



49.5 MW WIND POWER PROJECT BY FFCEL IN PAKISTAN



Document Prepared By: Emergent Ventures International Pte.Ltd.

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Prepared By	Emergent Ventures International Pte. Ltd.
Contact	#29-03 A, 10 Anson Road, International Plaza, Singapore- 079903 Email: contact@emergent-ventures.com

CONTENTS

1	PROJECT DETAILS.....	4
1.1	Summary Description of the Implementation Status of the Project	4
1.2	Sectoral Scope and Project Type	4
1.3	Project Proponent	4
1.4	Other Entities Involved in the Project	4
1.5	Project Start Date	5
1.6	Project Crediting Period	5
1.7	Project Location	5
1.8	Title and Reference of Methodology	7
1.9	Participation under other GHG Programs	7
1.10	Other Forms of Credit	7
1.11	Sustainable Development	8
2	SAFEGUARDS	8
2.1	No Net Harm	8
2.2	Local Stakeholder Consultation	8
2.3	AFOLU-Specific Safeguards	9
3	IMPLEMENTATION STATUS	9
3.1	Implementation Status of the Project Activity	9
3.2	Deviations	9
3.3	Grouped Projects	9
4	DATA AND PARAMETERS	9
4.1	Data and Parameters Available at Validation	9
4.2	Data and Parameters Monitored	11
4.3	Monitoring Plan	14
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	16
5.1	Baseline Emissions	16
5.2	Project Emissions	17
5.3	Leakage	17
5.4	Net GHG Emission Reductions and Removals	17

APPENDIX I: METER CALIBRATION..... 19

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity is renewable power generation from wind and supply of the power to the grid. The total installed capacity of the project activity is 49.5 MW equipped with 33 Wind Turbine Generators (WTGs) of 1.5 MW installed capacity each.

The project proponent, FFC Energy Limited (hereafter referred to as the “FFCEL”) is a subsidiary of Fauji Fertilizer Company Limited (hereafter referred to as the “FFC”). FFCEL has setup the project at Jhampir, Distt – Thatta, Sindh, Pakistan.

The project activity got commissioned on 16th May 2013. This monitoring report covers the period from 01-12-2014 to 30-11-2020. In the current monitoring period, the project activity generates **714,316.51** MWh of clean energy and feeds to the connected electricity grid and thereby reduces **453,091** tCO₂e of GHG emissions.

1.2 Sectoral Scope and Project Type

Sectoral Scope: 1 - Energy Industries (renewable- /non-renewable sources).

Project Type: Renewable Energy Sources

1.3 Project Proponent

Organization name	FFC Energy Limited
Contact person	Brig. Muhammad NaeemSI(M) Retd.
Title	Designation: Project Director – FFCEL Wind Power Project
Address	FFC SONA Tower, 156 the Mall, Rawalpindi, Pakistan
Telephone	Work Phone: +92-51-8457501
Email	mnaeem@ffc.com.pk

1.4 Other Entities Involved in the Project

Organization name	Emergent Ventures International Pte. Ltd.
Role in the Project	Project Consultant
Contact person	AtulSanghal
Title	Business Head

Address	#29-03 A, 10 Anson Road, International Plaza, Singapore- 079903
Telephone	+91-97173 96309
Email	contact@emergent-ventures.com

1.5 Project Start Date

16-May-2013.

1.6 Project Crediting Period

Crediting Period Start Date: 16-May-2013

Crediting Period End Date: 15-May-2023

Total number of years of the crediting period: 10 years

1.7 Project Location

Project is located at Jhimpir, District Thatta, Sindh, Pakistan. Geo-coordinates of individual WTGs are provided below:

Turbine No	Easting 'E' (M)	Northing 'N' (M)
T-01	397089	2773257
T-02	397226	2773647
T-03	396806	2773917
T-04	396621	2774104
T-05	397843	2774073
T-06	397505	2774307
T-07	397367	2773072
T-08	397621	2772897
T-09	396548	2773623
T-10	396936	2774702
T-11	397131	2774562
T-12	398397	2773482
T-13	398881	2773222
T-14	398183	2773155
T-15	398398	2772974
T-16	398657	2772798
T-17	399243	2773093
T-18	400099	2772348
T-19	398288	2772430
T-20	398900	2772607
T-21	398603	2772209
T-22	398891	2772011
T-23	399157	2771828
T-24	399473	2771610
T-25	399758	2771414
T-26	400348	2771824
T-27	399286	2772390

T-28	399583	2772208
T-29	399782	2771962
T-30	399846	2772687
T-31	399534	2772901
T-32	400120	2771238
T-33	397624	2773479

The above mentioned geo-coordinates are provided in Universal Transverse Mercator (UTM) system. The applicable grid zone¹ is 42 R.

