Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT

Title: 6.3 MW Bundled Small Scale Wind Power Project (M/s Hanumantha Rao) by Energy Advisory Services

Version 1.0
Date 20/02/2023

First CoU Issuance Period: 07 Years and 11 Months

Monitoring Period: 16/02/2015 to 31/12/2022

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Monitoring Report (MR)
CARBON OFFSET UNIT (CoU) PROJECT

Monitoring Report	
Title of the project activity	6.3 MW Bundled Small Scale Wind Power Project (M/s Hanumantha Rao) by Energy Advisory Services
UCR Project Registration Number	226
Version	1.0
Completion date of the MR	20/02/2023
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: 07 Years and 11 Months (first and last days included (16/02/2015 to 31/12/2022)
Project participants	Energy Advisory Services Pvt. Ltd. **(Representator)** M/s M. Hanumantha Rao **(Project Proponent)**
Host Party	India
Applied methodologies and standardized baselines	Applied Baseline Methodology: AMS-I.D.: "Grid connected renewable electricity generation", version 18
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated amount of GHG emission reductions for this monitoring period in the registered PCN	2015: 5,554 CoUs (5,554 tCO2eq)
	2016: 10,740 CoUs (10,740 tCO2eq)
	2017: 11,909 CoUs (11,909 tCO2eq)
	2018: 12,505 CoUs (12,505 tCO2eq)
	2019: 11,979 CoUs (11,979 tCO2eq)
	2020: 9,690 CoUs (9,690 tCO2eq)
	2021: 11,448 CoUs (11,448 tCO2eq)
	2022: 11,119 CoUs (11,119 tCO2eq)
Total:	84,944 CoUs (84,944 tCO2eq)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity >>

The proposed project activity with title under UCR "6.3 MW Bundled Small Scale Wind Power Project by M/s Hanumantha Rao", is a grid connected renewable power generation activity which incorporates installation and operation of three Wind Turbine Generators (WTGs) having capacity 2100 kW each in the state of Gujarat in India. The project is an operational activity with continuous reduction of GHG, currently being applied under "Universal Carbon Registry" (UCR).

a) Purpose of the project activity and the measures taken for GHG emission reductions >>

The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The project activity replaces anthropogenic emissions of greenhouse gases (GHG's) into the atmosphere, by displacing the equivalent amount of electricity generation through the operation of existing fuel fossil fuel-based power plants and future capacity expansions connected to the grid. In the absence of the project activity the equivalent amount of electricity would have been generated from the fossil fuel-based power plant. Whereas the electricity generation from operation of Wind Energy Convertors (WEC's) is emission free. Commissioning dates of the Wind Turbine Generators installed are shown in the below table:

Sr. No.	RR. No	No. & Capacity	Commissioning Date
(1)	GDG/DN/WF/HESCOM/MHR-168	1 X 2100 Kw	16/02/2015
(2)	GDG/DN/WF/HESCOM/MHR-171	1 X 2100 Kw	31/03/2015
(3)	GDG/DN/WF/HESCOM/MHR-173	1 X 2100 Kw	29/09/2015

The project will generate 82,268 MWh of electricity per annum. The net generated electricity from the project activity is for captive consumption by the project proponent. Wheeling agreement is signed between PP and Karnataka Power Transmission Corporation Limited (KPTCL). 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 powerplants. The total CO2e emission reduction by the project activity is expected to be 84,944 t/CO2.

b) Brief description of the installed technology and equipment>>

The project activity involves 3 Wind Turbine Generators (WTGs) having individual capacity of 2100 kW and aggregated installed capacity of 6,300 kW. WTGs are manufactured and supplied by **Suzlon Energy Limited.**
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 into the tower for operation and maintenance.

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

Nacelle
The Nacelle is the one which contains all the major parts of a WEG. 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 is to connect 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.

c) Relevant dates for the project activity (e.g., construction, commissioning, continued operation periods, etc.)>>

The duration of the crediting period corresponding to the monitoring period is covered in this monitoring report.

