WIND GROUPED PROJECT BY HERO FUTURE ENERGIES PRIVATE LIMITED (EKIESL-VCS-AUG-16-03)

Document Prepared By EKI Energy Services Ltd

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1 PROJECT DETAILS

1.1 Summary Description of the Project and its Implementation Status

The proposed grouped project activity is a step towards supporting the implementation and installation of grid connected renewable energy power plants in India. The implementation of grouped project activity ensures energy security, diversification of the grid generation mix and sustainable growth of the electricity generation sector in India.

The main goal of grouped project activity is to implement renewable energy projects in the country and the significant importance of revenues from sale of Verified Carbon Units (VCUs) to achieve this goal forms the basis of the implementation of this grouped project activity. The grouped project activity is a voluntary action and Hero Future Energies Private Limited will be the Coordinating / Managing Entity (CME) or Project Proponent for all the project activity Instances. Hero Future Energies Private Limited act as a parent company formed different SPV (Special Purpose Vehicles) for wind projects and projects are developed by name of SPVs. There are no mandatory laws or regulations existing in India requiring PP or any other party to develop a programme for renewable generation plants.

Following are the SPV's in this project:-

Project Company Name	Wind	Capacity (MW)	Village	District	State	Date of Commissioning
Clean Wind Power (Ratlam) Private Limited	Wind	100	Shergadh, Gandhwada, Borjhadi, Indrawal, Panda, Khiledi, Kisanpura, Chandoriya,	Dhar	Madhya Pradesh	29-March-2016

The power produced displaces an equivalent amount of power from the grid, which is fed mainly by fossil fuel fired power plants. Hence, it results in reduction of GHG emissions. Average annual GHG emission reductions from the project activity are estimated as 171,293 tonnes of CO_2 and total GHG emission reductions for the chosen 10 year crediting period are estimated as 1,712,930 tonnes of CO_2.

The total actual GHG Emission reductions generated in current monitoring period of 29/03/2016 to 01/04/2017 are 160,061 tCO2e.

The grouped project activity will support the development of new grid-connected renewable energy power plants in India and will cover the wind energy technologies. It seeks to enable investment in large and small grid connected plants that export their generated output to the regional / national electricity grid in India. The implementation of these technologies currently faces various technological, institutional and financial barriers.

All project activity instances within this grouped project activity will consist of single wind renewable technology. Also an individual project activity instance will be large-scale project activity instance (having methodology ACM0002 version 17).

The electricity generated by renewable technology (Wind) installed as part of the grouped project activity will be supplied either to the regional grid and/or will be supplied to the identified facility via regional grid through a contractual wheeling agreement for captive consumption there by displacing the consumption of electricity from the regional grid electricity distribution system. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Thus for this Project activity instances Indian Grid is applicable.

The objective of the grouped project activity is to develop a platform for reducing VCS Registration timelines and process costs for registration of individual projects under VCS.

All the project instances i.e. renewable energy generation plants to be included in this grouped project will be from within India only. Hence the location and geographical boundary of the grouped project can be defined as India.

More project activity instances will be included in the grouped project activity in future. These new instances will also be grid connected renewable energy power plants will contribute to GHG emission reductions.

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity instances, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as “a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity”.

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology 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.

For project activity instances which supply renewable energy based electricity to users and baseline would be electricity supplied from national/regional grid, fossil fuel based captive power plant or carbon intensive mini grid.

Hence, pre-project scenario and baseline scenario are the same.

Wind Power Project Technology Details –

The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind power generation technology is environment friendly technology since there are no GHG emissions associated with the electricity generation. There is no transfer of technology involved in the project activity.

Technical details for Gamesa G97 of 2.0 MW machine[1]

Rated Power	2.0 MW
Cut-out speed	25 m/s
Cut-in speed	3 m/s
Rotor Diameter	97 m
Swept area	7,390 m^2
Control	Variable pitch and speed
Generator Type	Doubly-fed generator

1.2 Sectoral Scope and Project Type

The project activity under consideration is a grouped project activity. The project activity instances as part of the grouped project will have following parameters

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)

Project Type : I - Renewable Energy Projects

Project Category:

Each project activity instances will apply only Wind technology. However each project activity instances will be large scale.

