BUNDLED WIND POWER PROJECT BY SEMBCORP GREEN INFRA LIMITED IN INDIA

Document Prepared by (Infinite Solutions)

Project Title	Bundled Wind Power Project by Sembcorp Green Infra Limited in India
Version	04
Report ID	1856_MP-2
Date of Issue	04-Nov-2020
Project ID	1856
Monitoring Period	01-Jan-2019 to 31-Jul-2020 (Inclusive of both the dates)
Prepared By	Infinite Solutions
Contact	Infinite Solutions, 611, Chetak Centre Main, RNT Marg, Indore – 452001, India Landline No.: 0731-4050174 Website: www.infisolutions.org

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The purpose of the project activity is to generate clean electricity by harnessing the renewable wind energy.

The project activity involves the installation of 56 Wind Turbine Generators (WTGs) for generating the electricity having aggregated capacity of 95.5 MW. This is a greenfield bundled project activity consists of 3 individual projects promoted by:

Project	Project Promoter	State	COD[1]	Cap of each WTG	No of WTGs	MW	Total MW
Project 1	Green Infra Wind Energy Limited	Gujarat	02-Mar-17	2 MW	4	8	22
			22-Mar-17	2 MW	2	4	
			24-Mar-17	2 MW	2	4	
			25-Mar-17	2 MW	1	2	
			29-Mar-17	2 MW	1	2	
			28-Jun-17	2 MW	1	2	
Project 2	Green Infra Wind Energy Limited	Gujarat	31-Mar-17	2 MW	7	14	24
			30-May-17	2 MW	3	6	
			30-Jun-17	2 MW	2	4	
Project 3	Green Infra Wind Solutions Limited	Andhra Pradesh	30-Mar-17	1.5 MW	33	49.5	49.5
				Total	56		95.5 MW

Project WTGs technical details has been provided under section 3.1 of the MR.

Thus, project activity generates clean electricity & helps in avoiding the fossil fuel fired electricity generation from the grid electricity mix and thereby reducing the equivalent GHG emissions from the atmosphere.

The total GHG emission reductions or removals generated in this monitoring period (01-Jan-2019 to 31-Jul-2020) is 2,94,174 tCO_{2e}.

1.2 Sectoral Scope and Project Type

Sectoral Scope : 01 - Energy industries (renewable-/non-renewable sources)
Methodology applied is ACM 0002 of version 19.0

[1] As per Commissioning Certificates.

Project is neither an AFOLU project nor a grouped project. it consists of 3 independent wind power projects by 2 project developers with combined capacity of 95.5 MW.

1.3 Project Proponent

Organization name	Green Infra Wind Energy Limited
Contact person	Mr. Mayank Tyagi
Title	Manager
Address	5th floor, Tower C, Building No. 8, DLF Cybercity, Gurgaon – 122002 Haryana, India
Telephone	+ 0124-3896972
Email	mayank.tyagi@sembcorp.com

1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Project Consultant
Contact person	Mr. Jimmy Sah
Title	Head – Sustainability
Address	611, Chetak Centre Main, RNT Marg, Indore - 452001, India
Telephone	+91-9644130430
Email	jimmy@infisolutions.org

1.5 Project Start Date

The project start date for this project is said to be 02/03/2017.

This is the day on which the first machine was commissioned.

1.6 Project Crediting Period

The project chooses a renewable crediting period of 10 years. After 10 years, the crediting period will be renewed twice.

Crediting period start date : 02-Mar-2017

Crediting period end date : 01-Mar-2027

1.7 Project Location

The project activity is located in three states of India. The table provides details of location of each project:

Project	Promoter	Capacity (MW)	Location
Project 1	Green Infra Wind Energy Limited	22	Amreli/Rajkot, Gujarat
Project 2	Green Infra Wind Energy Limited	24	Surendra Nagar, Gujarat
Project 3	Green Infra Wind Solutions Limited	49.5	Kurnool, Andhra Pradesh

Project 1: The below table provides details of location of individual WTGs (Latitude and Longitude in Degree Min Sec format) of the project

S. No	WTG No	Village	Taluka	District	Latitude	Longitude
1	RJ9-T-094	Kalasar	Jasdan	Rajkot	N21° 56' 50.532"	E71° 16' 0.516"
2	RJ9-T-099	Lilapur	Jasdan	Rajkot	N21° 50' 39.84"	E71° 26' 37.068"
3	RJ9-T-076	Godladhar	Jasdan	Rajkot	N22° 3' 8.928"	E71° 19' 26.724"
4	RJ9-T-096	Kalasar	Jasdan	Rajkot	N21° 50' 53.088"	E71° 25' 45.732"
5	RJ9-T-078	Godladhar	Jasdan	Rajkot	N22° 6' 47.772"	E71° 19' 7.464"
6	RJ9-T-095	Kalasar	Jasdan	Rajkot	N21° 53' 26.7"	E71° 11' 18.348"
7	RJ9-T-039	Hirana	Lathi	Amreli	N22° 6' 58.212"	E71° 19' 7.32"
8	RJ9-T-013	Miya Khijadiya	Babra	Amreli	N22° 6' 33.696"	E71° 19' 1.524"
9	RJ8-T-073	Sukavada	Babra	Amreli	N22° 6' 6.408"	E71° 17' 8.916"
10	RJ9-T-040	Hirana	Lathi	Amreli	N22° 3' 17.82"	E71° 20' 44.196"
11	RJ-9T-075	Ambaradi	Jasdan	Rajkot	N22° 1' 50.232"	E71° 22' 26.04"