UCR Project ID	:	226
Start Date of Crediting Period	:	16/02/2015
Project Commissioned	:	16/02/2015

d) Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period>>

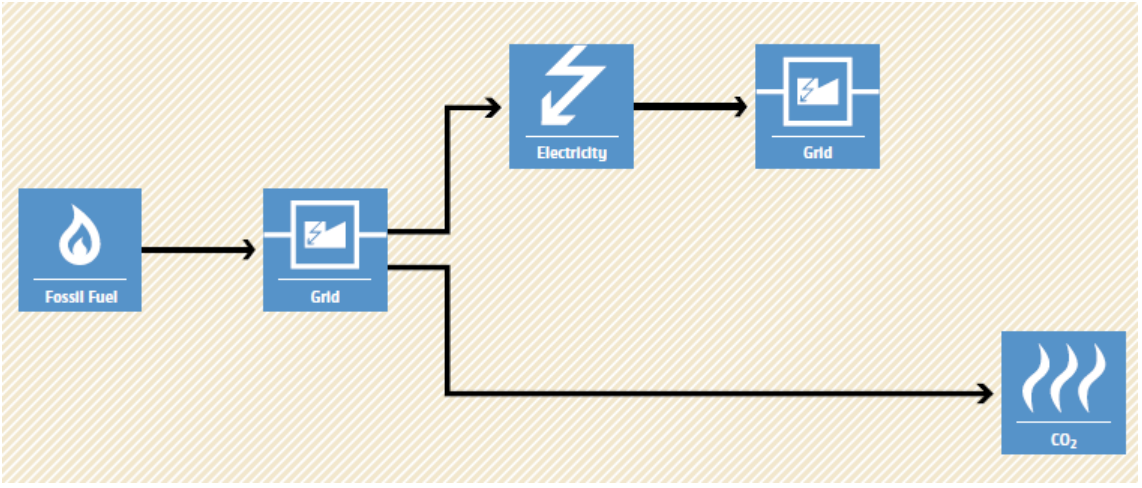
The total GHG emission reductions achieved in this monitoring period is as follows:

Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	16/02/2015
Carbon credits claimed up to	31/12/2022
Total ERs generated (tCO_{2eq})	84,944 tCO2eq
Leakage	0

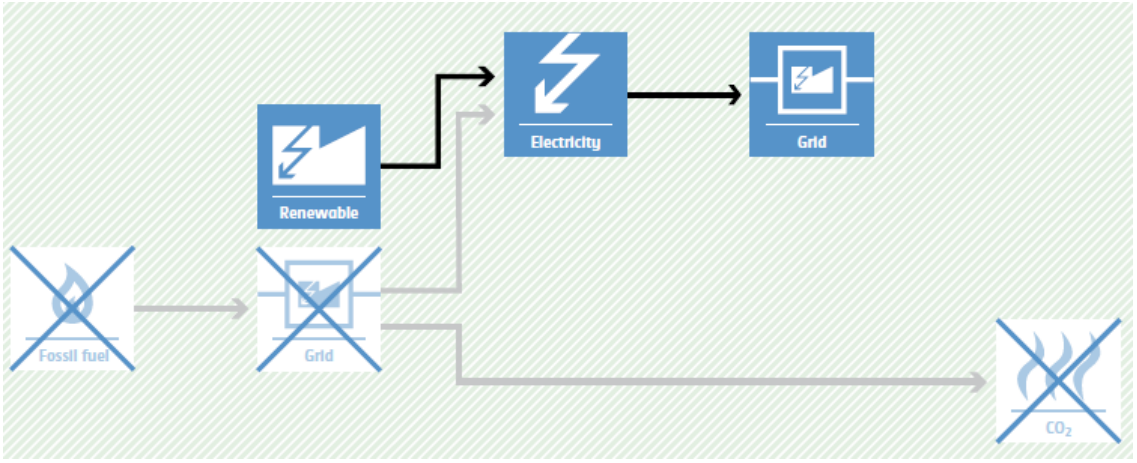
e) Baseline Scenario>>

As per the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following: **"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise, been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid"**.

Baseline Scenario



Project Scenario



A.2. Location of project activity>>

Country	:	India
District	:	Gadag
State	:	Karnataka

The project location is situated at Gadag district in the state of Gujarat. The project site is well connected by district and village roads to the nearest town.

The representative location map is included below:

Location of installed turbines:

Sr. No.	RR. No	Village	Latitude	Longitude
1	GDG/DN/WF/HESCOM/MHR-168	Shirunj	15°18’26.9” N	75°37’04.6” E
2	GDG/DN/WF/HESCOM/MHR-171	Kanavi	15°19’17” N	75°35’5.1” E
3	GDG/DN/WF/HESCOM/MHR-173	Nabapur	15°18’53.3” N	75°36’35.9” E

A.3. Parties and project participants >>

Party (Host)	Participants/Aggregator
India	**Project Owner:** M/s M. Hanumantha Rao House no.-37, Ward No-17, Ground Floor Main Road, Near park,Patel Nagar, Bellary-583101, Karnataka **Project Aggregator:** Energy Advisory Services Pvt Limited, Bangalore, Karnataka. Email: manoj@easpl.co.in

A.4. References to methodologies and standardized baselines >>

SECTORAL SCOPE - 01 Energy industries (Renewable/Non-Renewable Sources)

TYPE - Renewable Energy Projects

CATEGORY - AMS-I. D: "Grid connected renewable electricity generation", version 18

A.5. Crediting period of project activity >>

Start date : 16/02/2015
Length of the crediting period : 07 Years and 11 Months
16/02/2015 to 31/12/2022 (Both the dates are included).