For large scale project activities, below methodology will be applied

Title: ACM0002 Grid-connected electricity generation from renewable sources --- Version 17.0

Reference: ACM0002 Version 17

1.3 Project Proponent

Organization name	Hero Future Energies Private Limited
Contact person	Naveen Khandelwal
Title	-
Address	Unit No 89/1101A, Hemkunt Chambers, Nehru Place, Delhi, New Delhi-111019
Telephone	-
Email	-

[1] http://www.gamesacorp.com/recursos/doc/productos-servicios/aerogeneradores/nuevas-fichas/g97-20-mw-eng.pdf

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Manish Dabkara
Title	CEO
Address	Office No 201, Plot No 48, Scheme 78, Part 2, Vijay Nagar, Indore, Madhya Pradesh 452010
Telephone	+917566661647
Email	manish@enkingint.org

1.5 Project Start Date

The first project activity instance of the grouped project under consideration was commissioned and power generation started on 29/03/2016. This project activity instance by Hero Future Energies Private Limited having installed capacity of 100 MW. Hence the project start date is defined as follows:

Project start date: 29/03/2016

1.6 Project Crediting Period

Project crediting period for grouped project activity is taken as 10 years renewable twice. Accordingly the start date of the first crediting period is 29/03/2016 and end date will be 28/03/2026.

First crediting period is from 29/03/2016 to 28/03/2026.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

As per section 3.9.1 of VCS standard Version 3.5, the projects are classified as follows:

1) Projects: Less than or equal to 300,000 tonnes of CO_2e per year

2) Large projects: Greater than 300,000 tonnes of CO_2e per year

The grouped project activity instances being included currently have less than 300,000 tCO2e emission reductions, hence these project activity instances are classified as “Projects”. However in case of any project activity instance, if GHG emission reductions or removals are greater than 300,000 tonnes of CO2e per year, then project activity instances are considered as Large projects.

Similarly, the estimated GHG Emission Reductions will depend upon the power generation capacity of individual project activity instances. The emission reductions achieved as part of grouped project activity will increase as per addition of new project activity instances in the future.

However, estimated Emission Reduction for the project activity instances being included in the grouped project activity are as follows:

SPV Name	Estimated Annual Emission Reductions (tCO2e)
Hero Future Energies Private Limited	171,293

The categorization of project activity instances is as follows: All initial project activity instances fall in the category of 'Projects'

Project Scale	
Project	√
Large project	

Total emission reductions for all initial project activity instances being included in the grouped project are as below

Investor Name	Capacity (MW)	PLF	Net Generation (MWh/year)	Baseline Emission factor (tCO_2/MWh)	Baseline emissions (tCO_2e/ year)	Project emissions (tCO_2e/ year)	Leakage Emissions (tCO_2e/ year)	Emission reductions (tCO_2e/ year)
Clean Wind Power (Ratlam) Private Limited	100	20.00%	1,75,200	0.9777	1,71,293	0	0	1,71,293
Total			**1,75,200**		**1,71,293**	**0**	**0**	**1,71,293**
In Ten Years								**17,12,930**

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 1	171,293
Year 2	171,293
Year 3	171,293
Year 4	171,293
Year 5	171,293
Year 6	171,293
Year 7	171,293
Year 8	171,293
Year 9	171,293

Year 10	171,293
Total estimated ERs	171,293
Total number of crediting years	10
Average annual ERs	171,293

The above annual estimation for all initial project activity instances is based on estimated PLF and total capacity of all project activity instances, ir-respective of commissioning date of project activity instances, thus in actual emission reductions vary based on actual PLF and commissioning date of project activity instance.

1.8 Description of the Project Activity

The proposed project activities fall under Sectoral Scope I: "Energy industries (renewable-/non-renewable sources)".

The renewable energy generation technologies proposed to be employed under the project activity instances will be of single technology i.e Wind projects:

(a) Wind Power Plant/Unit;

In case of wind power plant/unit, the project activity instances would use wind energy to generate alternating current.

