangiTeshil : Jath District : Sangli
4	MV T-61	535796	1883332	17° 2' 1.9"	75° 20' 10.86"	Village : ShedyalTeshil : Jath District : Sangli
5	MV2 T-42	530238	1879946	17° 0' 12.01"	75° 17' 2.68"	Village : RavalgundawadiTeshil : Jath District : Sangli
6	MV T-45	533218	1889748	17° 5' 30.83"	75° 18' 44"	Village : KarajangiTeshil : Jath District : Sangli
7	MV2 T - 17	531346	1879175	16° 59' 46.87"	75° 17' 40.12"	Village : RavalgundawadiTeshil : Jath District : Sangli
8	MV2 T-2	532993	1880588	17° 0' 32.77"	75° 18' 35.9"	Village : MuchandiTeshil : Jath District : Sangli

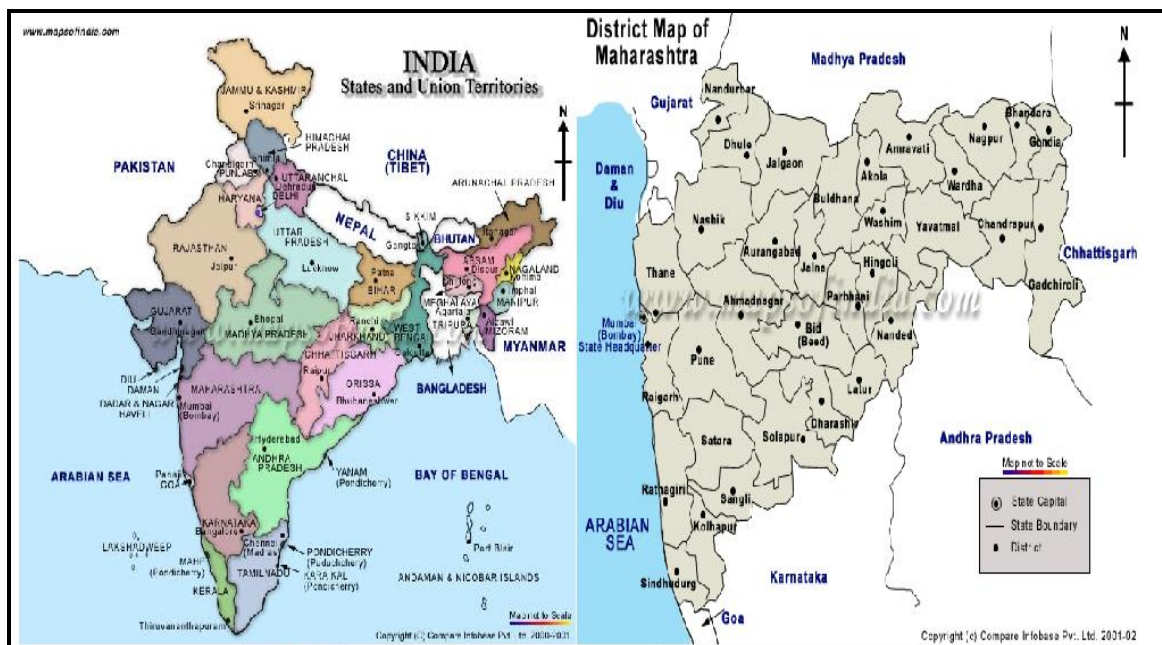
9	MV2 T-15	530784	1879320	16° 59' 51.61"	75° 17' 21.12"	Village : RavalgundawadiTeshil : Jath District : Sangli
10	MV2 T-41	530175	1879560	16° 59' 59.45"	75° 17' 0.54"	Village : RavalgundawadiTeshil : Jath District : Sangli
11	MV2 T-28	532352	1875997	16° 58' 3.4"	75° 18' 13.98"	Village : RavalgundawadiTeshil : Jath District : Sangli
12	MV2 T-3	533289	1880081	17° 0' 16.25"	75° 18' 45.88"	Village : MuchandiTeshil : Jath District : Sangli
13	MV T-62	534857	1882341	17° 1' 29.71"	75° 19' 39.04"	Village : MuchandiTeshil : Jath District : Sangli
14	MV T-63	534898	1882806	17° 1' 44.84"	75° 19' 40.45"	Village : MuchandiTeshil : Jath District : Sangli
15	MV2 T-37	531281	1880464	17° 0' 28.81"	75° 17' 37.99"	Village : MuchandiTeshil : Jath District : Sangli