Project 2: The below table provides details of location of individual WTGs (Latitude and Longitude in Degree Min Sec format) of the project

S. No	WTG No	Village	Taluka	District	Latitude	Longitude
1	SDL-T-30	Jepur (Ranipat)	Muli	Surendranager	N22° 42' 57.348"	E71° 13' 19.668"
2	SDL-T-33	Jepur (Ranipat)	Muli	Surendranager	N22° 43' 48.468"	E71° 13' 38.604"
3	SDL-T-38	Jepur (Ranipat)	Muli	Surendranager	N22° 43' 52.788"	E71° 12' 33.624"
4	SDL-T-168	Vadadhra	Muli	Surendranager	N22° 45' 16.74"	E71° 18' 1.332"
5	SDL-T-169	Vadadhra	Muli	Surendranager	N22° 45' 25.092"	E71° 17' 39.552"
6	SDL-T-170	Vadadhra	Muli	Surendranager	N22° 45' 43.38"	E71° 17' 32.496"
7	SDL-T-171	Vadadhra	Muli	Surendranager	N22° 45' 53.352"	E71° 16' 59.304"
8	SDL-T-172	Vadadhra	Muli	Surendranager	N22° 45' 4.824"	E71° 17' 23.244"
9	SDL-T-98	Asundrali	Muli	Surendranager	N22° 40' 27.372"	E71° 17' 32.028"
10	SDL-T-99	Asundrali	Muli	Surendranager	N22° 40' 19.488"	E71° 17' 40.992"
11	SDL-T-95	Palasa	Muli	Surendranager	N22° 37' 53.868"	E71° 19' 55.02"

12	SDL-T-96	Palasa	Muli	Surendranager	N22° 38' 7.836"	E71° 19' 41.232"

Project 3: The below table provides details of location of individual WTGs (Latitude and Longitude in Degree Min Sec format) of the project

S. No	WTG No	Village	Taluka	District	Latitude	Longitude
1	GISKK-01	Gundlakonda	Pattikonda	Kurnool	N15° 30' 56.484"	E77° 37' 1.02"
2	GISKK-02	Gundlakonda	Pattikonda	Kurnool	N15° 31' 4.908"	E77° 37' 2.28"
3	GISKK-03	Gundlakonda	Pattikonda	Kurnool	N15° 31' 15.456"	E77° 36' 47.952"
4	GISKK-04	Gundlakonda	Pattikonda	Kurnool	N15° 31' 39.396"	E77° 35' 41.784"
5	GISKK-05	Kunkanuru	Pattikonda	Kurnool	N15° 31' 42.996"	E77° 36' 18.828"
6	GISKK-06	Kunkanuru	Pattikonda	Kurnool	N15° 32' 57.768"	E77° 36' 7.668"
7	GISKK-07	Jilledubudakala	Pattikonda	Kurnool	N15° 31' 45.732"	E77° 37' 38.964"
8	GISKK-08	Gundlakonda	Pattikonda	Kurnool	N15° 31' 51.492"	E77° 36' 18.072"
9	GISKK-09	Devanakonda	Pattikonda	Kurnool	N15° 31' 51.564"	E77° 35' 40.56"
10	GISKK-10	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 8.412"	E77° 38' 59.244"
11	GISKK-11	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 41.676"	E77° 37' 44.184"
12	GISKK-12	Kunkanuru	Pattikonda	Kurnool	N15° 31' 59.844"	E77° 36' 16.38"
13	GISKK-13	Kunkanuru	Pattikonda	Kurnool	N15° 32' 9.528"	E77° 36' 10.476"
14	GISKK-14	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 23.172"	E77° 38' 53.52"
15	GISKK-15	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 51.144"	E77° 37' 43.608"
16	GISKK-16	Jilledubudakala	Pattikonda	Kurnool	N15° 31' 55.128"	E77° 37' 37.848"
17	GISKK-17	Kunkanuru	Pattikonda	Kurnool	N15° 32' 19.536"	E77° 36' 7.272"
18	GISKK-18	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 33.756"	E77° 38' 53.448"
19	GISKK-19	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 6.936"	E77° 37' 32.592"
20	GISKK-20	Kunkanuru	Pattikonda	Kurnool	N15° 32' 28.284"	E77° 36' 5.364"
21	GISKK-21	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 32.856"	E77° 37' 21.36"
22	GISKK-22	Kunkanuru	Pattikonda	Kurnool	N15° 32' 35.052"	E77° 35' 59.964"
23	GISKK-23	Kunkanuru	Pattikonda	Kurnool	N15° 37' 35.364"	E77° 35' 53.052"
24	GISKK-24	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 24.324"	E77° 37' 21.468"
25	GISKK-25	Jilledubudakala	Pattikonda	Kurnool	N15° 33' 21.996"	E77° 39' 3.636"
26	GISKK-26	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 24.36"	E77° 37' 56.28"
27	GISKK-27	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 58.344"	E77° 37' 42.816"
28	GISKK-28	Jilledubudakala	Pattikonda	Kurnool	N15° 32' 56.112"	E77° 38' 20.58"
29	GISKK-29	Kappatralla	Pattikonda	Kurnool	N15° 34' 26.688"	E77° 37' 43.032"
30	GISKK-30	Kappatralla	Pattikonda	Kurnool	N15° 34' 38.244"	E77° 37' 37.848"
31	GISKK-31	Jilledubudakala	Pattikonda	Kurnool	N15° 33' 37.404"	E77° 38' 48.012"
32	GISKK-32	Jilledubudakala	Pattikonda	Kurnool	N15° 34' 8.292"	E77° 37' 56.064"
33	GISKK-33	Kappatralla	Pattikonda	Kurnool	N15° 34' 19.092"	E77° 37' 53.688"