The project activity instances under grouped project activity will be grid connected and will install a new power plant (i.e Wind) at a site where no renewable power plant was operating prior to the implementation of the project activity (green-field plant). The generated electricity will be supplied to grid or uses grid network for captive or third party sale.

The project activity instances will be large scale project activities (with power generation capacity more than 15 MW). However project activity follows ACM0002 Version 17 methodology based on scale of project activity instances.

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as "a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology is the following:

As per para 23 of ACM0002 version 17.0; If the project activity is the installation of a Greenfield power plant

"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, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

For project activity instances which supply renewable energy based electricity to users and baseline would be electricity supplied from national/regional grid, fossil fuel based captive power plant or carbon intensive mini grid.

Hence, pre-project scenario and baseline scenario are the same.

The estimated lifetime of the project activity is considered as 25 years for wind technology. This may increase depending on the operation & maintenance of the plant.

The installed capacity is as below:

Project Company Name	WTG Id.	Geo-coordinates	
		Latitude (N)	Longitude (E)
Clean Wind Power (Ratlam) Private Limited	BD-01	22° 51' 43.9308"	75° 07' 56.6296"
	BD-02	22° 51' 38.6892"	75° 08' 06.1345"
	BD-03	22° 51' 30.2616"	75° 08' 12.1269"
	BD-04	22° 51' 24.8472"	75° 08' 27.7371"
	BD-05	22° 51' 16.4232"	75° 08' 29.8690"
	BD-06	22° 51' 07.9128"	75° 08' 17.1575"
	BD-07	22° 50' 59.1576"	75° 08' 27.2545"
	BD-08	22° 50' 51.9504"	75° 08' 13.1062"
	BD-09	22° 50' 47.4756"	75° 08' 34.3303"
	BD-10	22° 50' 42.0324"	75° 08' 48.1143"
	BD-11	22° 50' 27.9456"	75° 09' 26.5198"
	BD-12	22° 50' 21.3684"	75° 09' 34.0208"
	BD-13	22° 50' 11.9544"	75° 09' 16.2562"
	BD-14	22° 50' 11.9544"	75° 09' 16.2562"
	BD-15	22° 50' 04.2828"	75° 09' 47.9649"
	BD-16	22° 49' 47.7840"	75° 09' 25.9122"
	BD-17	22° 49' 37.4448"	75° 09' 24.2514"
	BD-18	22° 49' 19.2036"	75° 09' 20.1610"
	BD-19	22° 49' 04.2456"	75° 09' 16.2149"
	BD-20	22° 49' 26.7780"	75° 08' 10.3897"
	BD-21	22° 49' 17.8608"	75° 08' 18.5901"
	BD-22	22° 49' 17.8644"	75° 08' 17.2920"
	BD-23	22° 48' 51.5052"	75° 09' 41.8092"
	BD-24	22° 48' 04.4676"	75° 09' 20.9881"
	BD-25	22° 48' 13.3848"	75° 09' 15.0701"
	BD-26	22° 48' 20.3796"	75° 09' 47.1044"
	BD-27	22° 47' 49.6896"	75° 10' 37.9280"
	BD-28	22° 48' 26.2908"	75° 10' 23.9439"
	BD-29	22° 48' 15.7212"	75° 10' 23.4395"
	BD-30	22° 48' 07.2540"	75° 10' 03.5400"
	BD-31	22° 47' 57.8508"	75° 10' 07.5974"
	BD-32	22° 47' 37.5720"	75° 10' 26.4428"
	BD-33	22° 47' 34.2780"	75° 10' 03.7803"
	BD-34	22° 47' 23.8380"	75° 09' 32.0955"
	BD-35	22° 47' 14.7552"	75° 09' 42.5720"
	BD-36	22° 50' 38.1444"	75° 09' 40.2509"
	BD-37	22° 46' 49.4976"	75° 09' 31.8804"
	BD-38	22° 46' 49.4832"	75° 09' 45.2778"
	BD-39	22° 46' 39.1044"	75° 09' 50.3157"
	BD-40	22° 46' 27.1128"	75° 09' 41.7443"
	BD-41	22° 46' 20.1360"	75° 09' 58.1837"