Location of 25 WTGs from ReGen Power (By NSL Wind Power Company (Kayathar) Pvt. Ltd.):

S. No.	WTG No.	UTM (Universal Transverse Mercator) format		DD-MM-SS (Degree/minutes/Seconds) format		Location
		Easting (m)	Northing (m)	Latitude N	Longitude E	
1	NSL P1-332	524859	1894452	17° 8' 4.29"	75° 14' 1.35"	Village : WayphalTeshil : Jath District : Sangli
2	NSL P1-408	525895	1895627	17° 8' 42"	75° 14' 36.46"	Village : WayphalTeshil : Jath District : Sangli

3	NSL P1-186	526238	1894037	17° 7' 50.73"	75°14' 48.01"	Village : BanaliTeshil : Jath District : Sangli
4	NSL P1-331	524784	1894116	17° 7' 53.36"	75°13' 58.8"	Village : Banali Teshil : Jath District : Sangli
5	NSL P1-179A	525198	1895440	17° 8' 36.43"	75°14' 12.87"	Village : BanaliTeshil : Jath District : Sangli
6	NSL P1-179	525260	1895102	17° 8' 25.43"	75°14' 14.95"	Village : BanaliTeshil : Jath District : Sangli
7	NSL P1-310	525023	1894815	17° 8' 16.1"	75°14' 6.92"	Village : BanaliTeshil : Jath District : Sangli
8	NSL P1-1001	527255	1898405	17° 10' 12.83"	75°15' 22.62"	Village : WayphalTeshil : Jath District : Sangli
9	NSL P1-1000	527255	1898405	17° 10' 12.83"	75°15' 22.62"	Village : WayphalTeshil : Jath District : Sangli
10	NSL P1-1028	527971	1897996	17° 9' 59.49"	75°15' 46.84"	Village : WayphalTeshil : Jath District : Sangli
11	NSL P1-95	528098	1897567	17° 9' 45.52"	75°15' 51.12"	Village : WayphalTeshil : Jath District : Sangli
12	NSL P1-930	527308	1899768	17° 10' 57.18"	75°15' 24.47"	Village : WayphalTeshil : Jath District : Sangli
13	NSL P1-229	527201	1894912	17° 8' 19.16"	75°15' 20.64"	Village : WayphalTeshil : Jath District : Sangli
14	NSL P1-929	527156	1899108	17° 10' 35.71"	75°15' 19.303"	Village : WayphalTeshil : Jath District : Sangli
15	NSL P1-276	527115	1895607	17° 8' 41.79"	75°15' 17.76"	Village : WayphalTeshil : Jath District : Sangli

16	NSL P1-1034	527184	1897750	17° 9' 51.51"	75°15' 20.19"	Village : WayphalTeshil : Jath District : Sangli
17	NSL P1-1078/1	526377	1896547	17° 9' 12.41"	75°14' 52.82"	Village : WayphalTeshil : Jath District : Sangli
18	NSL P1-169A	524926	1896003	17° 8' 54.76"	75°14' 3.68"	Village : BanaliTeshil : Jath District : Sangli
19	NSL P1-169B	524882	1896306	17° 9' 4.62"	75°14' 2.21"	Village : Banali Teshil : Jath District : Sangli
20	NSL P1-252A	525005	1893004	17° 7' 17.16"	75°14' 6.23"	Village : Banali Teshil : Jath District : Sangli
21	NSL P1-252B	525073	1892655	17° 7' 5.81"	75°14' 8.52"	Village : Banali Teshil : Jath District : Sangli
22	NSL P1-407	525915	1895958	17° 8' 53.25"	75°14' 37.16"	Village : WayphalTeshil : Jath District : Sangli
23	NSL P1-216	528475	1896022	17° 8' 55.23"	75°16' 3.81"	Village : WayphalTeshil : Jath District : Sangli
24	NSL P1-236	526679	1894772	17° 8' 14.63"	75°15' 2.96"	Village : WayphalTeshil : Jath District : Sangli
25	NSL P1-171,172	530643	1887491	17° 4' 17.52"	75°17' 16.76"	Village : ValsangTeshil : Jath District : Sangli



1.8 Title and Reference of Methodology

Title: Grid-connected electricity generation from renewable sources³

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

³ <http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

1.9 Other Programs

The project may have been eligible to participate in different mechanism such as REC etc. to create another form of GHG related environmental credits; however project has never been applied under any such mechanism other as yet.

