



PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT



Title: 59.4 MW Bundled Wind Power Project in Rajasthan & Madhya Pradesh by Orchid Renewable Powertech Private Limited

Version 2.0

Date: 30/09/2024

First CoU Issuance Period: 08 Years, 09 Months

Date: 01/04/2015 to 31/12/2023



Project Concept Note (PCN) CARBON
OFFSET UNIT (CoU) PROJECT

BASIC INFORMATION

Title of the project activity	59.4 MW Bundled Wind Power Project in Rajasthan & Madhya Pradesh by Orchid Renewable Powertech Private Limited
Scale of the project activity	Large Scale Project
Completion date of the PCN	30/09/2024
Project participants	ORCHID RENEWABLE POWERTECH PRIVATE LIMITED
Host Party	India
Applied methodologies and standardized baselines	CDM UNFCCC Methodology ACM0002: Grid connected electricity generation from renewable sources- Version 21.0
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated amount of total GHG emission reductions in 11 years	To be estimated during verification. An ex-ante estimate is 88,978 CoUs (88,978) tCO ₂ eq

SECTION A. Description of project activity

A.1. Purpose and general description of Carbon offset Unit (CoU) project activity >>

The Project activity titled, "59.4 MW Bundled Wind Power Project in Rajasthan & Madhya Pradesh by Orchid Renewable Powertech Private Limited" is a bundled wind-power Project located in Rajasthan and Madhya Pradesh. This project comprises of 56 wind turbines spread across 9 villages in two states: Rajasthan (seven villages in Jaisalmer and Jodhpur districts) and Madhya Pradesh (two villages in Dewas district).

It has been operational since 31 March 2006, which is the earliest commissioning date, and the last commissioning date of the project is March 14, 2011, owned by Orchid Renewable Powertech Private limited (hereinafter referred to as the Project Proponent or PP).

Purpose of the project activity:

The core objective of this bundled project is to leverage wind energy, a sustainable and naturally renewable resource, for electrical power generation. By replacing electricity production from existing and planned fossil fuel-based power plants within the grid, this initiative demonstrably contributes to the reduction of anthropogenic greenhouse gas emissions released into the atmosphere. In the absence of this project, the requisite electricity would be generated by traditional power plants, which rely on the combustion of fossil fuels and consequently contribute to air pollution. Conversely, the wind turbines employed in this project generate electricity with no emissions whatsoever. Commissioning dates of the Wind Turbine Generator installed are shown in the below table:

Company	LOCNO	Make	Site	Capacity	DOC	Village
Orchid-Raj	MK205	Suzlon	Jaisalmer	2100	11-Sep-10	Selat
Orchid-Raj	MK204	Suzlon	Jaisalmer	2100	11-Sep-10	Selat
Orchid-Raj	MK203	Suzlon	Jaisalmer	2100	11-Sep-10	Selat
Orchid-Raj	MK202	Suzlon	Jaisalmer	2100	24-Sep-10	Selat
Orchid-Raj	MK201	Suzlon	Jaisalmer	2100	24-Sep-10	Selat
Orchid-Raj	AK29	Suzlon	Akal	1250	14-Mar-11	Moda
Orchid-Raj	AK18	Suzlon	Akal	1250	14-Mar-11	Sirwa
Orchid-Raj	J723	Suzlon	RATAN KA BAAS	1500	31-Mar-08	Deriya
Orchid-Raj	J724	Suzlon	RATAN KA BAAS	1500	31-Mar-08	Deriya
Orchid-Raj	J725	Suzlon	RATAN KA BAAS	1500	31-Mar-08	Deriya

Orchid-Raj	J726	Suzlon	RATAN KA BAAS	1500	31-Mar-08	Deriya
Orchid-Raj	J727	Suzlon	RATAN KA BAAS	1500	31-Mar-08	Deriya
Orchid-Raj	RKBNL09	Suzlon	RATAN KA BAAS	1500	25-Sep-09	Bastwa
Orchid-Raj	RKB87	Suzlon	RATAN KA BAAS	1500	07-Nov-09	Bastwa
Orchid-Raj	RKB84	Suzlon	RATAN KA BAAS	1500	29-Sep-09	Bastwa
Orchid-Raj	RKB85	Suzlon	RATAN KA BAAS	1500	25-Sep-09	Bastwa
Orchid-Raj	KSOLTI-07 (77)	Enercon	Tinwari	800	30-Sep-08	Salodi
Orchid-Raj	KSOLTI-10 (64)	Enercon	Tinwari	800	26-Sep-08	Salodi
Orchid-Raj	KSOLTI-06 (76)	Enercon	Tinwari	800	30-Sep-08	Salodi
Orchid-Raj	KSOLTI-05 (74)	Enercon	Tinwari	800	26-Sep-08	Salodi
Orchid-Raj	KSOLTI-09 (65)	Enercon	Tinwari	800	26-Sep-08	Salodi
Orchid-Raj	KSOLTI-08 (66)	Enercon	Tinwari	800	30-Sep-08	Salodi
Orchid-Raj	KSOLTI-04 (71)	Enercon	Tinwari	800	29-Sep-08	Salodi
Orchid-Raj	KSOLTI-03 (69)	Enercon	Tinwari	800	26-Sep-08	Salodi
Orchid-Raj	KSOLTI-02 (14)	Enercon	Tinwari	800	26-Sep-08	Beru
Orchid-Raj	KSOLTI-01 (13)	Enercon	Tinwari	800	26-Sep-08	Beru
Orchid-MP	N-16	Suzlon	Dewas	1250	31-Mar-06	Nagada
Orchid-MP	N-13	Suzlon	Dewas	1250	31-Mar-06	Nagada
Orchid-MP	KSOLRT-30 (90)	Enercon	Dewas	800	29-Jun-09	Karnavad
Orchid-MP	KSOLRT-29 (65)	Enercon	Dewas	800	10-Jun-09	Karnavad
Orchid-MP	KSOLRT-28 (64)	Enercon	Dewas	800	10-Jun-09	Karnavad
Orchid-MP	KSOLRT-27 (63)	Enercon	Dewas	800	10-Jun-09	Karnavad
Orchid-MP	KSOLRT-31 (91)	Enercon	Dewas	800	29-Jun-09	Karnavad
Orchid-MP	KSOLRT-32 (92)	Enercon	Dewas	800	29-Jun-09	Karnavad
Orchid-MP	KSOLRT-24 (54)	Enercon	Dewas	800	10-Jun-09	Karnavad
Orchid-MP	KSOLRT-33 (93)	Enercon	Dewas	800	29-Jun-09	Karnavad