A.6. Contact information of responsible persons/entities >>

Name : Manoj
E-Mail : manoj@easpl.co.in

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity >>

a) Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN>>

The project consists of Three WTGs with individual capacity of 2100 kW which and aggregate capacity of 6,300 kW. These were installed in three phases and commissioned by Gujarat Energy Development Agency (GEDA), Government of Gujarat on:

Sr. No.	RR. No	No. & Capacity	Commissioning Date
(1)	GDG/DN/WF/HESCOM/MHR-168	1 X 2100 kW	16/02/2015
(2)	GDG/DN/WF/HESCOM/MHR-171	1 X 2100 kW	31/03/2015
(3)	GDG/DN/WF/HESCOM/MHR-173	1 X 2100 kW	29/09/2015

The project generates clean energy by utilizing the kinetic energy of flowing wind.

b) For the description of the installed technology, technical process and equipment, include diagrams, where appropriate>>

The project activity involves 3 Wind Turbine Generators which is manufactured and supplied by Suzlon Energy Limited with total installed capacity of 6,300 kW. The connectivity of all the WTGSs is to a central Monitoring Station (CMS) through high-speed WLAN modem or fibre optic cable which helps in providing real time status of the turbine at CMS with easy GUI (Graphical User Interface) and ability to monitor the functioning of the turbine from CMS.

Some of the salient features of the project equipment can be found in the below mentioned table:

Parameter	S97M	
Operating Data	Wind Class	IEC IIIA
	Rated Power	2,100kw
	Cut-in Wind Speed	3.5 m/s
	Rated Wind Speed	11 m/s
	Cut-out Wind Speed	20/25 m/s
Rotor	Rotor Diameter	97 m
	Swept Area	7,386 m^2
Generator	Frequency	50 / 60 Hz

	Type	Asynchronous 3 phase induction generator with slip ring operated with rotor circuit inverter system (DFIG)
Tower	hub Height	90 m
	Type	Tubular Steel Tower

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

Indian economy is highly dependent on "Coal" as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and places immense stress on the environment.
Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of renewable energy (RE) sources. This project is a greenfield activity where grid power is the baseline. The renewable power generation is gradually contributing to the share of clean & green power in the grid; however, grid emission factor is still on higher side which defines grid as distinct baseline.
The Government of India has stipulated following indicators for sustainable development in the interim approval guide lines for such projects which are contributing to GHG mitigations. The Ministry of Environment, Forests & Climate Change, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. It has been envisaged that the project shall contribute to sustainable development using the following ways:

Social well-being: The project would help in generating direct and indirect employment benefits accruing out of ancillary units for manufacturing towers for erection of the Wind Turbine Generators and for maintenance during operation of the project activity. It will lead to development of infrastructure around the project area in terms of improved road network etc. and will also directly contribute to the development of renewable infrastructure in the region.

Environmental well-being: The project utilizes Wind energy for generating electricity which is a clean source of energy. The project activity will not generate any air pollution, wind pollution or solid waste to the environment which otherwise would have been generated through fossil fuels. Also, it will contribute to reduction GHG emissions. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Economic well-being: Being a renewable resource, using Wind energy to generate electricity contributes to conservation precious natural resources. The project contributes to the economic sustainability through promotion of decentralization of economic power, leading to diversification of the national energy supply, which is dominated by conventional fuel based generating units. Locally, improvement in infrastructure will provide new opportunities for industries and economic activities to be setup in the area. Apart from getting better employment opportunities, the local people will get better prices for their land, thereby resulting in overall economic development.