	BD-42	22° 46’ 16.2552”	75° 09’ 37.3478”
	BD-43	22° 45’ 47.7108”	75° 09’ 59.0913”
	BD-44	22° 45’ 37.6632”	75° 09’ 25.9061”
	BD-45	22° 45’ 37.6632”	75° 09’ 25.9061”
	BD-46	22° 45’ 37.6632”	75° 09’ 25.9061”
	BD-47	22° 45’ 20.2968”	75° 09’ 59.0931”
	BD-48	22° 45’ 09.9360”	75° 08’ 37.5553”
	BD-49	22° 45’ 00.0180”	75° 08’ 36.8436”
	BD-50	22° 45’ 03.7332”	75° 09’ 36.7372”

1.9 Project Location

All the project activity instances in the proposed grouped project activity would be located within geographical boundaries of Republic of India. Thus geographical area of grouped project is India.

The geographical boundary is delineated in the form of extreme geographic coordinates as follows:[2]
The geographical boundary is delineated in the form of extreme geographic coordinates of India country as follows
Latitude - 8°4' to 37°6' N
Longitude - 68°7' to 97°25' E

Please refer below web link for the range of co-ordinates
https://en.wikipedia.org/wiki/Geography_of_India

The kml file for India is submitted to DOE.

Project locations along with the WTG Ids are shown in below table and figure:

Sr. No.	Project Owner	WTG Id.	Village	Taluka	District	State
1	Clean Wind Power (Ratlam) Pvt. Ltd	BD-01	Shergadh	Badnawar	Dhar	Madhya Pradesh
2		BD-02	Shergadh	Badnawar	Dhar	Madhya Pradesh
3		BD-03	Shergadh	Badnawar	Dhar	Madhya Pradesh
4		BD-04	Shergadh	Badnawar	Dhar	Madhya Pradesh
5		BD-05	Shergadh	Badnawar	Dhar	Madhya Pradesh
6		BD-06	Shergadh	Badnawar	Dhar	Madhya Pradesh
7		BD-07	Shergadh	Badnawar	Dhar	Madhya Pradesh
8		BD-08	Shergadh	Badnawar	Dhar	Madhya Pradesh
9		BD-09	Shergadh	Badnawar	Dhar	Madhya Pradesh
10		BD-10	Shergadh	Badnawar	Dhar	Madhya Pradesh
11		BD-11	Shergadh	Badnawar	Dhar	Madhya Pradesh
12		BD-12	Shergadh	Badnawar	Dhar	Madhya Pradesh
13		BD-13	Shergadh	Badnawar	Dhar	Madhya Pradesh
14		BD-14	Shergadh	Badnawar	Dhar	Madhya Pradesh
15		BD-15	Gandhwada	Gandhwada	Dhar	Madhya Pradesh
16		BD-16	Shergadh	Badnawar	Dhar	Madhya Pradesh

[2] Precise latitude and longitude details are provided in section 1.8 of this monitoring report.