1.8 Title and Reference of Methodology

Type : ACM0002,
Title : "Grid-connected electricity generation from renewable sources"
Sectoral Scope : 01
Version : 19
EB : 100
Reference: http://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD

In line with the applied methodology, following tools and guidelines are referred in this PD:

- Tool to calculate the emission factor for an electricity system, Version 7, EB 100 annex 6[2]
- Tool for the demonstration and assessment of additionality - Version 7, EB 70 Annex 8[3]

1.9 Participation under other GHG Programs

PP has submitted the undertaking confirming that project has not participated in any other binding and/or non-binding GHG program and any national REC scheme to the DOE. Hence, there is no double accounting of emission reduction has happened.

Participation under Other GHG Programs:
The project activity has never participated in any other GHG programs.

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits:
The project proponent is not part of any emission trading program. PP also does not have any binding GHG emission limits. The net GHG emission reductions from the project will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions. A letter of this effect from the project proponent shall be submitted to the DOE.

The project activity has not participated under any other GHG programs. A letter of this effect from the project proponent shall be submitted to the validator during verification.

Other Forms of Environmental Credit:
The project activity does not result in creation of any other kind of environmental credits. A letter from the project proponent shall be submitted to the validator with an undertaking that the project has not created another form of environmental credit. PP has not participated in REC mechanism. Hence, not eligible to claim REC benefits.

1.11 Sustainable Development

Ministry of Environment & Forests, Government of India has stipulated following indicators for sustainable development in the interim approval guidelines for GHG projects.

1.Social well-being

2.Economic well-being

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

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

3.Environmental well-being

4.Technological well-being

Social well-being
The main source of fuel for this project activity is Renewable Source of energy i.e. Wind. Since the project is located in villages, it will assist in alleviation of poverty to certain extent by generating both direct and indirect employment in the area of skilled/unskilled jobs during the construction and for regular operation and maintenance of the wind power project. The project activity leads to development in infrastructure in the region like development of roads and also may promote local's business with improved power generation.

Economic well-being
The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits. The project activity will also help to reduce the demand supply gap in the state. Increased income levels shall contribute to the economic safety and empowerment of the most vulnerable sections of local society.

Environmental well-being
The project is using renewable Wind Energy for electricity generation. There is no net GHG emission from this project activity. Wind is considered one of the cleanest sources of energy which contributes in reduction of GHG emissions of CO_2. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Technological well-being
The project makes use of efficient environmentally safe technology for electricity generation with no Green House Gas (GHG) emission.

In view of the above, the PP has considered that the project activity profoundly contributes to the sustainable development.

2 SAFEGUARDS

2.1 No Net Harm

There is no net harm from the project activity as the wind project does not have any negative environmental and socio-economic impacts.

Further, as per the prevailing Ministry of Environment and Forest laws, the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated 14 September (2006), 38 activities are required to undertake environmental impact assessment studies. Environmental Impact Assessment study is not required for wind mill project as there is no negative environmental impact due to the project activity and wind energy is one of the cleanest sources of energy.

2.2 Local Stakeholder Consultation

Local stakeholder consultation has already done during registration of project activity. The stakeholder consultation meeting was conducted during the social survey as a part of the ESIA

study. The consultations were done by identifying the right stakeholders, including, local farmers, villagers, school teachers, government officials, panchayat officials, local NGOs.