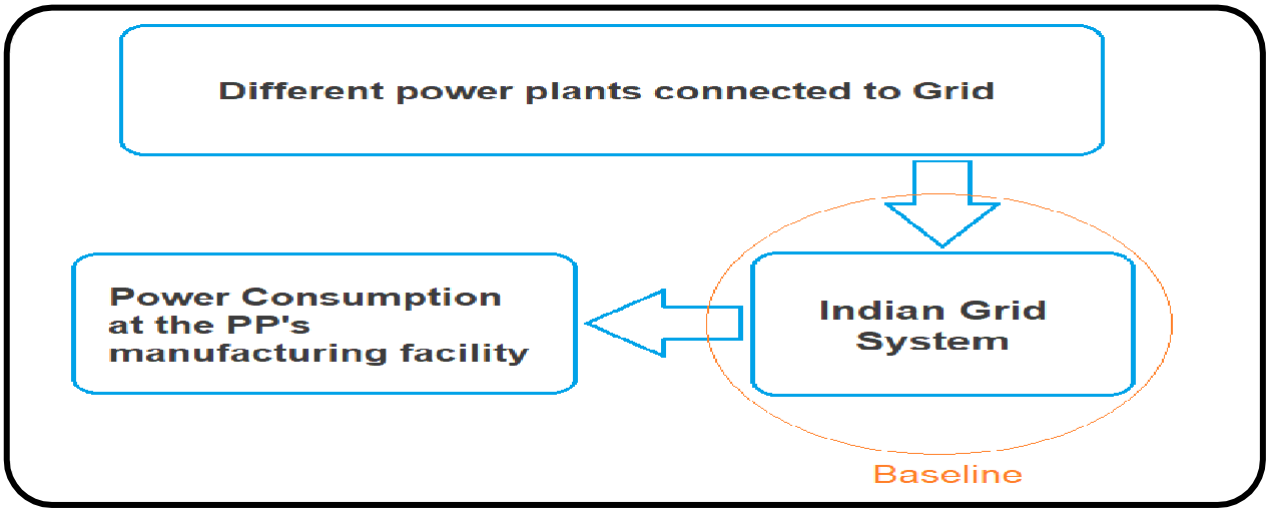
Technological well-being: The project activity leads to the promotion of 2100 kW Wind Turbine Generators into the region and will promote practice for small scale industries to reduce the

dependence on carbon intensive grid supply to meet the captive requirement of electrical energy and also increasing energy availability and improving quality of power under the service area. Hence, the project leads to technological well-being.

B.3. Baseline Emissions>>

In the absence of the project activity, the equivalent amount of electricity would have been imported from the regional grid (which is connected to the unified Indian Grid system (NEWNE Grid)), which is carbon intensive due to predominantly sourced from fossil fuel-based power plants.

Baseline Scenario:



Thus, this project activity was a voluntary investment which replaced equivalent amount of electricity from the Indian grid. Thus, the continued operation of the project activity would continue to replace fossil fuel-based power plants and fight against the impacts of climate change. The Project Proponent hopes that carbon revenues from 2015-2022 will help repay the loans and continuous working of this project activity.

B.4. Debundling>>

This project activity is not a de-bundled component of a larger project activity.

SECTION-C: Application of methodologies and standardized baselines

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

Sectoral Scope: 01 Energy industries (Renewable/Non-Renewable Sources)

TYPE I – Renewable Energy Projects

Applied Baseline Methodology: AMS-I.D.: "Grid connected renewable electricity generation", version 18.

C.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 captive consumption. The project activity has installed capacity of 6.3 MW which will qualify for a small-scale project activity under Type-I of the Small-Scale methodology. The project status is corresponding to the methodology AMS-I.D., version 18 and applicability of methodology is discussed below.

Applicability Criterion	Project Case
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is a RenewableEnergy Project i.e., wind power project for captive consumption which falls under applicability criteria option 1 point (b). Thus, this project activity fulfills this criterion.
2. This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The option (a) of applicability criteria 2 is applicable as project is a Greenfield plant. Hence the project activity meets the given applicability criterion.
3. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a) The project activity is implemented in existing reservoir, with no change in the volume of the reservoir; or (b) The project activity is implemented in existing reservoir, where the volume of the reservoir(s) is increased and the power density as per definitions given in the project emissions section, is greater than 4 W/m2. (c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2	The project activity involves installation of Wind Turbine Generators (WTGs); hence, this criterion is not applicable.

4. If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The proposed project is 6.3 MW Wind power project, i.e., only component is renewable power project below 15MW, thus the criteria is not applicable to this project activity.
5. Combined heat and power (co-generation) systems are not eligible under this category	The project activity is wind power project thus the criterion is not applicable to this project activity.
6. In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct1 from the existing units.	The proposed project is a greenfield 6.3 MW wind power project. As no capacity addition is taking place thus the criterion is not applicable to this project activity.
7. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The proposed project is a greenfield 6.3 MW wind power project. As this does not involve retrofit, rehabilitation or replacement, thus the criterion is not applicable to this project activity.
8. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is usedfor electricity generation for supply to a grid, then the baseline for the electricity component shall bein accordance with procedure prescribed under thismethodology. If the recovered methane is used forheat generation or cogeneration other applicableType-I methodologies such as "AMS- I.C.: Thermal energy production with or without electricity" shall be explored.	The proposed project is a greenfield 6.3 MW wind power project; hence, this criterion is not applicable to this project activity.
9. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	No biomass is involved, the project is only a wind power project and thus the criterion is not applicable to this project activity.