The project location has been highlighted on the map of Pakistan²:-



¹<http://www.dmap.co.uk/utmworld.htm>

²<http://www.mapsofworld.com/pakistan/>



1.8 Title and Reference of Methodology

ACM0002 - Grid-connected electricity generation from renewable sources (Large-Scale); Version 15.0

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

Title and reference of tool applied to the project activity:

- Tool for the demonstration and assessment of additionality, version 7.0.0
<https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

1.9 Participation under other GHG Programs

The project participant confirmed that the project is not registered under any other programs.

1.10 Other Forms of Credit

The Project participant confirmed that the project activity has not sought or received another form of GHG related environmental credit, including renewable energy certificates during this monitoring period.

1.11 Sustainable Development

The Project contribution for sustainable development of the Host Country has been explained below:-

Socio-economic Wellbeing

- Project activity provides for employment generation activities during construction and operation phases. This leads to socio-economic wellbeing of the people.

Environmental wellbeing

- The project activity produces power from wind which is clean source of energy and does not involve any GHGs emission.
- Wind is one of the cleanest forms of renewable energy and power generation from wind does not involve any fossil fuels.

Technological wellbeing

- The project activity uses the environmental safe and sound technologies for wind power generation in the Country. By adopting foreign manufacturer wind turbines, the project activity will promote important transfer of technical know-how to Pakistan, and can act as a pioneer in promoting the spread of this technology to other wind power projects.
- Towers for the wind turbines were manufactured for the first time in Pakistan at Descon's workshop in Karachi; a step towards indigenization of wind power technology in the country.

2 SAFEGUARDS

2.1 No Net Harm

The project activity is a wind energy project and is free from any kinds of emissions. Wind power projects do not create any harm to the environment by the way of emissions of air pollutants or waste generation unlike fossil fuel based thermal power plants.

2.2 Local Stakeholder Consultation

Local stakeholders' consultation meeting was conducted on 20/01/2009 at 11.00 am to get the comments and suggestions of the local stakeholders on the project activity. Invitation for stakeholder meeting was published in the national newspaper "Daily News Karachi", Daily Aman Karachi and local newspaper Daily Kawish on 20/12/2008. This information is part of the registered PD.

Further, the stakeholders can anytime provide their inputs or concerns over the project. The site manager is responsible for addressing the grievances received from stakeholders. Project owner is committed to keep engaging with the local communities on a regular basis. Project owner keeps identifying needs of the community through their CSR activities in the area and provide for resources for the implementation and running for the programs. FFCEL also has a dedicated officer for engaging local community around site. The officer takes inputs of requirements from the local community and on the basis of same we provide CSR projects.

No complaints were received during the monitoring period.

2.3 AFOLU-Specific Safeguards

Not Applicable, as this project is a non-AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

This project has an installed capacity of 49.5 MW and is normally operated during the current monitoring period. There are no outages during the current monitoring period which have directly impacted the GHG emission reductions.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation involved during the current monitoring period.

3.2.2 Project Description Deviations

There is no project description deviation involved during the current monitoring period.

3.3 Grouped Projects

This is not a grouped project activity.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OMy}$
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor for grid in the year y
Source of data	Pakistan Energy Yearbook published by Ministry of Petroleum & Natural Resources
Value applied	0.7625
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex ante as per “Tool to calculate the emission factor for an electricity system, ver. 04.0” as 3-year generation-weighted average of latest three years, 2011, 2012, 2013, data obtained from Pakistan Energy Yearbook published by Ministry of Petroleum & Natural Resources, Hydrocarbon Development Institute of Pakistan.

Purpose of Data	Calculation of baseline emissions
Comments	Computed once during VCS-PD finalization (ex-ante) and will remain same throughout the crediting period.