Sr. No.	Project Owner	WTG Id.	Village	Taluka	District	State
17		BD-17	Gandhwada	Gandhwada	Dhar	Madhya Pradesh
18		BD-18	Gandhwada	Gandhwada	Dhar	Madhya Pradesh
19		BD-19	Kisanpura	Badnawar	Dhar	Madhya Pradesh
20		BD-20	Chandoriya	Begamganj	Dhar	Madhya Pradesh
21		BD-21	Chandoriya	Begamganj	Dhar	Madhya Pradesh
22		BD-22	Chandoriya	Begamganj	Dhar	Madhya Pradesh
23		BD-23	Borjhadi	Badnawar	Dhar	Madhya Pradesh
24		BD-24	Indrawal	Badnawar	Dhar	Madhya Pradesh
25		BD-25	Indrawal	Badnawar	Dhar	Madhya Pradesh
26		BD-26	Indrawal	Badnawar	Dhar	Madhya Pradesh
27		BD-27	Shergadh	Badnawar	Dhar	Madhya Pradesh
28		BD-28	Indrawal	Badnawar	Dhar	Madhya Pradesh
29		BD-29	Indrawal	Badnawar	Dhar	Madhya Pradesh
30		BD-30	Indrawal	Badnawar	Dhar	Madhya Pradesh
31		BD-31	Indrawal	Badnawar	Dhar	Madhya Pradesh
32		BD-32	Indrawal	Badnawar	Dhar	Madhya Pradesh
33		BD-33	Indrawal	Badnawar	Dhar	Madhya Pradesh
34		BD-34	Indrawal	Badnawar	Dhar	Madhya Pradesh
35		BD-35	Indrawal	Badnawar	Dhar	Madhya Pradesh
36		BD-36	Indrawal	Badnawar	Dhar	Madhya Pradesh
37		BD-37	Panda	Badnawar	Dhar	Madhya Pradesh
38		BD-38	Panda	Badnawar	Dhar	Madhya Pradesh
39		BD-39	Panda	Badnawar	Dhar	Madhya Pradesh
40		BD-40	Panda	Badnawar	Dhar	Madhya Pradesh
41		BD-41	Panda	Badnawar	Dhar	Madhya Pradesh
42		BD-42	Panda	Badnawar	Dhar	Madhya Pradesh
43		BD-43	Phuledi	Badnawar	Dhar	Madhya Pradesh
44		BD-44	Khiledi	Badnawar	Dhar	Madhya Pradesh
45		BD-45	Khiledi	Badnawar	Dhar	Madhya Pradesh
46		BD-46	Khiledi	Badnawar	Dhar	Madhya Pradesh
47		BD-47	Phuledi	Badnawar	Dhar	Madhya Pradesh
48		BD-48	Khiledi	Badnawar	Dhar	Madhya Pradesh
49		BD-49	Khiledi	Badnawar	Dhar	Madhya Pradesh
50		BD-50	Khiledi	Badnawar	Dhar	Madhya Pradesh

Figure 1. National Boundary

Figure 2. Image showing project locations

1.10 Conditions Prior to Project Initiation

The project activity instances as part of the proposed grouped project activity are Greenfield renewable power generation projects. These will be installed at locations where there was no power generation activity at the site. In the absence of the project activity instances as part of the proposed

grouped project activity, the equivalent amount of electricity would have been generated from the existing/new power plants connected to the grid.

For project activity instances which supply renewable energy based electricity to users and baseline would be electricity supplied from national/regional grid, fossil fuel based captive power plant or carbon intensive mini grid. Therein, the main emission source in the pre-project scenario are the grid connected power plants and the primary GHG involved is CO_2.

The project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

For this project activity, the baseline scenario is the same as conditions existing prior to project initiation. Please refer section 2.4 of joint VCS PD and MR for baseline scenario for the project activity.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Compliance related to following aspects will be provided for each of the project activity instance to be included in the grouped project activity:

- Commissioning certificates
- Power Purchase agreement with state electricity board

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The renewable energy technology installed at site of each of the project activity instances as part of the proposed grouped project activity are under ownership of SPV/Project Proponent. These SPVs are a part of Hero Future Energies Private Limited group. As per agreement between project proponent and EPC Contractors, PPA for the project activity and commissioning certificate for project activity are the supporting documents to demonstrate the project ownership.

This demonstrates the right of use according to clause 3.11.1 (3) of VCS Standard (v3.6) – “a project ownership arising by virtue of a statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals”.

1.12.2 Emissions Trading Programs and Other Binding Limits

The grouped project activity under consideration is not participating in any other Emission trading programme and other binding limits.

The all project activity instances are not participating at moment in any other emission trading programme and other binding limits. The GHG emission reductions generated during the current monitoring period have not been used for compliance of other mechanism.

1.12.3 Other Forms of Environmental Credit

The proposed grouped project activity neither has nor intends to generate any other form of GHG related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

The initial project activity instances are neither has nor intends to generate any other form of GHG related environmental credit for GHG emission reductions or removals claimed under the VCS Program

1.12.4 Participation under Other GHG Programs

The proposed grouped project activity has not been registered and is not seeking registration at moment under any other GHG programs.

The initial project activity instances are not participating in any other GHG program.

1.12.5 Projects Rejected by Other GHG Programs

The proposed grouped project activity is not participating in other Environmental credits, other GHG programs and has not been rejected by other GHG programs.