The purpose of the consultation was to account for the views of the people impacted either directly or indirectly due to the project activity. The objective of the SHC meetings was to inform the stakeholders on the environmental and social impact of the project activity and to discuss their concerns regarding it. Notices were put up in the local panchayats at least a week in advance of the consultations.

Also, post consultations the project proponent has also devised a Grievance mechanism to address any concerns of the villagers. A grievance Register with the details of site contact person, Head office HSE person are available at all the panchayat offices in the project location.

However, there is no comments received in the current monitoring period.

2.3 AFOLU-Specific Safeguards

This is not applicable to the project activity as for non-AFOLU projects, this section is not required.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity has been successfully commissioned by project promoters and was registered by VCS Board subsequently (Project ID: Ref No1856).

The project is a bundled Wind Power project, consists of 3 individual projects which involves installation of total 56 numbers of WTGs (11 WTGs x 2MW = 22MW, 12 WTGs X 2MW = 24MW, 33 WTGs X 1.5MW = 49.5MW) aggregated capacity of project is 95.5 MW. The generated electricity is delivered to grid i.e. Sale to Grid.

The detailed specifications of the WTGs are as below:

Project	Project Promoter	Capacity	No of WTGs	Capacity & Make
Project 1	Green Infra Wind Energy Limited	22 MW	11	2MW, INOX make (DF100[4]-92 M)
Project 2	Green Infra Wind Energy Limited	24 MW	12	2MW, INOX make (DF113[5] - 92M)

[4] Turbine Technical Details: https://en.wind-turbine-models.com/turbines/1098-inox-df-100
[5] Turbine Technical Details: https://en.wind-turbine-models.com/turbines/1846-inox-df-113

Project 3	Green Infra Wind Solutions Limited	49.5 MW	33	1.5 MW each of ReGen make (V87[6])

As described above Project 1 and Project 2 are promoted by the SPV 'Green Infra Wind Energy Limited" and Project 3 is promoted by the SPV "Green Infra Wind Solutions Limited" of which **"Green Infra Wind Energy Limited"** is the representative of promoters of this bundled project.

The electricity generated by the project is exported to the Indian electricity grid. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.

The project activity has been in operation continuously since its commissioning. There have been no emergencies happened to the monitoring system. There are no events or situation that occurred during the monitoring period which may impact the applicability of the methodology.

Key Reasons for Downtime during the Current Monitoring Period:

Reasons for Scheduled Maintenance: Manual stop for 6 monthly service of WTG, All voltage lines, Feeder line maintenance, GSS yard billing Bay maintenance, USS Yard maintenance, BOP equipment; Relay Testing & yearly Maintenance work etc.

Reasons Unscheduled Maintenance: Power Line shutdown, Grid Failure, Feeder tripping, initialization fail, Transformer tripping, Overheating in the grid induction, Blade Position Error, accelerometer vibration issue, other inspection work and emergency maintenance of plant equipment.

Lifetime of the project activity
The lifetime of the project activity is 25 years.

3.2 Deviations

2.3.1 Methodology Deviations

There has been no methodology deviation applied during this monitoring period of the project activity.

2.3.2 Project Description Deviations

There is a project description deviation applied during this monitoring period of the project activity which is transparently described under this section of MR.

In line with the Para 3.18.2 of the VCS standard version 4, "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

[6] Turbine Technical Details: https://en.wind-turbine-models.com/turbines/483-regen-powertech-vensys-87

described and justified in the monitoring report. This shall include a description of when the changes occurred and the reasons for the changes. The deviation shall also be described in all subsequent monitoring reports."

1.Typo Error Correction in Reporting the Make of Energy Meters for project 1.

Reason: The Make of Energy Meters for the project 1 is "EDMI" but inadvertently reported as Secure. Hence, PP is correcting the typo error in reporting the "Make" of Energy meters. Please refer Appendix-1 for details of Energy Meters.

The above deviations do 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.

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3.3 Grouped Projects

The project is not a grouped project hence this section is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor of INDIAN Grid
Source of data	Central Electricity Authority: CO_2 Emission Database CEA CO_2 Baseline database Version 13
Value applied	0.9726
Justification of choice of data or description of measurement methods and procedures applied	Calculated using "Tool to calculate the emission factor for an electricity system" using data from Central Electricity Authority of India's (CEA) "Baseline Carbon Dioxide Emission Database Version 13".
Purpose of Data	Calculation of baseline emissions
Comments	The operating margin emission factor is a 3-year generation weighted average (2014-17). The operating Margin is calculated ex ante and fixed during the crediting period