However, both the sub-projects seeking registration under CDM and both the sub-projects are listed as part of CDM project individually as follows;

Project developer	Project Title under CDM	Current status
Jath Wind Energy Private Limited	Wind Power Project by M/s Jath Wind Energy Private Limited in Maharashtra, India.	Under validation
NSL Wind Power Company (Kayathar) Pvt. Ltd.	Kayathar Wind Power Project in Maharashtra, India	Under validation

However, the PP has provided declaration stating that Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits any specific monitoring period under two mechanisms.

The host country (i.e. India) of the project activity is a non-Annex 1 country; hence, the project does not have any compliance driven emission trading program or other binding limits.

The project has not sought or received any other form of GHG related environmental credit.

1.10 Sustainable Development

The electricity generated by the project activity is displacing the grid electricity which would have been otherwise generated through sources dominated by fossil fuel based power plants at NWENE grid.

Thus, the project activity reduces the emission of GHG gases and also helps to reduce the supply demand gap in the state with contribution in the sustainable development.

Project activity also contributes in national energy security. Direct & Indirect revenue generation is also linked with the project activity during its construction & operation phase.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project activity consists of 40 WTGs implemented by the two project developers as listed in the section 1.1. The project WTGs has been bundled together as new project activity from the beginning and there is no any new instance applicable to the project activity at this stage.

There are no events occurred during this verification or since project commissioning that may impact the GHG emission reductions or removals and monitoring with the project.

2.2 Deviations

2.2.1 Methodology Deviations

Not Applicable

2.2.2 Project Description Deviations

As per section 3.6.1 (2) "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.

In Current Monitoring Period, a deviation has been taken on account of delay in meter calibration. Details of energy meter & delay in calibration has been provided in Appendix 1 of the monitoring report

As per PD "The project adheres to all the mandatory regulatory and statutory requirements at the state as well as national level."

The 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. 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 has followed conservative approach and hence, an error factor equating the maximum permissible limit of error for the meters has been 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..

2.3 Grouped Project

This is not a grouped project activity, the project activity is a bundled project developed by the two project developers and bundle has been represented by one project proponent.

2.4 Safeguards

2.4.1 No Net Harm

There is not net harm linked with the project activity.

2.4.2 Local Stakeholder Consultation

For both the project participants, the stakeholder's consultation has been carried out in common on 06/02/2014. All the relevant information & details has been provided in VCS PD as per the VCS guidance.

There were no negative comments received for the project activity.

3 DATA AND PARAMETERS

3.1 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 CO ₂ Baseline database Version 10
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 DOE for validation. Data compiled in CEA CO ₂ CDM database is in line with the requirements Version 5.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of the 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 _{2e} emission factor of NEWNE grid
Source of data	Central Electricity Authority:CO ₂ Emission Database CEA CO ₂ Baseline database Version 10
Value applied	0.9495
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 5.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of the data	Calculation of baseline emissions
Comments	The build Margin would be calculated ex ante and fixed during the crediting period.

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 5.0 of "Tool to calculate the emission factor for an electricity system".
Purpose of the data	Calculation of baseline emissions
Comments	The Combined Margin would be calculated ex ante and fixed during the crediting period.

3.2 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 (i.e. total 40 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 & measurement⁴of electricity at project metering point is being done on continuous basis; while recording is being done on monthly basis as Joint Meter Reading by therepresentatives 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 WTG, controller reading for all WTGsconnected at the given meteringpoint and the electricity reading (export, import 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: $EG_{\text{facility},y} = \sum EG_{\text{JMR, project, export}} - \sum EG_{\text{JMR,project, import}}$ (Here $EG_{\text{JMR, project, export}}$ & $EG_{\text{JMR, project, import}}$ Signifies values related to all WTGs included in the project activity, i.e WTGs from both the participants - NSL Wind Power Company (Kayathar) Pvt. Ltd. & Jath Wind Energy Private Limited) 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. $(EG_{\text{facility},y})$. 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	197,054.64 (Corrected value post applying error factor)
Monitoring equipment	Not applicable as the parameter is calculated
QA/QC procedures to be applied	The quantity of net electricity supplied will be cross-verified from the invoices raised on MSEDCL by the project participant. QA/QC procedures will be as implemented by DISCOM pursuant to the provisions of the power purchase agreement and there will be no

⁴ 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. Details of meter calibration has been provided in Appendix 3. Also, delay in meter calibration is applied appropriately. Please refer ER sheet for detailed calculation.

	additional QA/QC procedures.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Calculation method is described in detail in section 4.1.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period.