Data / Parameter	$EF_{grid,BMy}$
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for grid in the year y
Source of data	Pakistan Energy Yearbook published by Ministry of Petroleum & Natural Resources
Value applied	0.2496
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex ante as per “Tool to calculate the emission factor for an electricity system, ver. 04.0” based on the most recent year 2013 data available from Pakistan Energy Yearbook published by Ministry of Petroleum & Natural Resources, Hydrocarbon Development Institute of Pakistan.
Purpose of Data	Calculation of baseline emissions
Comments	Computed once during VCS-PD finalization (ex-ante) and will remain same throughout the crediting period.

Data / Parameter	$EF_{grid,CMy}$
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid in the year y
Source of data	Calculated weighted average combined margin using equation – $EF_{grid,CMy} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BMy} \times w_{BM}$ The default values for w_{OM} and w_{BM} are taken as applicable to wind power generation project activities as $w_{OM} = 0.75$ and $w_{BM} = 0.25$.
Value applied	0.6343
Justification of choice of data or description of measurement methods and procedures applied	Calculated ex ante as per “Tool to calculate the emission factor for an electricity system, ver. 04.0” as follows: $EF_{grid,CMy} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BMy} \times w_{BM}$
Purpose of Data	Calculation of baseline emissions
Comments	Computed once during VCS-PD finalization (ex-ante) and will remain same throughout the crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG_{export,y}
Data unit	MWh
Description	Electricity exported to the grid by the project activity in year y
Source of data	Joint monthly meter reading report
Description of measurement methods and procedures to be applied	Energy meters installed at Jhampir- 132 kV line and Nooriabad 132 kV line measures the export and import of electricity on continuous basis. Meter readings are taken and verified, once in a month, jointly by the representatives of NTDC and the representative of FFCEL. Meter readings taken from both feeders will be added to arrive at electricity exported to the grid by the project activity in year y.
Frequency of monitoring/recording	Measured continuously, read monthly, Value Applied is the measured quantity in the present monitoring period
Value monitored	716,538.94
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	The data is cross-checked with the invoices raised in case sale of the electricity and electricity bills in case of captive use. As per NEPRA grid code, meters shall be calibrated atleast once in two years to verify meter accuracy. The metering points to record net electricity exported to grid are at the Jhampir -132 kV line and Nooriabad – 132 kV line. The metering system has an accuracy class of 0.2 or better and is located within the substation. Under the provisions of EPA, as part of metering system of wind farm, two independent energy meters have been installed at each feeders (Jhampir and Nooriabad) in the substation (i) Metering System and (ii) Back-up Metering System. These meters are of identical type and accuracy class. The Metering System and the Back-Up Metering System is jointly sealed by NTDC and FFCEL. Metering system is used for billing purposes. In case the Metering System has a failure, the Back-Up Metering System is used for the same purpose. In case the Metering System has a failure, the data from the Back-Up Metering System shall be used for emission reduction calculation.
Purpose of the data	Calculation of baseline emissions

Calculation method	$EG_{\text{export},y} = EG_{\text{export},y, \text{Jhampir}} + EG_{\text{export},y, \text{Nooriabad}}$ $EG_{\text{export},y, \text{Jhampir}} =$ Electricity exported to the grid measured at Jhampir 132 kV line $EG_{\text{export},y, \text{Nooriabad}} =$ Electricity exported to the grid measured at Nooriabad 132 kV line
Comments	The data will be archived in electronic and physical form for the crediting period + 2 years

Data / Parameter	$EG_{\text{import},y}$
Data unit	MWh
Description	Electricity imported from the grid by the project activity in year y
Source of data	Joint monthly meter reading report
Description of measurement methods and procedures to be applied	Energy meters installed at Jhampir 132 kV line and Nooriabad 132 kV line measures the export and import of electricity on continuous basis. Meter readings are taken and verified, once in a month, jointly by the representatives of National Transmission & Despatch Company (NTDC) and the representative of FFCEL. Meter readings taken from both feeders will be added to arrive at electricity imported from the grid by the project activity in year y.
Frequency of monitoring/recording	Measured continuously, read monthly, Value Applied is the measured quantity in the present monitoring period
Value monitored	2,222.43
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	The data is cross-checked with the invoices raised in case sale of the electricity and electricity bills in case of captive use. As per National Electric Power Regulatory Authority (NEPRA) grid code, meters shall be calibrated atleast once in two years to verify meter accuracy. The metering points to record net electricity exported to grid are at the Jhampir -132 kV line and Nooriabad – 132 kV line. The metering system has an accuracy class of 0.2 or better and is located within the substation. Under the provisions of Energy Purchase Agreement (EPA), as part of metering system of wind farm, two independent energy meters have been installed at each feeders (Jhampir and Nooriabad) in the substation (i) Metering System and (ii) Back-up Metering System. These meters are of identical type and accuracy class. The Metering System and the Back-Up Metering System is jointly sealed by NTDC and FFCEL. Metering system is used for billing purposes. In case the Metering System has a failure, the Back-Up Metering System is used for the same purpose.