Data / Parameter	$EF_{grid,BM,y}$

Data unit	tCO_2/MWh
Description	Operating margin CO_2 emission factor of INDIAN Grid
Source of data	Central Electricity Authority: CO_2 Emission Database CEA CO_2 Baseline database Version 13
Value applied	0.8723
Justification of choice of data or description of measurement methods and procedures applied	Calculated using "Tool to calculate the emission factor for an electricity system" using data from Central Electricity Authority of India's (CEA) "Baseline Carbon Dioxide Emission Database Version 13". The value is calculated ex-ante as most recent build margin provided by the CEA
Purpose of Data	Calculation of baseline emissions
Comments	The emission factor is fixed ex-ante and will not be monitoring throughout the crediting period

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin emission factor of the Indian grid
Source of data	Central Electricity Authority: CO_2 Emission Database CEA CO_2 Baseline database Version 13
Value applied	0.9475
Justification of choice of data or description of measurement methods and procedures applied	The data has been considered in accordance to the Tool to calculate emission factor of an electricity system. The tool guides to take 75% weightage of $EF_{grid,OMsimple}$, & 25% weightage of $EF_{grid,BM,y}$.
Purpose of Data	Calculation of baseline emissions
Comments	The emission factor is fixed ex-ante and will not be monitoring throughout the crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$\mathbf{EG}_{facility,y}$
Data unit	MWh/year

Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y. Calculated (based on the measured values of electricity exported and imported)
Source of data	Project 1 & Project 2: Monthly "Certificate for Share of Electricity Generated by Wind Farm" issued by GETCO Project 3: JMR (Joint Meter Reading) issued by EB
Description of measurement methods and procedures to be applied	Project 1 & Project 2: Data Type: Measured & Calculated. Monitoring equipment: a) At WTG yard: Secure make Meters of accuracy class 0.2s. b) At substation: Secure make Meters accuracy class 0.2s. Archiving Policy: Paper & Electronic. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from Monthly Meter reading reports provided by GETCO/ SLDC as per below equation: Calculation of $EG_{facility,y}$: Net Electricity = Export – Import The net electricity exported by the project activity is taken directly from the share certificate issued by GETCO on monthly basis. The apportioning procedure is performed by GEDA personnel on monthly basis and the PP has no role in it. Responsibility: a) At WTG yard: The O&M shift-in-charge shall be responsible for the regular recording of data. b) At substation: The representatives of the PP/GETCO/GEDA are responsible for taking monthly joint meter reading at the substation. Project 3: Data Type: Measured & Calculated. Monitoring equipment: Substation: All Secure make Meters accuracy class 0.2s. Archiving Policy: Paper & Electronic. Net electricity supplied will be calculated based on the difference between calculated values of "export" and "import" and transmission losses on the EB energy meter at the "evacuation point".

	(Net Electricity = Export – Import – Transmission loss) The Export and import are referred from JMR. Currently, DISCOM[7] has considered the Transmission Losses while preparing the JMR. Hence same has been considered and deducted from the Export value to arrive at the Net Electricity delivered to the grid. Calibration Frequency: Once in five years
Frequency of monitoring/recording	Continuous monitoring with monthly recording
Value monitored	Project 1: 75,436.256 Project 2: 80,564.299 Project 3: 15,474.244 Total: 3,10,474.799
Monitoring equipment	Energy meter Accuracy class: 0.2s
QA/QC procedures to be applied	Net electricity supplied to the grid by the project activity will be cross checked with invoices submitted to EB. The meter(s) shall be calibrated and maintained by the state utility as per their own schedule, and this frequency of meter calibration is not within the control of the Project Proponent. Calibration of electricity meters is carried out in-line with the Nation standard[8] which recommends at least once in 5-year calibration or whenever abnormal difference/inconsistency is observed between main meter and check meter. Meter Details has been provided under Appendix-1 of the MR.
Purpose of the data	Calculation of Baseline Emissions
Calculation method	-
Comments	-

4.3 Monitoring Plan

All the three projects in the bundle have entered into agreement with the WTG Suppliers for the

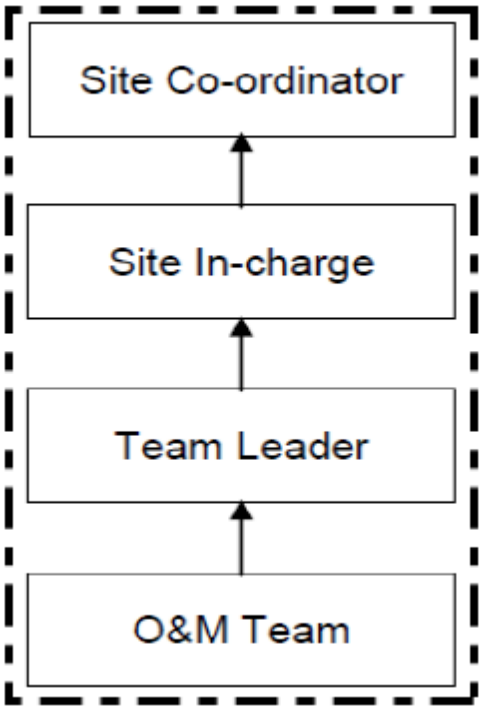
[7] JMR preparation and calculation procedure is solely under the purview of State DISCOM which is a govt authority. PP has no control over the same. Hence, deducted the transmission losses as per the JMR.