The initial project activity instances are not participating in other Environmental credits, other GHG programs and have not been rejected by other GHG programs

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is a grouped project and following are the eligibility criteria for inclusion of new project activity instances into the grouped project activity:

1) Applicability Conditions: The project activity instances shall meet applicability conditions for applicable methodology as defined in section 2.2

2) Geographical Area: The project activity instances to be included in the grouped project activity will be activities involving renewable electricity generation power plants with grid connection using Wind technology located within India

3) Baseline scenario: All Project Activity Instances shall meet the baseline definition as defined in respective methodology and as explained in section 2.4

4) Technology type: The project activity instances to be included in the grouped project activity will be Greenfield activities involving renewable electricity generation power plants with grid connection using Wind technology.

5) Additionality: The project activity instances to be added as part of the grouped project will meet additionality criteria as set out in the methodology.

For large scale project activity instances, investment analysis will be followed and additionality tool "Tool for the demonstration and assessment of additionality" and methodological tool "Investment Analysis" will be used.

Thus each project activity instance will follow consistent characteristics in terms of additionality based on scale of project activity instances..

6) Start Date: The start date of each project activity instance under the grouped project should not be prior to the start date of the grouped project. The start date of each project activity instance will be determined through documentary evidence.

7) Conditions that avoid double counting of emission reductions like unique identifications of project and claiming emission reduction only under one GHG program.

8) The Grouped Project specific requirements stipulated by the Entity responsible for coordinating and managing grouped project for conducting local stakeholder consultations and environmental impact assessment (EIA), as applicable.

9) The project activity using wind project will supply electricity to grid or to users.

General criteria (to be fulfilled by all project activity instances for inclusion in the grouped project activity)

Sr. No	Eligibility Criteria	Project Activity instances eligibility
1	**Applicability Conditions**: The project activity instances shall meet applicability conditions for applicable methodology (ACM0002 Version 17) as defined in section 2.2	All initial project activity instances meet applicability conditions of methodology ACM0002 Version 17, hence this eligibility criteria is fulfilled. Please refer section 2.2 of this document for applicability criteria.
2	**Geographical Area**: The project activity instances to be included in the grouped project activity will be activities involving grid connected renewable electricity generation using wind technology located within India.	All initial project activity instances being included in the grouped project are located within geographic boundaries of India. Hence this condition is fulfilled. Please refer commissioning certificate, PPA for Geographical area of project activity.
3	**Baseline scenario:** All Project Activity Instances shall meet the baseline definition as defined in respective methodology and as explained in section 2.4	All initial project activity instances have same baseline as per methodology as detailed in subsequent sections. Hence this eligibility criteria is fulfilled. Please refer section 2.4 of this document for baseline scenario.
4	**Technology type:** The project activity instances to be included in the grouped project activity will be Greenfield activities involving grid connected renewable electricity generation using wind technology. The electricity should be supplied to grid, or to third party or to be used for captive purpose etc.	All initial project activity instances being included in the grouped project activity are wind power plants connected to grid and are green field activities. The generated electricity is supplied to grid. Hence this condition is fulfilled. Please refer PO / Commissioning certificate/PPA for the technology of project activity.

5	**Additionality:** The project activity instances to be added as part of the grouped project will meet additionality criteria as set out in applicable methodology ACM0002. For large scale projects - investment analysis will be followed and additionality tool and methodological tool "Investment Analysis" will be used.	The initial project activity instances being included in grouped project activity are large scale projects and their additionality is demonstrated as discussed in section 2.5 of this document. Hence this condition is fulfilled. Please refer section 2.5 of this document for additionality.
6	**Start Date:** The start date of each project activity instance under the grouped project should not be prior to the start date of the grouped project. The start date of each project activity instance will be determined through documentary evidence.	The start date of grouped project is considered as 29/03/2016 which is commissioning date of project activity instance and start date of all other project activity instances is after this date. Hence this condition is fulfilled. Please refer section 1.5 of this document for start date of grouped project activity.
7	Conditions that avoid double counting of emission reductions like unique identifications of project and claiming emission reduction only under one GHG program	For initial project activity instances being included in grouped project activity, PP declaration has been provided and these project activity instances are not participating in any other GHG program. Hence this condition is fulfilled. Please refer PP declaration for no double accounting of GHG emission reductions.
8	The Grouped Project specific requirements stipulated by the Entity responsible for coordinating and managing grouped project for conducting local stakeholder consultations and environmental impact assessment (EIA), as applicable	Being wind renewable technology, EIA is not required for any project activity instances as per EIA notification. For initial project activity instances being included in grouped project activity, local stakeholder consultation is not mandatory, hence this is not mentioned in VCS PD. The DOE validation contract is already signed prior to 19/04/2017. For new future project activity instances, local stakeholder consultation is required.
9	The project activity using wind project will supply electricity to grid or to users.	For initial project activity instances being included in grouped project activity, are supplying electricity to grid. Please refer PPA of the project activity for same.