	In case the Metering System has a failure, the data from the Back-Up Metering System shall be used for emission reduction calculation.
Purpose of the data	Calculation of baseline emissions
Calculation method	$EG_{import,y} = EG_{import,y, Jhampir} + EG_{import,y, Nooriabad}$ $EG_{import,y, Jhampir}$ = Electricity imported from the grid measured at Jhampir 132 kV line $EG_{import,y, Nooriabad}$ = Electricity imported from the grid measured at Nooriabad 132 kV line
Comments	The data will be archived in electronic and physical form for the crediting period + 2 years

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y
Source of data	Joint monthly meter reading report
Description of measurement methods and procedures to be applied	Energy meter installed at Jhampir 132 kV line and Nooriabad 132 kV line measures the export and import of electricity on continuous basis. Meter readings are taken and verified, once in a month, jointly by the representatives of NTDC and the representative of FFCEL. The net electricity supplied to the grid is calculated by subtracting the import of the electricity from the export of the electricity.
Frequency of monitoring/recording	Measured continuously, read monthly, Value Applied is the measured quantity in the present monitoring period
Value monitored	714,316.51
Monitoring equipment	Energy Meter
QA/QC procedures to be applied	The data is cross-checked with the invoices raised in case sale of the electricity and electricity bills in case of captive use. As per NEPRA grid code, meters shall be calibrated atleast once in two years to verify meter accuracy. The metering points to record net electricity exported to grid are at the Jhampir -132 kV line and Nooriabad – 132 kV line. The metering system has an accuracy class of 0.2 or better and is located within the substation. Under the provisions of EPA, as part of metering system of wind farm, two independent energy meters have been installed at each feeders (Jhampir and

	Nooriabad) in the substation (i) Metering System and (ii) Back-up Metering System. These meters are of identical type and accuracy class. The Metering System and the Back-Up Metering System is jointly sealed by NTDC and FFCEL. Metering system is used for billing purposes. In case the Metering System has a failure, the Back-Up Metering System is used for the same purpose. In case the Metering System has a failure, the data from the Back-Up Metering System shall be used for emission reduction calculation.
Purpose of the data	Calculation of baseline emissions
Calculation method	Net electricity fed to the grid is calculated as $EG_{BL,y} = EG_{export,y} - EG_{import,y}$
Comments	The data will be archived in electronic and physical form for the crediting period + 2 years

4.3 Monitoring Plan

Monitoring of emission reductions has been carried as per the applied methodology in the project activity i.e. ACM0002, version 15.0, which requires monitoring of the following relevant parameters:

- $EF_{grid,CM,y}$: Combined margin CO₂ emission factor for the grid in the year y
- $EG_{PJ,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y

Since the project proponent has chosen ex-ante determination of CO₂ emission factor for the grid, 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 produced and supplied to the grid by the project activity.

The general conditions set out for metering, recording, meter readings, meter inspections, test & checking and communication has been carried out as per the Power Purchase Agreement signed by the project proponent with National Electric Power Regulatory Authority.

The personnel appointed by the project owner are in charge of the monitoring plan.