[8] (Page number 12 of the order) http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

operation and maintenance of WTGs. The WTG supplier has dedicated and technically well-equipped O&M team for day to day Operation and maintenance of each WTG. O&M contractor will provide a monthly report, which includes generation data, major breakdown events and machine availability. Project manager is responsible for recording of monthly meter readings of export and import. Monthly power export and import data will be sent regularly to site in charge of each project separately.

Monitoring roles and responsibilities:

The data for the project is compiled by the O&M Contractor and subsequently stored by the PP, the reporting and data flows as per the below mentioned flow chart starting from Site O&M team which monitors day to day operational data and monthly recording. The reporting responsibilities for the project are described as below;



The Site In-charge will be responsible for carrying out internal auditing and QA/QC. All the values from generation record will be checked with JMR and invoices for consistency. In case there are any nonconformances identified. The Site In-charge will investigate the error and revise the record to correct it. In any case where values have slightest of variation in different records the most conservative value will be taken in the project monitoring report.

Personal Training:

The training for operating and maintaining the plant will be provided to the O&M team whenever there would be necessity or any technological up gradation.

Emergency preparedness:

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

Data recording & archiving: The project proponent shall maintain data both in electronic form and hard copies. The monitored data shall be archived till 2 years after the completion of crediting period.

Monitoring Process at project site

Project 1 & Project 2 (Same Procedure):

- Joint monthly meter reading shall be taken from pooling substation (PSS) meter by representative of GEDA/GETCO and O&M team/service provider (on behalf of individual wind mill owners). Let the total generation recorded for particular month is 'X' units in sub-station meter.

- Joint daily meter reading shall be taken at Local Meter (transformer yard meter of each WTG) by representative of GEDA/GETCO on a monthly basis. Let us assume total approved generation recorded for particular month is 'Y1' units.

- Similarly, joint meter reading for other wind farm owners connected to the sub-station shall also be taken. Let the generation of individual owner recorded for particular month are 'Y2, Y3, ...Yn' units.

- The GEDA/GETCO apportions 'X' to individual wind farm owners using following formula and issues monthly certificates. Net units calculated for billing = X * Yi / ΣYn

- For PP, net units calculated for billing = X * Y1 / ΣYn

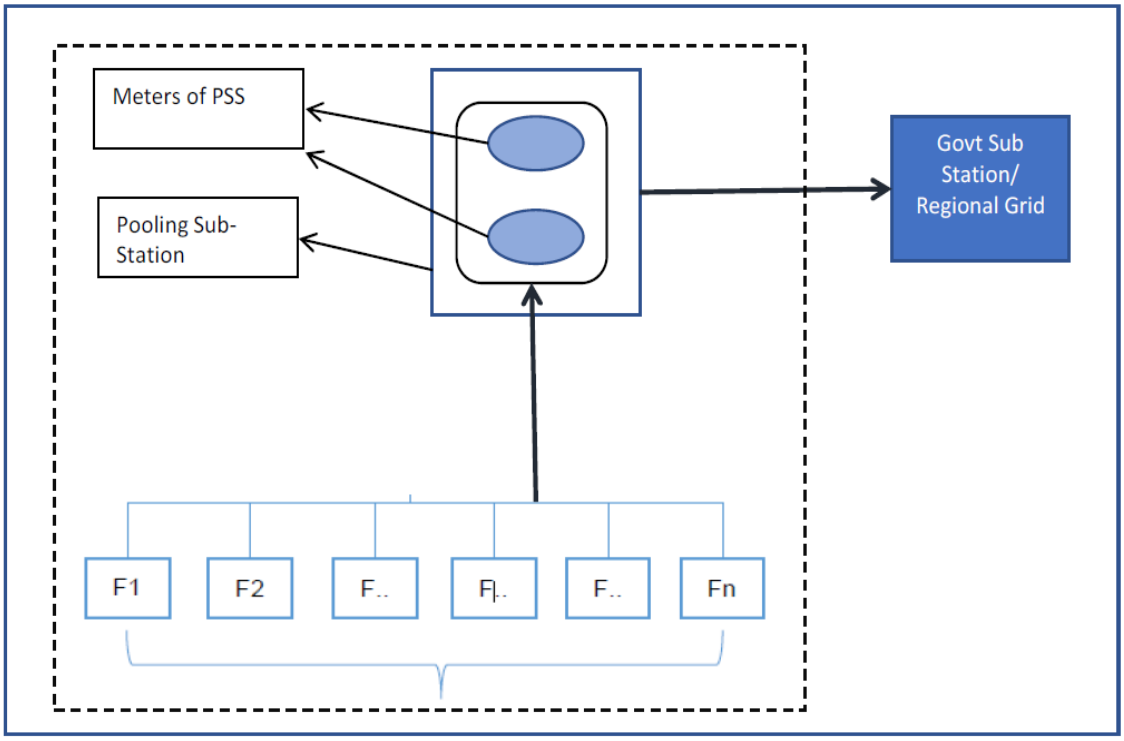
The net electricity generated by the project owners is being provided by GETCO in the share certificate of electricity generated. The value of the net electricity generated by the project activity has been taken directly by the project proponent from the share certificate provided by GETCO for calculation of emission reductions. The share certificate provides the value of export and import by the project.