Orchid-MP	KSOLRT-25 (55)	Enercon	Dewas	800	10-Jun-09	Karnavad
Orchid-MP	KSOLRT-34 (94)	Enercon	Dewas	800	29-Jun-09	Karnavad
Orchid-MP	KSOLRT-26 (56)	Enercon	Dewas	800	10-Jun-09	Karnavad
Orchid-MP	KSOLRT-23 (53)	Enercon	Dewas	800	26-Mar-09	Karnavad
Orchid-MP	KSOLRT-15 (45)	Enercon	Dewas	800	26-Mar-09	Karnavad
Orchid-MP	KSOLRT-16 (46)	Enercon	Dewas	800	26-Mar-09	Karnavad
Orchid-MP	KSOLRT-14 (44)	Enercon	Dewas	800	08-Aug-08	Karnavad
Orchid-MP	KSOLRT-13 (43)	Enercon	Dewas	800	21-Jul-08	Karnavad
Orchid-MP	KSOLRT-12 (42)	Enercon	Dewas	800	21-Jul-08	Karnavad
Orchid-MP	KSOLRT-11 (41)	Enercon	Dewas	800	24-Jun-08	Karnavad
Orchid-MP	KSOLRT-10 (40)	Enercon	Dewas	800	24-Jun-08	Karnavad
Orchid-MP	KSOLRT-09 (39)	Enercon	Dewas	800	24-Jun-08	Karnavad
Orchid-MP	KSOLRT-08 (19)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-07 (18)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-06 (17)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-05 (16)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-03 (14)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-04 (15)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-02 (10)	Enercon	Dewas	800	20-Mar-08	Karnavad
Orchid-MP	KSOLRT-01 (9)	Enercon	Dewas	800	20-Mar-08	Karnavad

This bundled project will generate approximately **98,865** MWh electricity per annum. The net generated electricity from the project activity is for selling it to Jaipur, Jodhpur, & Ajmer VIDYUTH VITRAN NIGAM LIMITED (JVNL), for Rajasthan & MP Power Trading Co. Ltd for Madhya Pradesh by the project proponent. The power produced by the Project Activity is evacuated at Amarsagar 220KV/132KV, Govt Akal GSS 440 KV/220KV, Tinwari GSS 220 KV/132KV, located at Jaisalmer and Jodhpur. For Madhya Pradesh the power produced by the project activity is evacuated at Dewas GSS 132KV/33KV, Ashtha, Vicholi & Indore

220KV/33KV located at Dewas. A Power Purchase Agreement has been signed between PP and RDPPC & MP Power Trading Co Ltd. The project activity has been helping in greenhouse gas (GHG) emission reduction by using renewable resources (wind energy) for generating power which otherwise would have been generated using grid mix power plants, which is dominated by fossil fuel based thermal power plants. Through the injection of renewable power to the grid, the project activity would be displacing equivalent quantum of fossil fuel based electricity resulting in emission reduction of **88,978 tCO₂** and whereas actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification.

A.2 Do no harm or Impact test of the project activity>>

There are social, environmental, economic and technological benefits which contribute to sustainable development.

Social benefits:

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

Environmental benefits:

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

Economic benefits:

- The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this will create additional employment opportunities in the region.
- The generated electricity will be fed into the NEWNE regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be



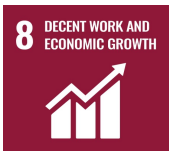

setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

Technical benefits:

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

United Nations Sustainable Development Goals:

The project activity generates electrical power using wind energy, which is generated from windmills, thereby displacing non-renewable fossil resources resulting to sustainable, economic and environmental development. In the absence of the project activity equivalent amount of power generation would have taken place through fossil fuel dominated power generating stations. Thus, the renewable energy generation from project activity will result in reduction of the greenhouse gas emissions.

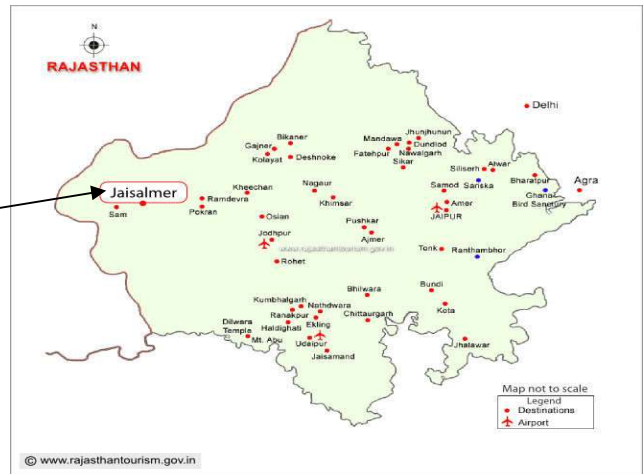
SDG Goals	Description
Goal 4 	The project provides underprivileged and rural schools with essential educational resources, equipping students and unlocking new opportunities for them to achieve quality education.
Goal 7 	This Bundled wind energy project will generate clean electricity at a more accessible price for consumers. By utilizing a renewable resource, the project contributes to a growing share of clean energy sources in the global energy mix, ultimately reducing reliance on fossil fuels.
Goal 8 	The wind farm project strengthens the local community by generating employment for the locals wherein a safe and inclusive work environment that empowers women is promoted.
Goal 13 	This 59.4 MW wind power project meets the SDG 13 goal by displacing fossil fuel-based energy generation by producing clean energy. This project is expected to reduce 88,978 tCO ₂ emission per year.