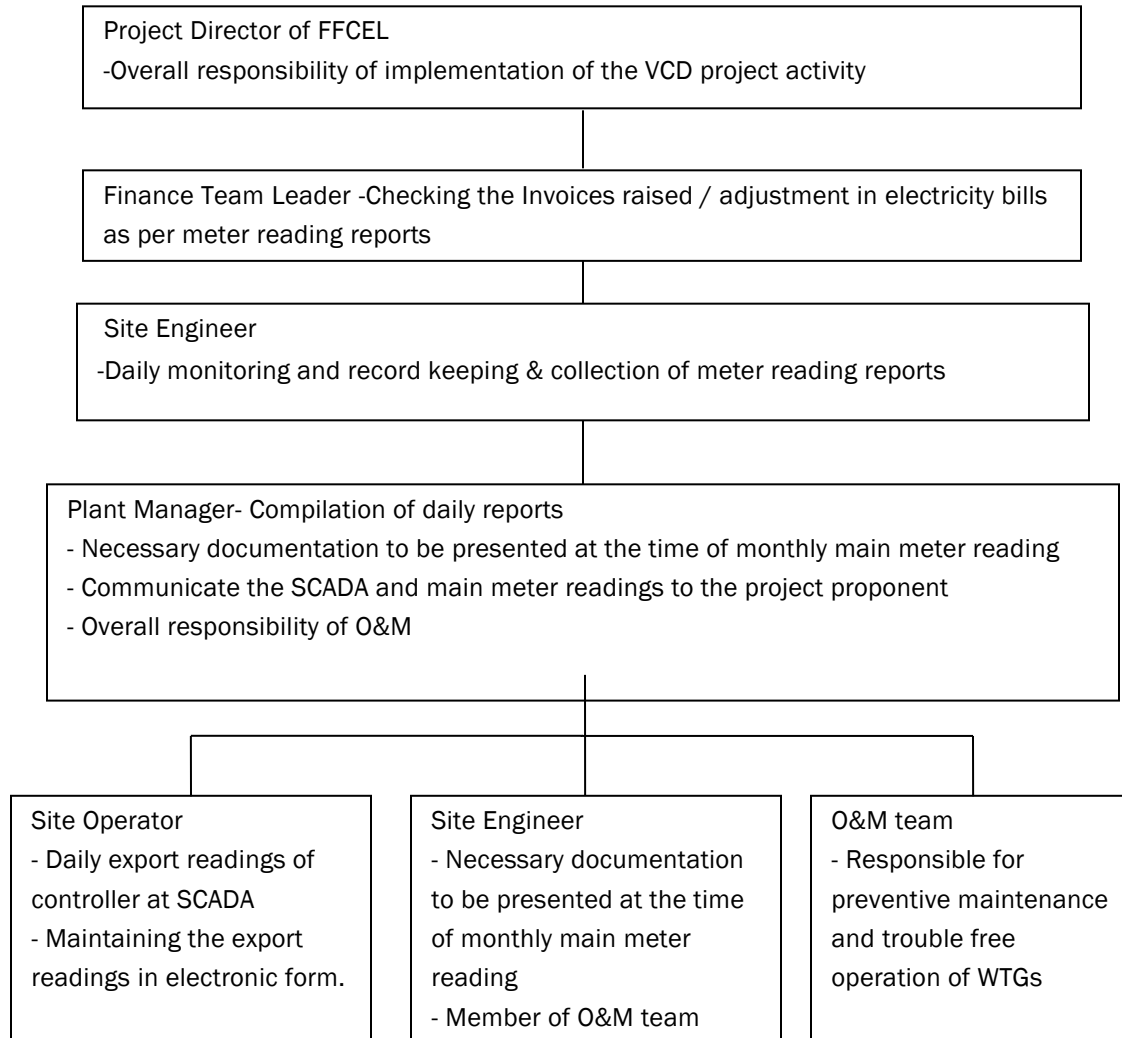
1. Monitoring objects

The main monitoring object is the electricity delivered to the grid.

2. Management structure

The project owner has appointed personnel to carry out the monitoring plan.

The personnel structure along with assigned responsibility is as follows:



3. Monitoring equipment and installation

The meters are installed at the interconnection point to the grid for monitoring the electricity delivered to the grid. The accuracy of the meters and the calibration is according to National standards.

4. Data collection

The project owner and the grid company are responsible for checking the meters. During the monitoring period it was ensured that all meters are sealed and without damages.

5. Meters maintenance and calibration

As per NEPRA grid code, meters shall be calibrated at least once in two years to verify meter accuracy. All meters were calibrated as scheduled except the following:

- a. The schedule date for meter calibration was 27/04/2018 however meters got calibrated on 25/01/2019. The results of the delayed calibration however do not show any errors in the measuring equipment hence in line with EB 52, annex 60, hence a maximum permissible error i.e. 0.2% has been applied in a conservative manner to the period not covered by calibrated meters as a conservative approach.
- b. Similarly, in another time, schedule date for meter calibration was 24/01/2021 however meters got calibrated on 07/10/2021. The results of the delayed calibration however do not show any errors in the measuring equipment hence in line with EB 52, annex 60, hence a maximum permissible error i.e. 0.2% has been applied in a conservative manner to the period (Jan 2021 to Jul 2021) not covered by calibrated meters as a conservative approach

There was no instance of meter failures or error found to be outside acceptable limits of accuracy during the present monitoring period.