Data / Parameter	EG_{JMR, Project, 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 4.1.
Frequency of monitoring/recording	Monthly recording
Value monitored	197,261.03
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 will be on monthly basis.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Calculation method is described in section 4.1.
Comments	Date will be archived for crediting period plus two years after the end of Crediting period

Data / Parameter	EG_{JMR, Project, import,y}
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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 4.1.
Frequency of monitoring/recording	Monthly recording
Value monitored	206.39
Monitoring equipment	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 will be on monthly basis.
Purpose of the data	Used to calculate baseline emissions
Calculation method	Calculation method is described in section 4.13.
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 WEGs. 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 monitoring and Monthly recording
Value monitored	196,783.85
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

3.3 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 team, 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 the 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 calibration⁵, periodical testing, sealing and maintenance of meters in the presence of PPs representative. The frequency of meter testing is once in 3 years. 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 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 snapshot 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 proponents have signed "Operation and Maintenance" contracts with the respective suppliers, i.e. ReGen Power Tech Private Limited and INOX Wind 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

⁵Details of meter calibration are provided in Appendix 3. Also, delay in meter calibration is applied appropriately. Please refer ER sheet for detailed calculation.

monitored by the contractor. The technology providers will monitor the generation of the WTG daily on a regular basis and will maintain 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 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.

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

$EG_{JMR, Project, import}$ = Electricity imported by a WEC 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-

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

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

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

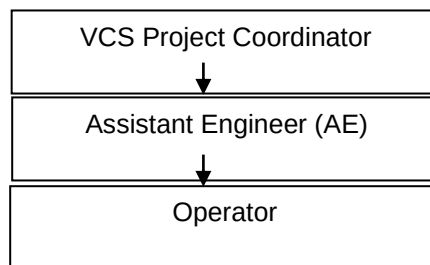
$$\sum EG_{\text{JMR, NSL, export}} = EG_{\text{JMR, Project, export}, y}$$

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

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.

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 will be provided by the technology suppliers.

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 $EG_{\text{JMR, project, export}, y}$, $EG_{\text{JMR, project, import}, y}$ and $EG_{\text{facility},y}$ 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 are not included in section 4.2 of the PD.

Thus, the monitoring plan is complete, accurate and in line with actual metering and monitoring arrangement finalised by DISCOM in consultation with State Electricity Regulatory Commission

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

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

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

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 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:

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

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 in year y (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Emission reduction (ER) calculation for the period 01/02/2016 to 30/09/2017 (including first and last day):

$$\begin{aligned} BE_y &= EG_{facility,y} * EF_{grid,CM,y} \\ &= 197,054 * 0.9767 \text{ tCO}_2\text{e/MWh} \\ &= 192,463 \text{ tCO}_2\text{e (values rounded down)} \end{aligned}$$

As the project activity is wind power project, project emissions are zero and there is no leakage emission.

Therefore, Net Emission Reductions are:

$$\begin{aligned} ER_y &= BE_y - PE_y \\ &= 192,463 - 0 \\ &= 192,463 \text{ tCO}_2\text{e} \end{aligned}$$

4.2 Project Emissions

There is no project emission associated with the project activity.

4.3 Leakage

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

4.4 Net GHG Emission Reductions and Removals

The details of net emission reductions year-wise are provided in the table below.

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)
01-Feb-2016 to 31-Dec-2016	94,830	0	0	94,830
01-Jan-2017 to 30-Sep-2017	97,633	0	0	97,633
Total	192,463	0	0	192,463

APPENDIX 1: TECHNICAL SPECIFICATION>**Technical Specification of WTGs:**

WTGs supplied by ReGenPowertech

ReGenPowertech	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

WTGs supplied by INOX Wind:

No. of WTGs⁶ - 15	
INOX WIND - MODEL⁷ WT 2000 DF	
OPERATING DATA	
Rated power	2000 kW
Cut-in wind speed	3 m/s
Rated wind speed	11.5m/s
Cut-out wind speed	20 m/s
Survival wind speed	52.5 m/sec
Hub height	80 meters
Type class	TC IIIB
Rotor speed	15.9 RPM
Operational mode	Variable speed
Design Standards	Germanischer Lloyd
ROTOR	
Pitch system	Pitch control- electrical, variable speed inverters, power back up with ultra capacitor
Diameter	93 meters
Swept area	6785 sq meters
Blade material type	Epoxy glass fibre
GENERATOR	
Type	Double fed induction generator
Rated power	2000 kW