A.3. Location of project activity >>

The windmills are installed in seven separate villages in Rajasthan and two in Madhya Pradesh, and their locations are listed in a table.

Village	Installed Capacity	District	State
Sirwa	1250kW	Jaisalmer	Rajasthan
Selat	10500kW	Jaisalmer	Rajasthan
Moda	1250kW	Jaisalmer	Rajasthan
Deriya	7500kW	Jaisalmer	Rajasthan
Bastwa	6000kW	Jodhpur	Rajasthan
Salodi	6400kW	Jodhpur	Rajasthan
Beru	1600kW	Jodhpur	Rajasthan
Nagada	2500kW	Dewas	Madhya Pradesh
Karnavad	22400kW	Dewas	Madhya Pradesh

The representative Location of map is included below:



Project Activity

The following table shows the WEG numbers for all the wind turbines located in Rajasthan and Madhya Pradesh:

Loc No	Site Name	WEG	Wind turbine capacity kW	Capacity in Kw
		Serial No		
MK205	Jaisalmer	52110008	2100	10500kW
MK204	Jaisalmer	52110005	2100	
MK203	Jaisalmer	52110008	2100	
MK202	Jaisalmer	52110023	2100	
MK201	Jaisalmer	52110022	2100	
AK29	Akal	64264298	1250	2500kW
AK18	Akal	64263080	1250	
J723	RATAN KA BAAS	51507480	1500	7500kW
J724	RATAN KA BAAS	51507473	1500	
J725	RATAN KA BAAS	51507467	1500	
J726	RATAN KA BAAS	51508307	1500	
J727	RATAN KA BAAS	51507292	1500	
RKBNL09	RATAN KA BAAS	51507551	1500	6000kW
RKB87	RATAN KA BAAS	51507041	1500	
RKB84	RATAN KA BAAS	5108275	1500	
RKB85	RATAN KA BAAS	51508228	1500	
KSOLTI-07 (77)	Tinwari	91/7708	800	
KSOLTI-10 (64)	Tinwari	91/7719	800	
KSOLTI-06 (76)	Tinwari	91/7709	800	
KSOLTI-05 (74)	Tinwari	91/7721	800	
KSOLTI-09 (65)	Tinwari	91/7725	800	
KSOLTI-08 (66)	Tinwari	91/7735	800	
KSOLTI-04 (71)	Tinwari	91/7722	800	

KSOLTI-03 (69)	Tinwari	91/7744	800	
KSOLTI-02 (14)	Tinwari	91/7695	800	
KSOLTI-01 (13)	Tinwari	91/7696	800	
N-16	Dewas	N8/479703	1250	2500kW
N-13	Dewas	N8/480655	1250	
KSOLRT-30 (90)	Dewas	91/P/391-2/163	800	8000kW
KSOLRT-29 (65)	Dewas	91/L/T/481-2/391	800	
KSOLRT-28 (64)	Dewas	91/L/T/391-2/472	800	
KSOLRT-27 (63)	Dewas	91/P/391-2/149	800	
KSOLRT-31 (91)	Dewas	91/P/391-2/162	800	
KSOLRT-32 (92)	Dewas	91/S/534-2/391	800	
KSOLRT-24 (54)	Dewas	91/S/513/391-2	800	
KSOLRT-33 (93)	Dewas	91/S/391-2/522	800	
KSOLRT-25 (55)	Dewas	91/L/T391-2/493	800	
KSOLRT-34 (94)	Dewas	91/MF/391-2/003	800	
KSOLRT-26 (56)	Dewas	91/S/518/391-2	800	
KSOLRT-23 (53)	Dewas	91/L&T/391-2/435	800	
KSOLRT-15 (45)	Dewas	91/L&T/391-2/446	800	
KSOLRT-16 (46)	Dewas	91/S/391-2/493	800	
KSOLRT-14 (44)	Dewas	91/L&T/391-2/410	800	
KSOLRT-13 (43)	Dewas	91/GB/391-2/062	800	
KSOLRT-12 (42)	Dewas	91/S/391-2/0448	800	
KSOLRT-11 (41)	Dewas	91/P/391-2/0073	800	
KSOLRT-10 (40)	Dewas	91/S/391-2/0451	800	
KSOLRT-09 (39)	Dewas	91/S/391-0/0319	800	

KSOLRT-08 (19)	Dewas	91/GB/390-0/0052	800	22400kW
KSOLRT-07 (18)	Dewas	91/S/391-0/0282	800	
KSOLRT-06 (17)	Dewas	91/B/391-2/0269	800	
KSOLRT-05 (16)	Dewas	91/P/391-2/0038	800	
KSOLRT-03 (14)	Dewas	91/L&T/390-0/0328	800	
KSOLRT-04 (15)	Dewas	91/L&T/390-0/0368	800	
KSOLRT-02 (10)	Dewas	91/B/391-02/0276	800	
KSOLRT-01 (9)	Dewas	91/L&T/377/391-2	800	

Latitudes and longitudes of each site are mentioned in table below:

Loc No	Make	Site	Capacity in kW	Village	Latitude	Longitude
MK205	Suzlon	Jaisalmer	2100	Selat	27.19742	70.809694
MK204	Suzlon	Jaisalmer	2100	Selat	27.19558	70.814611
MK203	Suzlon	Jaisalmer	2100	Selat	27.19381	70.819528
MK202	Suzlon	Jaisalmer	2100	Selat	27.192	70.824472
MK201	Suzlon	Jaisalmer	2100	Selat	27.19019	70.829417
AK29	Suzlon	Akal	1250	Moda	26.707778	71.101806
AK18	Suzlon	Akal	1250	Sirwa	26.668361	71.101806
J723	Suzlon	RATAN KA BAAS	1500	Deriya	26.59386	72.55930556
J724	Suzlon	RATAN KA BAAS	1500	Deriya	26.59139	72.56197222
J725	Suzlon	RATAN KA BAAS	1500	Deriya	26.57875	72.56013889
J726	Suzlon	RATAN KA BAAS	1500	Deriya	26.57764	72.56430556
J727	Suzlon	RATAN KA BAAS	1500	Deriya	26.56847	72.56038889
RKBNL09	Suzlon	RATAN KA BAAS	1500	Bastwa	26.53647	72.56517778
RKB87	Suzlon	RATAN KA BAAS	1500	Bastwa	26.51966	72.57119444

RKB84	Suzlon	RATAN KA BAAS	1500	Bastwa	26.50928	72.56259167
RKB85	Suzlon	RATAN KA BAAS	1500	Bastwa	26.51044	72.57031111
KSOLTI- 07 (77)	Enercon	Tinwari	800	Salodi	26.45925	72.83380556
KSOLTI- 10 (64)	Enercon	Tinwari	800	Salodi	26.46103	72.84280556
KSOLTI- 06 (76)	Enercon	Tinwari	800	Salodi	26.45799	72.83213056
KSOLTI- 05 (74)	Enercon	Tinwari	800	Salodi	26.45684	72.82733056
KSOLTI- 09 (65)	Enercon	Tinwari	800	Salodi	26.45925	72.84255278
KSOLTI- 08 (66)	Enercon	Tinwari	800	Salodi	26.45641	72.843475
KSOLTI- 04 (71)	Enercon	Tinwari	800	Salodi	26.45198	72.83128056
KSOLTI- 03 (69)	Enercon	Tinwari	800	Salodi	26.45103	72.83588611
KSOLTI- 02 (14)	Enercon	Tinwari	800	Beru	26.42775	72.86227222
KSOLTI- 01 (13)	Enercon	Tinwari	800	Beru	26.4262	72.86237778
N-16	Suzlon	Dewas	1250	Nagada	22.89683	76.085361
N-13	Suzlon	Dewas	1250	Nagada	22.89525	76.077556
KSOLRT- 30 (90)	Enercon	Dewas	800	Karnavad	22.82214	76.226222
KSOLRT- 29 (65)	Enercon	Dewas	800	Karnavad	22.81111	76.212972
KSOLRT- 28 (64)	Enercon	Dewas	800	Karnavad	22.80936	76.2095
KSOLRT- 27 (63)	Enercon	Dewas	800	Karnavad	22.80747	76.208528
KSOLRT- 31 (91)	Enercon	Dewas	800	Karnavad	22.80972	76.235278
KSOLRT- 32 (92)	Enercon	Dewas	800	Karnavad	22.808	76.235611
KSOLRT- 24 (54)	Enercon	Dewas	800	Karnavad	22.79861	76.198778
KSOLRT- 33 (93)	Enercon	Dewas	800	Karnavad	22.80522	76.240028
KSOLRT- 25 (55)	Enercon	Dewas	800	Karnavad	22.79653	76.198278
KSOLRT- 34 (94)	Enercon	Dewas	800	Karnavad	22.80422	76.244917

KSOLRT-26 (56)	Enercon	Dewas	800	Karnavad	22.79442	76.196889
KSOLRT-23 (53)	Enercon	Dewas	800	Karnavad	22.79489	76.21
KSOLRT-15 (45)	Enercon	Dewas	800	Karnavad	22.78511	76.215639
KSOLRT-16 (46)	Enercon	Dewas	800	Karnavad	22.78586	76.219861
KSOLRT-14 (44)	Enercon	Dewas	800	Karnavad	22.78294	76.215056
KSOLRT-13 (43)	Enercon	Dewas	800	Karnavad	22.78125	76.214556
KSOLRT-12 (42)	Enercon	Dewas	800	Karnavad	22.77925	76.213972
KSOLRT-11 (41)	Enercon	Dewas	800	Karnavad	22.77756	76.210972
KSOLRT-10 (40)	Enercon	Dewas	800	Karnavad	22.77378	76.200222
KSOLRT-09 (39)	Enercon	Dewas	800	Karnavad	22.77214	76.197
KSOLRT-08 (19)	Enercon	Dewas	800	Karnavad	22.74361	76.183694
KSOLRT-07 (18)	Enercon	Dewas	800	Karnavad	22.74178	76.1835
KSOLRT-06 (17)	Enercon	Dewas	800	Karnavad	22.73983	76.183139
KSOLRT-05 (16)	Enercon	Dewas	800	Karnavad	22.73847	76.18525
KSOLRT-03 (14)	Enercon	Dewas	800	Karnavad	22.73875	76.192167
KSOLRT-04 (15)	Enercon	Dewas	800	Karnavad	22.73669	76.188861
KSOLRT-02 (10)	Enercon	Dewas	800	Karnavad	22.72961	76.196917
KSOLRT-01 (9)	Enercon	Dewas	800	Karnavad	22.72908	76.201389

A.4. Technologies/measures >>

This Bundled project activity consists of multiple Wind turbines of 800kW, 1500 kW, 1250kW, 2100 kW respectively manufactured and supplied by Enercon & Suzlon. This project Generate 59.4 MW power which is consumed by customers delivered by the Grid.

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind has a considerable amount of kinetic energy when blowing at high speeds. This kinetic energy when passing through the blades of the WEG is converted into mechanical energy and rotates the wind

blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The technology is clean technology since there are no GHG emissions associated with electricity generation.