6. QA/QC procedures

The meters have been jointly inspected and sealed and have not been interfered by either project owner, FFCEL or Power Purchaser, NTDC without the presence of the other party and other than as scheduled.

7. Data archiving

Data from monthly metering reports have been archived in electronic and physical form for the entire crediting period plus two years.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emission calculation for the project activity is attributable to the CO₂ Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the national grid will be multiplied by the grid emission factor to calculate the baseline emissions reduced by the proposed project activity.

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

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 CDM project activity in year y (MWh/yr); equal to $EG_{facility,y}$ - Quantity of net electricity generation supplied by the project to the grid in year y (MWh)
$EF_{grid,CM,y}$	Combined margin CO ₂ emissions factor in year y (tCO ₂ /MWh)

Monitoring Period	Emission Factor, (EF _y) (tCO ₂ /MWh)	Net Electricity delivered to the grid, (EG _y) (MWh)	Baseline Emissions, (BE _y) (tCO ₂ e)
2014 (01-12-2014 to 31-12-2014)	0.6343	8,479.00	5,378
2015	0.6343	131,689.00	83,530
2016	0.6343	130,484.55	82,766
2017	0.6343	121,581.54	77,119
2018	0.6343	119,231.89	75,628
2019	0.6343	111,225.85	70,550
2020 (01-01-2020 to 30- 11-2020)	0.6343	91,624.68	58,117
Total		714,316.51	453,091

5.2 Project Emissions

There are no project emissions associated with the power generation from wind power project.

Hence, $PE_y = 0$

5.3 Leakage

No leakage emissions are considered for the proposed project activity since no energy generating equipment is transferred from another activity and/or the existing equipment is transferred to another activity.

Thus, $L_y = 0$

5.4 Net GHG Emission Reductions and Removals

$$ER_y = BE_y - PE_y - L_y$$

BE_y = Baseline Emissions

PE_y = Project Emissions = 0

L_y = Leakage Emissions = 0

$$ER_y = 453,091 - 0 - 0 = 453,091 \text{ tCO}_2\text{e}$$

The vintage year – wise emission reduction is tabulated 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)
2014 (01-12-2014 to 31-12-2014)	5,378	0	0	5,378
2015	83,530	0	0	83,530
2016	82,766	0	0	82,766
2017	77,119	0	0	77,119
2018	75,628	0	0	75,628
2019	70,550	0	0	70,550
2020	58,117	0	0	58,117
Total	453,091	0	0	453,091

APPENDIX I: METER CALIBRATION

The energy meters are properly maintained with regular calibration schedules to ensure accuracy. The details of calibration of meters during the current monitoring period are as follows:

Meter Details	Previous calibration 1	Validity	Previous calibration 2	Validity	Previous calibration 3	Validity	Current calibration	Validity
Type: Main Meter	13-09-2014	12-09-2016	28-04-2016	27-04-2018	25-01-2019	24-01-2021	07-10-2021	06-10-2023
Meter No.: 41507169								
Make: ISKRA, Slovenia								
Accuracy class: 0.2s								
Feeder : Jhampir								
Type: Backup Meter	13-09-2014	12-09-2016	28-04-2016	27-04-2018	25-01-2019	24-01-2021	07-10-2021	06-10-2023
Meter No.: 41510586								
Make: ISKRA, Slovenia								
Accuracy class: 0.2s								
Feeder : Jhampir								
Type: Main Meter	13-09-2014	12-09-2016	28-04-2016	27-04-2018	25-01-2019	24-01-2021	07-10-2021	06-10-2023
Meter No.: 41507148								
Make: ISKRA, Slovenia								
Accuracy class: 0.2s								
Feeder : Nooriabad								
Type: Backup Meter	13-09-2014	12-09-2016	28-04-2016	27-04-2018	25-01-2019	24-01-2021	07-10-2021	06-10-2023
Meter No.: 41510585								
Make: ISKRA, Slovenia								
Accuracy class: 0.2s								
Feeder : Nooriabad								

*The schedule date for meter calibration was 27/04/2018 however meters got calibrated on 25/01/2019. The results of the delayed calibration however do not show any errors in the measuring equipment hence in line with EB 52, annex 60, hence a maximum permissible error i.e. 0.2% has been applied in a conservative manner to the period not covered by calibrated meters as a conservative approach.