Calculation of $EG_{facility,y}$:
Net Electricity = Export – Import

Hence, the net electricity supplied to the grid by the project activity is taken directly from the share certificate issued by GETCO on monthly basis by simply taking export & import. The apportioning procedure is performed by GEDA personnel on monthly basis and the PP has no role in it. Hence the PP does not has detailed apportioning available.

A schematic diagram indicating the metering system is provided below:

Metering System



Project 3:

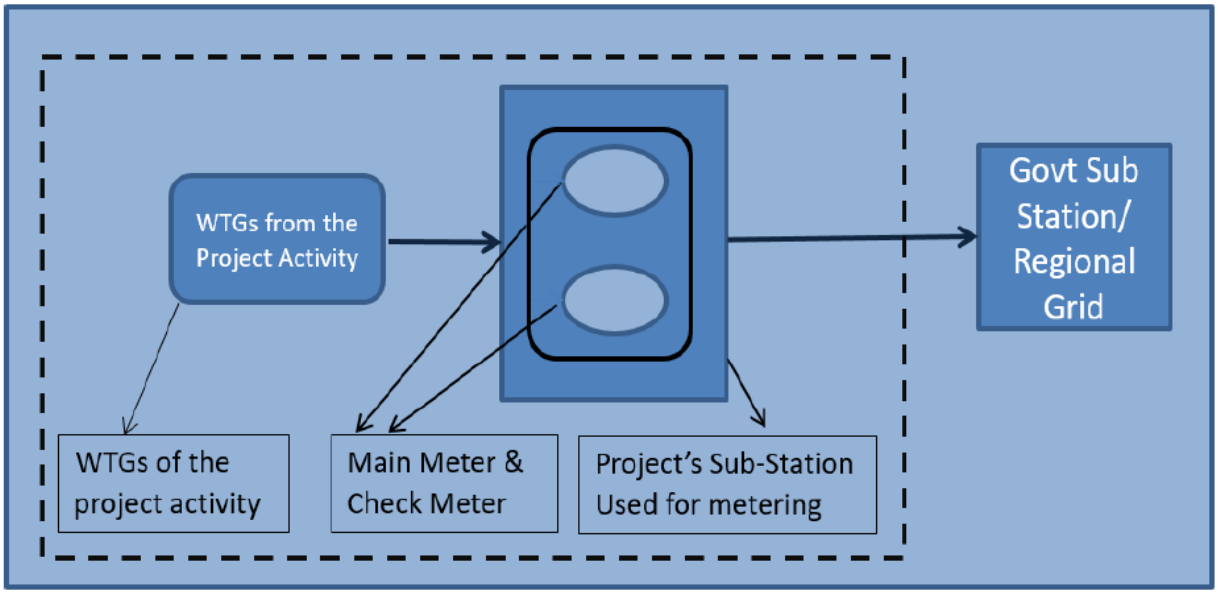
Joint monthly meter reading is taken at the Pooling substation (PSS) meters by representative of DISCOM and O&M team/service provider (on behalf of the project proponent). It must be noted here that the meter readings as mentioned above shall be calculated as the product of meter multiplication factor and the difference of the current and previous meter readings and transmission losses are also deducted to prepare the JMR.

(i.e. Net Electricity = Export – Import -Transmission Losses)

Based on the above procedure, the Monthly JMRs shall be provided to the project proponent.

A schematic diagram indicating the metering system is provided below:

Metering System



For all the projects in the bundle this is to be noted that the detail procedure of monitoring is illustrated here for the sake of understanding; for the preparation of subsequent monitoring report during periodic verifications, only the net electricity generation value shall be directly used for emission reduction calculation. No other parameters as explained above shall be used and presented in the monitoring report.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per description earlier under this document:

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

$EF_{grid,CM,y}$ is 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) (i.e, 0.9475 tCO2/MWh).
and;

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

Here,

BEy = 310,474.799 MWh * 0.9475 tCO2/MWh

= 294,174 tCO_{2e}

Net Electricity Project wise:

Net Electricity (kWh)				
Month	**Project 1**	**Project 2**	**Project 3**	**Total**
Jan-19	2670109.000	3284015.000	5593388.000	11547512.000
Feb-19	2328823.000	2244620.000	6821112.000	11394555.000
Mar-19	3673630.000	3569187.000	7011858.687	14254675.687
Apr-19	3307581.000	4355554.000	7003997.653	14667132.653
May-19	5396310.000	7561982.000	7916187.095	20874479.095
Jun-19	5290449.000	7329238.000	15113806.862	27733493.862
Jul-19	7621429.000	7826119.000	18371719.146	33819267.146
Aug-19	5330345.000	5162061.000	17715583.422	28207989.422
Sep-19	2479888.000	2407977.000	9183108.760	14070973.760
Oct-19	2301170.000	2616740.000	2979966.863	7897876.863
Nov-19	1801658.000	1909357.000	4168545.207	7879560.207
Dec-19	4494301.000	1457940.000	3629460.643	9581701.643
Jan-20	3796399.000	3339650.000	3352395.472	10488444.472
Feb-20	3710489.000	3372074.000	5837086.167	12919649.167
Mar-20	4249379.000	4321603.000	6870929.748	15441911.748
Apr-20	4498735.000	4367323.000	5983449.069	14849507.069
May-20	6467893.000	7655522.000	7118273.599	21241688.599
Jun-20	2931511.000	3523221.000	11354360.000	17809092.000
Jul-20	3086157.000	4260116.000	8449016.000	15795289.000
Total	75436256.000	80564299.000	154474244.394	310474799.394

Monthly calculations of baseline emissions:

Month	**Net Generation (kWh)**	**Emission Factor (tCO_{2e}/MWh)**	**Baseline emissions (tCO_{2e}) $EG_{PJ,y}$ (MWh)/1000 x $EF_{grid,CM,y}$ (tCO2/MWh)**
Jan-19	11547512	0.9475	10,941
Feb-19	11394555	0.9475	10,796
Mar-19	14254676	0.9475	13,506
Apr-19	14667133	0.9475	13,897
May-19	20874479	0.9475	19,779
Jun-19	27733494	0.9475	26,277
Jul-19	33819267	0.9475	32,044
Aug-19	28207989	0.9475	26,727
Sep-19	14070974	0.9475	13,332
Oct-19	7897877	0.9475	7,483

Nov-19	7879560	0.9475	7,466
Dec-19	9581702	0.9475	9,079
Jan-20	10488444	0.9475	9,938
Feb-20	12919649	0.9475	12,241
Mar-20	15441912	0.9475	14,631
Apr-20	14849507	0.9475	14,070
May-20	21241689	0.9475	20,126
Jun-20	17809092	0.9475	16,874
Jul-20	15795289	0.9475	14,966
Total	**310474799**		**294,174**

Refer the ER sheet for detailed calculations.

5.2 Project Emissions

The project activity involves in harnessing wind power. So, the emissions from the project are zero.

5.3 Leakage

No leakage emissions have been considered and hence the leakage emission is zero.

5.4 Net GHG Emission Reductions and Removals

As per the applied methodology, emission reductions are calculated as follows:

$ER_y = BE_y - PE_y$

Where,

ER_y = Emission Reduction in tCO_{2e}/year

BE_y = Baseline emission in tCO_{2e}/year

PE_y = Project emissions in tCO_{2e}/year

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
(01/01/2019 to 31/12/2019) 2019	191,327	0	0	191,327
(01/01/2020 to 31/07/2020) 2020	102,847	0	0	102,847
Total	294,174	0	0	294,174

It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 301,640 tCO_{2e}, whereas actual emission reductions achieved are 294,174 tCO_{2e}, which is approximately 2.48% lower than the estimated emission reductions. The lower generation during the current verification period is hence due to certain natural conditions and hence acceptable.

APPENDIX 1: < METER CALIBRATION DETAILS >

Project wise - Meter & Calibration Details:

Project 1:		
Meter & Calibration Details:		
Details	**Line 1**	**Line 2**
Meter Number	GJ-3057-A	GJ-3058-A
Make	EDMI	EDMI
Accuracy	0.2s	0.2s
Location	33kV/220 kV Sukhpur Substation	33kV/220 kV Sukhpur Substation
Last Calibration	20-Feb-17	20-Feb-17
Validity Date	19-Feb-22	19-Feb-22

Project 2:		
Meter & Calibration Details:		
Details	**Line 1**	**Line 2**
Meter Number	GJ3819A	GJ3820A
Make	Secure	Secure
Accuracy	0.2s	0.2s
Location	33kV/220kV Sadla (Inox) Substation	33kV/220 kV Sadla (Inox) Substation
Last Calibration	25-Feb-17	25-Feb-17
Validity Date	24-Feb-22	24-Feb-22

Project 3:		
Meter & Calibration Details:		
Details	**Line 1**	**Line 2**
Meter Number	APX01475	APX01476
Make	Secure	Secure
Accuracy	0.2s	0.2s
Location	33 kV/220 kV Karidikonda Pooling Substation	33 kV/220 kV Karidikonda Pooling Substation
Last Calibration	31-Mar-17	31-Mar-17
Validity Date	30-Mar-22	30-Mar-22