Main component of the windmill is explained below:

Main Tower

This is a very tall structure with a door and inside ladder at the bottom. The door is used to enter the tower for operation and maintenance.

Blades

The windmills are provided with three blades. The blades are self-supporting in nature made up of Fibre Reinforced Polyester. The blades are mounted on the hub.

Nacelle

The Nacelle is the one which contains all the major parts of a windmill. The nacelle is made up of thick rugged steel and mounted on a heavy slewing ring. Under normal operating conditions, the nacelle would be facing the upstream wind direction.

Hub

The Hub is an intermediate assembly between the wing and the main shaft of the wind turbine. Inside the hub, a system to actuate the aerodynamic brake is fitted. The hub is covered with nose cone.

Main Shaft

The shaft connects the gear box and the hub. Solid high carbon steel bars or cylinders are used as main shaft. The shaft is supported by two bearings.

Gear Box, Bearing and Housing

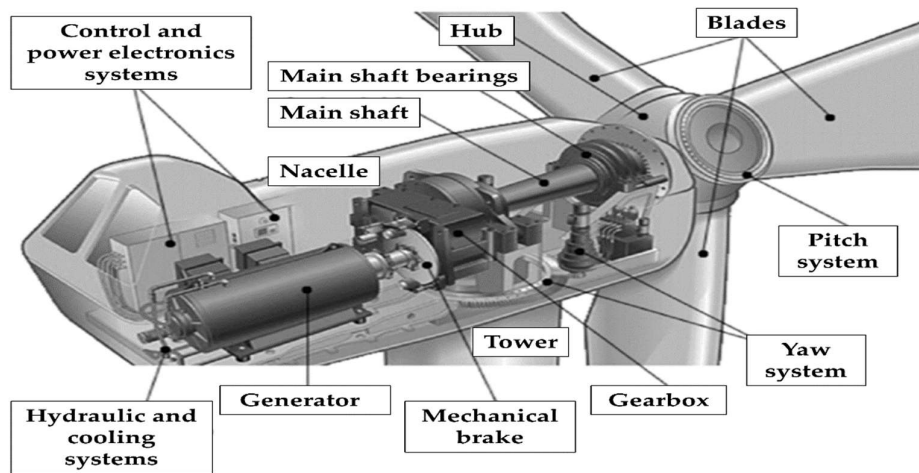
The gearbox is used to increase the speed ratio so that the rotor speed is increased to the rated generator speed. Oil cooling is employed to control the heating of the gearbox. Gearboxes are mounted over dampers to minimize vibration. The main bearings are placed inside the housing.

Brake

Brake is employed in the WEGs to stop the wind turbine mainly for maintenance check. Brakes are also applied during over speed conditions of the wind turbine. The brakes are placed on the high-speed shaft.

Generator

The generator uses an induction type of generator. The generators are provided with monitoring sensors in each phase winding to prevent damage to the generators.



Some of the salient features of the project equipment can be found in the below mentioned table. It consists of S66, S88, S82, & E53 make.

Suzlon

MODEL	S66-1250kW	S82-1500kW	S88-2100kW
OPERATING DATA			
Rated power	1250 kW	1,500 kW	2100 kW
Cut-in wind speed	3 m/s	4 m/s	4 m/s
Rated wind speed	14 m/s	12 m/s	14 m/s
Cut-off wind speed	22 m/s	20 m/s	25 m/s
Survival wind speed	52.5 m/s	52.5 m/s	59.5 m/s
ROTOR			
Type	3 Blades, Upwind /Horizontal axis	3 Blades, Upwind/ Horizontal axis	3 Blades, Upwind/ Horizontal axis
Diameter	66 m	82 m	88 m
Rotational speed at rated power	13.5 to 20.3 rpm	15.6 to 16.3 rpm	15.1-17.7 rpm
Rotor blade material	Epoxy bonded fiber glass	Epoxy bonded fiberglass	Fiberglass / Epoxy
Swept area	3421 m ²	5,281 m ²	6,082 m ²
Power regulation	Active pitch regulated	Active pitch regulation	Active pitch regulation
GEARBOX			
Nominal load	1390 kW	1,650 kW	2,310 kW

Type of cooling	Forced oil cooling lubrication system	Forced oil cooling lubrication system	Forced oil cooling lubrication system
GENERATOR			
Type	Dual speed induction generator (asynchronous)	Induction generator with slip rings, variable rotor resistances via Suzlon Flexi	Induction generator with slip rings, variable rotor resistance with Suzlon Flexi slip
Speed at rated power	1506 rpm	1,511 rpm	1,812 rpm
Rated voltage	690 V AC (phase to phase)	690 V AC (phase to phase)	690/600V
Frequency	50 Hz	50 Hz	50/60Hz
Insulation	Class H	Class H	Class H
TOWER			
Tower height	63 m	76.1 m	71-90m
Hub height (including foundation)	65 m	76.8 m	80 m

Enercon (<https://renewablesfirst.co.uk/renewable-energy-technologies/windpower/wind-turbines/enercon-e53-800-kw-wind-turbine/>)

Parameter	E53- 800kW
Turbine	
Configuration	Three blade, horizontal axis, upwind
Rated Power	800kW at 12m/s
Rotor Speed	11 to 30 rpm
IEC 61400-1 Turbine Class	IIIA
Site Average Wind Speed	7.5 m/s
Survival Wind Speed	57 m/s
Rotor	
Rotor Diameter	52.9 m
Swept Area	2,198 m ²
Blade Material	GRP (Epoxy)
Power regulation	Pitch controlled variable speed
Generator	