C.3 Applicability of double counting emission reductions >>

The project was not applied under any other GHG mechanism. Hence project will not cause double accounting of carbon credits (i.e., COUs).

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

As per applicable methodology AMS-I.D. Version 18, "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system." Thus, the project boundary includes the Wind Turbine Generators and the Indian grid system.

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	**CO_2**	**Yes**	**CO2 emissions from electricity generation in fossil fuel fired power plants**
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	No other GHG emissions were emitted from the project
Project	Greenfield Wind Power Project Activity	CO_2	No	No CO_2 emissions are emitted from the project
		CH_4	No	Project activity does not emit CH_4
		N_2O	No	Project activity does not emit N_2O
		Other	No	No other emissions are emitted from the project

C.5. Establishment and description of baseline scenario (UCR Protocol) >>

As per para 19 of the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

The project activity involves setting up of a new Wind Turbine Generators to harness the green power from Wind energy and to use for Captive Consumption. In the absence of the project activity, the equivalent amount of power would have been generated by the operation of grid-connected fossil fuel-based power plants and by the addition of new fossil fuel-based generation sources into the grid. 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 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. Also, for the vintage 2021 and 2022, the combined margin emission factor calculated from CEA database in India results into same emission factors as that of the default value. Hence, the same emission factor has been considered to calculate the emission reduction.

Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ERy = BEy - PEy - LEy$$

Where,

ERy	=	Emissions reductions in year y (t CO_2)
BEy	=	Baseline emissions in year y (t CO_2)
PEy	=	Project emissions in year y (t CO_2)
LEy	=	Leakage emissions in year y (t CO2)

Baseline Emissions

Baseline emissions include only CO_2 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 are to be calculated as follows:

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

Where:

The Baseline emissions in year y can be calculated as follows:

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

Where,

BEy	= 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)

Hence,

BE = 94,382 x 0.9 = 84,944 tCO2eq

We have taken the conservative value (Round down) for calculating carbon credits.

Project Emissions

As per paragraph 39 of AMS-I.D. (version 18), for most renewable energy project activities emission is zero.

Hence,
PE = 0

Leakage Emissions

As per paragraph 42 of AMS-I.D. version-18, all projects other than Biomass projects have zero leakage.

Hence,
LE = 0

Total Emission reduction by the project for the current monitoring period is calculated as below:

Hence,

ER = 84,944 – 0 – 0 = 84,944 CoUs

C.6. Prior History>>

The project was not applied under any other GHG mechanism. Hence project will not cause double accounting of carbon credits (i.e., COUs).

C.7. Monitoring period number and duration>>

First Monitoring Period : 07 Years and 11 Months
16/02/2015 to 31/12/2022 (inclusive of both dates)

C.8. Changes to start date of crediting period >>

There is no change in Start date of crediting period.
Crediting period start date is 16/02/2015.

C.9. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

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

C.10. Monitoring plan>>

The project activity essentially involves generation of electricity from wind, the employed Wind Turbine Generators can only convert Wind energy into electrical energy and cannot use any other input fuel for electricity generation, thus no special ways and means are required to monitor leakage from the project activity. The recording of the electricity fed to the state utility grid is carried out by state power utility.

Parameter	**$EG_{PJ,y}$**
Data unit	MWh
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of this project activity in year y.
Source of data Value(s) applied	JMR
Procedures	The Net electricity generation by the WTGs is recorded at the sub-station. At the end of every month JMR are generated based on the total monthly electricity exported to the grid.
Monitoring frequency	Monthly
Purpose of data	To Calculate Baseline Emission

Data / Parameter	**UCR recommended emission factor**
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 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/UCRStandardAug2022updatedVer5_030822005728911983.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
Additional Comment	The combined margin emission factor as per CEA database (current Version 16, Year 2021) results into higher emission factor. Hence for 2021 vintage UCR default emission factor remains conservative.

ANNEXURE I (Emission Reduction Calculation)

Year	Total Amount of Electricity Generated in kwh	Total CoUs generated
2015	6171471.047	5554
2016	11933031	10740
2017	13231886	11909
2018	13894331	12505
2019	13310517	11979
2020	10766859	9690
2021	12720300	11448
2022	12353992	11119
Total Carbon Credits Generated in first Monitoring Period		**84,944**