⁶Arrangement of project activity & monitoring points is detailed in the Project Boundary diagram under section B.3

⁷<http://www.inoxwind.com/technical-data.html>

Rated voltage	690 V AC, 3 Phase
Frequency	50 Hz
Cooling system	Water Cooled
Insulation	Class H
BRAKING SYSTEM	
Aerodynamic brake	Full span independent blade pitching
Mechanical brake	Disc brakes
DRIVE TRAIN	
Drive train	Patented integral drive train with rotor shaft and drive train as single unit
Rated drive torque	1280 kNm
Maximum static torque	2235 kNm
Type of gearing	Two planetary and one parallel shaft gear
Transmission ratio	1: ~ 114.7
Gear lubrication	Forced lubrication
Connection gear / generator	Flexible coupling
YAW SYSTEM	
Type	Driven by 4 gear motors
Bearings	Slide bearings
TOWER	
Type	Conical tubular steel tower
Tower Height	78 meters
Corrosion protection	Protective paint
Average Lifetime	20 years (Reference – CA letter & Technology Provider Specification)

APPENDIX 2: COMMISSIONING DATES OF THE WTGS

WTG ID ref.	Date of Commissioning
NSL Wind Power Company (Kayathar) Pvt. Ltd.	
NSL P1-332	30/03/2014
NSL P1-408	30/03/2014
NSL P1-186	31/03/2014
NSL P1-331	31/03/2014
NSL P1-179A	31/03/2014
NSL P1-179	31/03/2014
NSL P1-310	31/03/2014
NSL P1-1001	31/03/2014
NSL P1-1000	31/03/2014
NSL P1-1028	31/03/2014
NSL P1-95	31/03/2014
NSL P1-930	31/03/2014
NSL P1-229	31/03/2014
NSL P1-929	31/03/2014
NSL P1-276	31/03/2014
NSL P1-1034	31/03/2014
NSL P1-1078/1	31/03/2014
NSL P1-169A	03/10/2015
NSL P1-1698	03/10/2015
NSL P1-252A	03/10/2015
NSL P1-252B	03/10/2015
NSL P1-407	03/10/2015
NSL P1-216	03/10/2015
NSL P1-236	03/10/2015
NSL P1-171,172	31/10/2015
Jath Wind Energy Private Limited	
MVT-10	30/03/2014
MVT-11	30/03/2014
MVT-45	30/03/2014
MVT-61	30/03/2014
MVT-62	30/03/2014
MVT-63	30/03/2014
MVT-05	30/03/2014
MV2T-2	31/03/2014
MV2T-41	31/03/2014
MV2T-28	31/03/2014
MV2T-42	31/03/2014
MV2T-15	31/03/2014
MV2T-17	31/03/2014
MV2T-3	31/03/2014
MV2T-37	31/10/2015

APPENDIX 3: ENERGY METERS CALIBRATION DETAILS:

Delay in meter calibration has happened as due date of meter calibrations was in “26th March 2017”. So in line with the registered VCS PD, maximum permissible error of 0.2% has been applied for the delay period. Being conservative, PP has considered the whole month from March 2017 to Sep 2017. Please refer ER calculation Sheet for detailed calculation.

Note: Please note that meter calibration is not under purview of PP. MSEDCL is the sole authority to conduct the meter calibration and as per CEA order dated 17 Mar 2016; It is evident from para 18(b) that "all the meters shall be tested once in five years."

For Jath Wind Energy Private Limited:

Metering Points	Meter Details					
	Serial no	Make	Type	Accuracy class	Date of Calibration	Due Date of Calibration
FEEDER No. 3	Main meter – HT01140155 Check meter – HT01140156	WALLABY	MK6E	0.2S	26/03/2014	26/03/2017
FEEDER No. 4	Main meter – HT01140157 Check meter – HT01140158	WALLABY	MK6E	0.2S	26/03/2014	26/03/2017

For NSL Wind Power Company (Kayathar) Pvt. Ltd.:

Metering Points	Meter Details					
	Serial no	Make	Type	Accuracy class	Date of Calibration	Due Date of Calibration
FEEDER No. 5	Main meter – HT01131245 Check meter – HT01131246	WALLABY	MK6E	0.2S	26/03/2014	26/03/2017
FEEDER No. 6	Main meter – HT01131248 Check meter – HT01131249	WALLABY	MK6E	0.2S	26/03/2014	26/03/2017