Generator Type	ENERCON direct drive synchronous ring generator
Configuration	3-Phase, 400V, 50Hz – 60Hz
Brake & Safety System	
Main Brake System	3 independent pitch control systems with emergency power supply
Secondary System	Rotor brake and Rotor lock (maintenance purposes)
Automatic Shutdown triggered by	High wind speed, grid failure, over-speed, all other fault conditions
Controls	
Control Systems User Interface	ENERCON SCADA
Towers	
Available Hub Heights	50 m, 60 m, 75 m
Tower Type	Tubular steel tower
Warranty	
Period and type	Up to 15-year standard service package

A.5. Parties and project participants >>

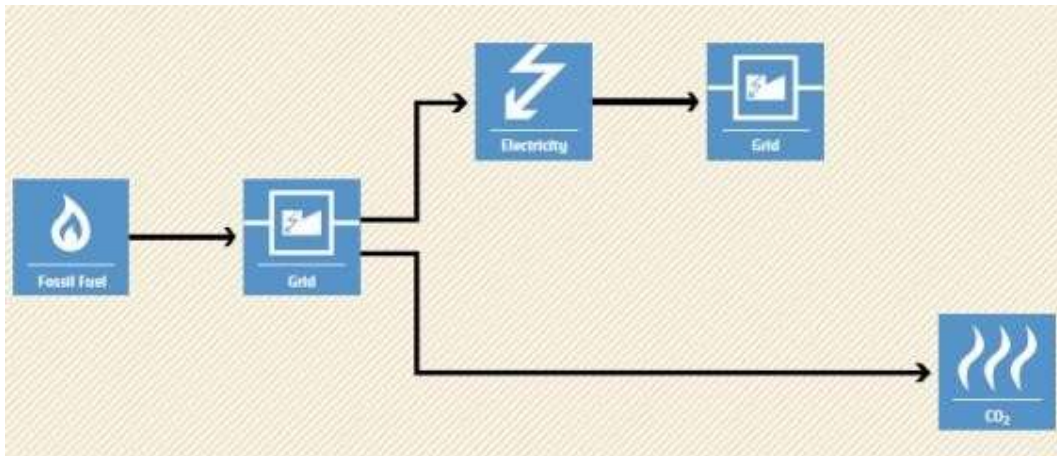
Party (Host)	Participants
India	ORCHID RENEWABLE POWERTECH PRIVATE LIMITED

A.6. Baseline Emissions>>

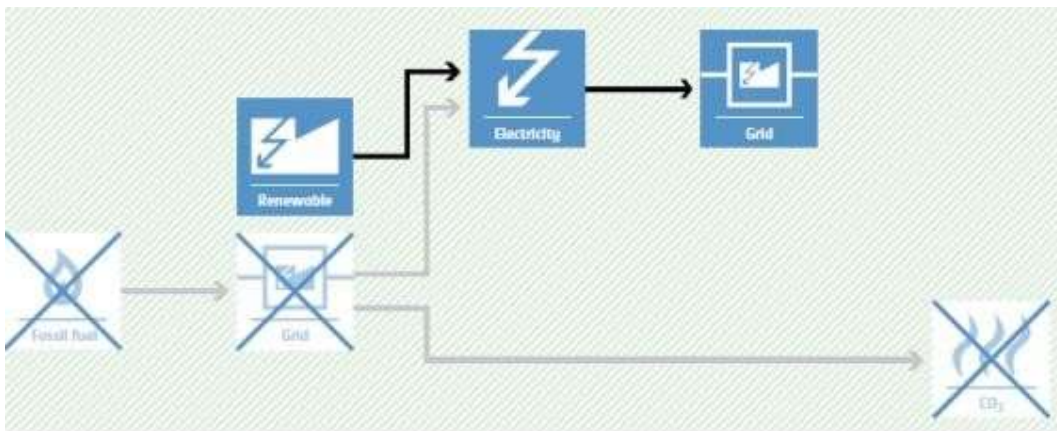
In the absence of the project activity, the equivalent amount of electricity would have been generated from fossil fuel-based power plants and exported to the regional grid (which is connected to the unified Indian Grid system) as national grid is predominantly sourcing from fossil fuel-based power plants. Hence, baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario.

Schematic diagram showing the baseline scenario:

Baseline Scenario:



Project Scenario:



A.7. Debundling>>

This 59.4 MW bundled wind project is not a debundled component of a larger registered carbon offset project activity.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines >>

SECTORAL SCOPE – 01 Energy industries (Renewable/Non-renewable sources)

TYPE I- Renewable Energy Projects

CATEGORY- ACM0002.: “Grid connected electricity generation from renewable sources- Version 21.0.”

B.2. Applicability of methodologies and standardized baselines >>

The project activity involves generation of grid connected electricity from the construction and operation of a new wind power-based power project for selling it to grid. The project activity has an installed capacity of 59.4 MW which will qualify for a large-scale project activity. The project status corresponds to the methodology ACM0002 version 21, and applicability of methodology is discussed below.

Applicability Criteria.	Project Case
<p>1) This methodology is applicable to grid-connected renewable energy power generation project activities that:</p> <ul style="list-style-type: none"> (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plant(s)/unit(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s). 	<p>The proposed project activity is a green field Plant, that is to connected Grid. Therefore, the project activity satisfies the point (a).</p>
<p>2) In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that:</p> <ul style="list-style-type: none"> (a) Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity addition to (an) existing solar photovoltaic or wind power plant(s)/unit(s); (c) Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s). 	<p>The project activity is the installation of 59.4 MW Wind power project and does not involve the integration of a Battery Energy Storage System (BESS). This condition is not applicable for this project.</p>
<p>3) The methodology is applicable under the following conditions:</p> <ul style="list-style-type: none"> (a) Hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, 	<p>The proposed project activity is the installation of a new Wind power plants without BESS integration. Therefore, the said criterion is not applicable</p>

and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;

(c) In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents);

(d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies 2 may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.

4) In case of hydro power plants, one of the following conditions shall apply:

a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or

b) The project activity is implemented in an existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (7) is greater than 4 W/m²; or

c) The project activity results in new single or multiple reservoirs and the power density calculate equation (7), is greater than 4 W/m².

d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density of any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m², all of the following conditions shall apply.

i) The power density calculated using the total installed capacity of the integrated project, as per equation (8) is greater than 4W/m²;

ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be:

Lower than or equal to 15 MW; and

Less than 10% of the total

iii) installed capacity of integrated hydro power project

The proposed project activity is the installation of Wind power plants/units. Therefore, the said condition is not applicable.

<p>5) In the case of integrated hydro power projects, project proponent shall:</p> <p>a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or</p> <p>b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability indifferent seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.</p>	<p>The proposed project activity is the installation of a wind power plants/units. Therefore, the said criteria is not applicable</p>
<p>6) The methodology is not applicable to:</p> <p>a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site.</p> <p>b) Biomass fired power plants;</p>	<p>The proposed project activity is Greenfield wind power project. herefore, the said criteria is not applicable.</p>
<p>7) In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance</p>	<p>The proposed project activity is the installation of wind power plants. Therefore, the said criteria is not applicable.</p>

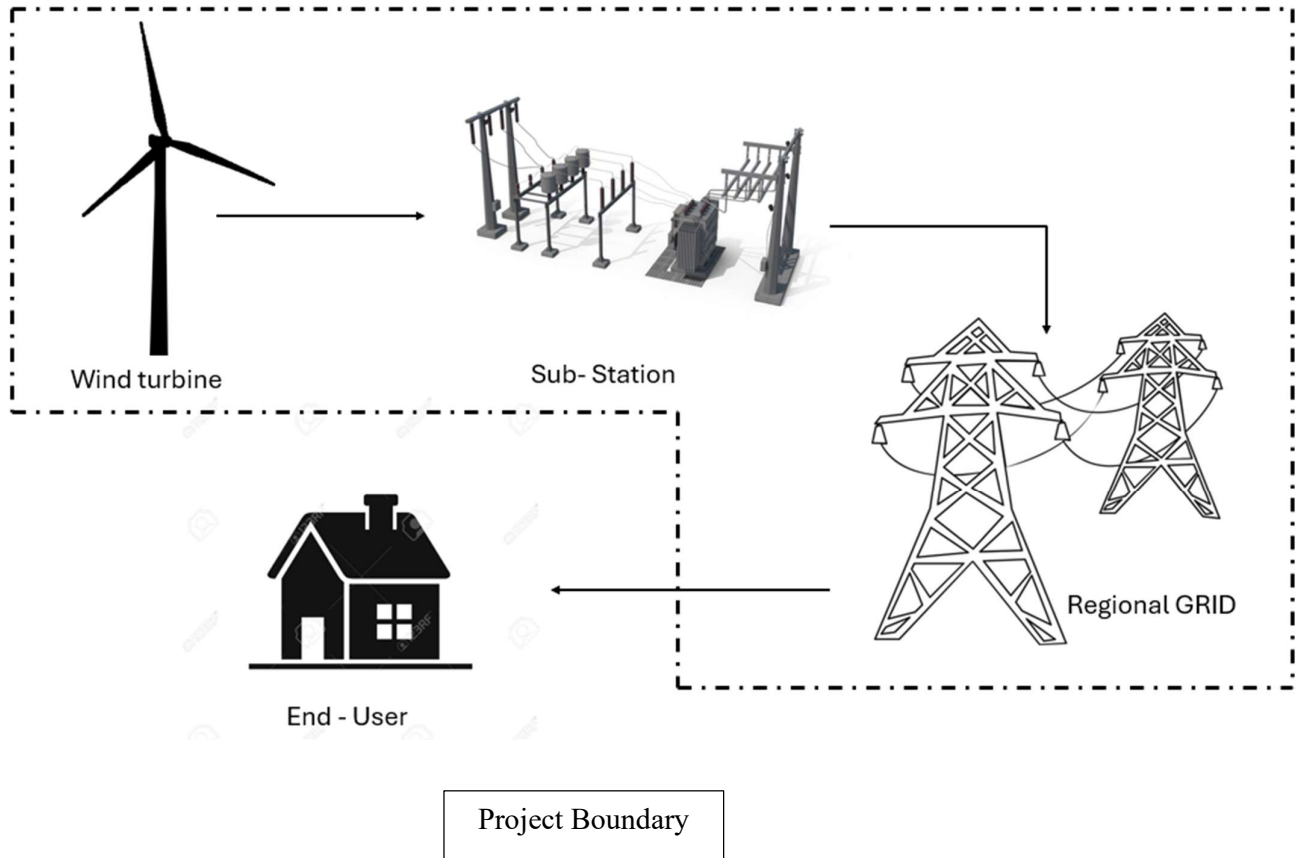
B.3. Applicability of double counting emission reductions >>

There is no double accounting of emission reductions in the project activity due to the following reasons:

- Project is uniquely identifiable based on its location coordinates,
- Project has dedicated commissioning certificate and connection point,
- Project is associated with energy meters which are dedicated to the consumption point for project developer.

B.4. Project boundary, sources and greenhouse gases (GHGs)>>

As per applicable methodology ACM0002. Version 21.0, “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected”. Hence, the project boundary includes the project site where the power plant has been installed, associated power evacuation infrastructure, energy metering points, switch yards and other civil constructs and connected to the regional grid of Rajasthan and Madhya Pradesh.



Thus, the project boundary includes the Wind Turbine Generator (WTG) and the Indian grid system.

	Source	Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	CO ₂	Yes	Main Emission Source
		CH ₄	No	Minor Emission Source
		N ₂ O	No	Minor Emission Source
		Other	No	No other GHG emissions were emitted from the project
Project	Greenfield	CO ₂	Yes	No CO ₂ emissions are emitted from the project

Wind Power Project Activity	CH ₄	No	Project activity does not emit CH ₄
	N ₂ O	No	Project activity does not emit N ₂ O
	Other	No	No other emissions are emitted from the project

B.5. Establishment and description of baseline scenario) >>

As per the approved consolidated methodology ACM0002. Version-21, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

The project activity involves setting up a new wind power plant to harness the green power from wind energy and sell it to the grid by signing a PPA. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants. The power produced at grid from the other conventional sources which are predominantly fossil fuel based. Hence, the baseline for the project activity is the equivalent amount of power produced at the Indian grid.

A "grid emission factor" refers to a CO₂ emission factor (tCO₂/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0^{1.9} tCO₂/MWh for the 2013-2023 years as a conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021, the combined margin emission factor calculated from CEA database in India results into higher emission than the default value. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

❖ Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{(Eq. 1)}$$

Where,

ER_y = Emissions reductions in year y (t CO₂)

BE_y = Baseline emissions in year y (t CO₂)

PE_y = Project emissions in year y (t CO₂)

LE_y = Leakage emissions in year y (t CO₂)

¹ https://a23e347601d72166ded6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com/Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf

Baseline Emissions

Baseline emissions include only CO₂ emissions from electricity generation in 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 in year y can be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{Grid,y}, \quad (\text{Eq. 2})$$

Where,

BE_y = Baseline emissions in year y (t CO₂)

$EG_{PJ,y}$ = 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)

$EF_{Grid,y}$ = Grid emission factor in year y (t CO₂/MWh)

As per paragraph 49 of ACM0002, version-21.0, “if the project activity is the installation of a Greenfield power plant with or without the BESS, as described under paragraph 4(a) or paragraph 5(a) then:

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

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

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

Project Emissions

Since the project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions as per the applicable methodology ACM0002, Paragraph 35, version 21. Thus,

$$PE_y = 0 \quad (\text{Eq. 3})$$

Leakage Emissions

No other leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected. Paragraph 61, ACM0002 Version 21.

Thus,

$$LE_y = 0 \quad (\text{Eq. 4})$$

$$ER_y = BE_y - PE_y$$

$$= (EG_{\text{facility, y}} * EF_{\text{grid, CM, y}}) - PE_y$$

The Estimated emission reduction (annualized average) achieved during the crediting period (01/01/2013 to 31/12/2023) are as follows

Year	Net estimated generation/export (EGy)	Baseline Emissions	Project Emissions	Leakage	Emission Reductions
	[MWh]	(tCO _{2e})	(tCO _{2e})	(tCO _{2e})	(tCO _{2e})
Year 1	98,865.36	88,978	0	0	88,978
Year 2	98,865.36	88,978	0	0	88,978
Year 3	98,865.36	88,978	0	0	88,978
Year 4	98,865.36	88,978	0	0	88,978
Year 5	98,865.36	88,978	0	0	88,978
Year 6	98,865.36	88,978	0	0	88,978
Year 7	98,865.36	88,978	0	0	88,978
Year 8	98,865.36	88,978	0	0	88,978
Year 9	98,865.36	88,978	0	0	88,978
Year 10	98,865.36	88,978	0	0	88,978
Year 11	98,865.36	88,978	0	0	88,978
Total Emission reduction	10,87,518.96	9,78,758	0	0	9,78,758
Annual Average ER	98,865.36	88,978	0	0	88,978

Estimated Annual or Total baseline emission reductions (BE_y) = 88,978CoUs /year (eq/year)

The actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring

and verification. However, for the purpose of an ex-ante estimation, following calculation has been submitted:

Estimated annual baseline emission reductions (BEy) = 98,865.36 MWh/year × 0.9 tCO₂/MWh = 88,978 tCO₂e/year (i.e., CoUs/year)

B.6. Prior History>>

The project activity is a Bundled large-scale wind power project, and this project was never applied under any other GHG mechanism prior to this registration with UCR. Also, the capacity or the total project has not been applied for any other environmental crediting or certification mechanism. Hence the project will not cause double accounting of carbon credits (i.e., COUs).

B.7. Changes to start date of crediting period >>

There is no change in the start date of the crediting period.

B.8. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

There are no permanent changes from the registered PCN monitoring plan and applied methodology.

B.9. Monitoring period number and duration>>

First Issuance Period : 08 years,09 Months
 Crediting Period : 01/01/2013 to 31/12/2023
 Monitoring Period : 01/04/2015 to 31/12/2023

B.10. Monitoring plan>>

Data and Parameters to be monitored.

Data / Parameter	<i>EFGrid,y</i>
Data unit	tCO ₂ /MWh
Description	A "grid emission factor" refers to a CO ₂ emission factor (tCO ₂ /MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO ₂ /MWh for the 2013 - 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

Source of data	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRC oUStandardAug2022updatedVer6_090822220127104470.pdf
Value applied	0.9
Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of Data	For the calculation of Emission Factor of the grid

Data / Parameter	EGPJ, facility, y
Data unit	MWh
Description	Net electricity supplied to the NEWNE grid facility by the project activity
Source of data	Joint Meter Reading Report
Measurement (if any):	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Archiving Policy: Electronic Calibration frequency: Once in 5 years (considered as per provision of CEA India). The net electricity procedures generated by the project activity will be calculated

Measurement Frequency:	Monthly
QA/QC procedures applied:	Continuous monitoring, hourly measurement monthly recording. Tri-vector (TVM)/ABT energy meters with accuracy class 0.2s
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Measurement Frequency:	Monthly
Value applied:	To be applied as per actual data
QA/QC procedures applied:	Calibration of the Main meters will be carried out once in five (5) years as per National Standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of power purchase agreement. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Any comment:	All the data will be archived till a period of two years from the end of the crediting period.