Leakage Management

Since the project activity instances to be included into the grouped project activity are renewable energy projects based on Wind technology, no leakage emissions are considered - in line with paragraph 60 of the large scale methodology ACM0002 (version 17.0).

Commercially Sensitive Information

Not applicable. No any commercially sensitive information has been excluded from the public version of the project description. There is no commercially sensitive information.

Sustainable Development

Apart from generation of renewable electricity, the grouped project activity and project activity instances proposed to be included under it would contribute to the sustainable development of the region - socially, environmentally and economically. Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development.

1. Social well-being;
2. Economic well-being;
3. Environmental well-being; and
4. Technological well-being

Social well-being

- The project activity instances under grouped project activity will result in creating job opportunities for the local population on temporary and permanent basis. Manpower is required both during erection and operation of the renewable energy projects. This would result in the improvement in living standards of the local community.
- The installation of the renewable energy projects also led to development of basic infrastructure like roads, communication with the nearby cities etc. which also improved in living standards of the local population.

Economic well-being

- The project activity instances under grouped project activity will create direct and indirect job opportunities to the local community during installation and operation of the renewable energy projects.
- The investment for the project activity instances under grouped project activity would lead to the improvement in the economic activity in the local area.

Environmental well-being

- The project activity instances under grouped project activity utilizes renewable energy for generating electricity which otherwise would have been generated through alternate fuel (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. As renewable energy projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable resource, to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment.

Technological well-being:

Clean technology transfer in renewable energy generation and optimal use of renewable energy in the industry.

There is no any provision is required to monitor and report these sustainable development indicators as per national rules and regulations.

Further Information

Not Applicable.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The methodology for large scale project activity instances will be the approved methodology for large-scale CDM project activities. The details of the methodology are as follows:

Methodology: ACM0002
Project Type: Type-I: Renewable Energy Projects
Title: Grid-connected electricity generation from renewable sources
Version No.: Version 17;
Reference: CDM Methodology**:**
https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN

The methodology refers to following CDM Tools:

- Tool for the demonstration and assessment of additionality (Version 07.0.0) (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf)
- Tool to calculate emission factor for an electricity system (Version 05.0) (http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf)

2.2 Applicability of Methodology

The Large Scale project activity instances under grouped project activity will meets the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 17.0, Sectoral Scope 1, as described below:

Applicability	**Project activity vis-à-vis applicability Conditions**
This methodology is applicable to grid-connected renewable power generation project activities that: • install a Greenfield power plant; • involve a capacity addition to (an) existing plant(s); • involve a retrofit of (an) existing operating plants/units; • involve a rehabilitation of (an) existing plant(s)/unit(s) or • Involve a replacement of (an) existing plant(s)/unit(s).	The project activity instances under grouped project activity is installation of a new grid connected renewable energy wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.
The project activity may include renewable energy power plant/unit of one of the following types: 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;	The proposed project activity instances under grouped project activity will be an installation of a new grid connected renewable wind energy power plant and hence this condition is met.
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	The proposed project activity instances under grouped project activity does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable.

reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, 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;	
In case of hydro power plants, one of the following conditions shall apply: • The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or • The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m^2; or • The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2.	The proposed project activity instances under grouped project activity is a grid connected renewable wind energy project. This condition is applicable only for hydro power plants and not applicable for wind projects.
The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: • The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2; • 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/m^2 shall be; ✓ Lower than or equal to 15 MW; and ✓ Less than 10 per cent of the total installed capacity of integrated hydro power project.	The proposed project activity instances under grouped project activity is a grid connected renewable wind energy project. This condition is applicable only for hydro power plants and not applicable for wind projects.
In the case of integrated hydro power projects, project proponent shall: • 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 • 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 proposed project activity instances under grouped project activity is a grid connected renewable wind energy project. This condition is applicable only for hydro power plants and not applicable for wind projects.

the specific scenario of water availability in different 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.	
Methodology is not applicable to the following • 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; • Biomass fired power plants/units	The project activity instances under grouped project activity will be installation of a new grid connected renewable wind energy project and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the grouped project activity. This grouped project activity does not involve any biomass based power plants and hence this criterion is not applicable to the project activity.
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".	The project activity instances under grouped project activity will be a new grid connected renewable wind energy plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions of "Tool to calculate the emission factor for an electricity system"	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since project activity instances under grouped project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.

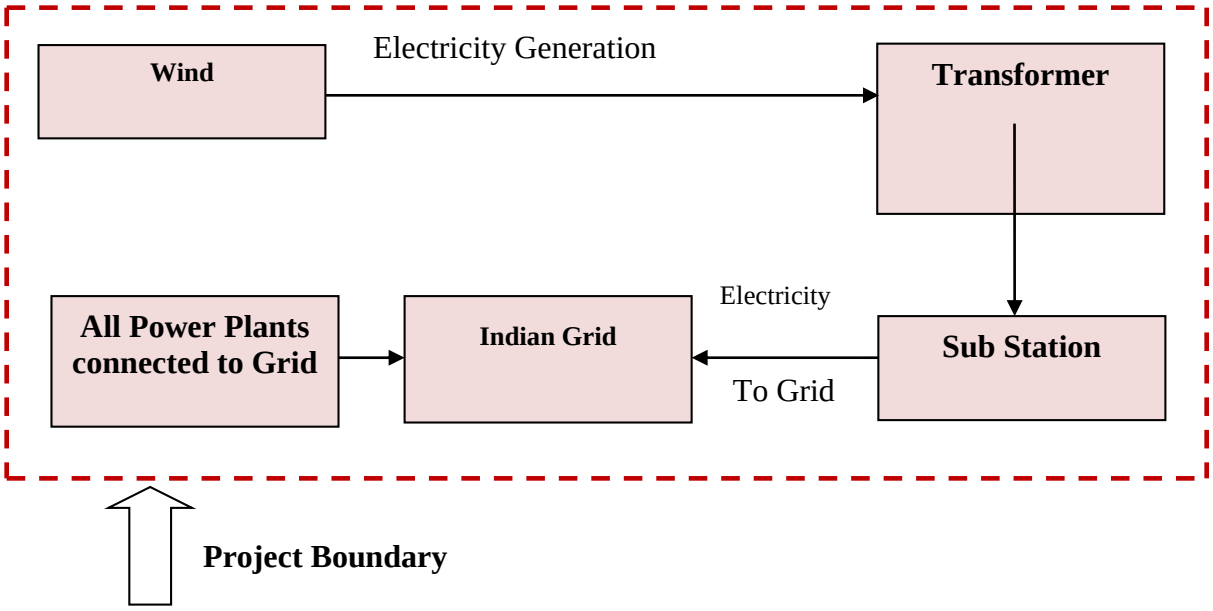
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity instances under grouped project activity will be located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	Each project activity instances under grouped project activity will be grid connected renewable wind energy project and CO2 emission factor is not considered for biofuels.

2.3 Project Boundary

Project boundary has been ascertained using para 21 of ACM0002 (Version 17.0) – "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".

Hence the project boundary includes the renewable energy power turbine generator, sub-stations, grid and all power plants connected to grid. The proposed project activity instances will evacuate power to the grid.

The boundary also extends to the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".



For project activity instances that have independent electricity meters installed for measurement of net electricity supplied to grid i.e. the meters installed at the grid inter-connection point measure the electricity generation from the project activity instances only, the project boundary would consists of dedicated meters.

For project activity instances that do not have independent electricity meters installed for measurement of net electricity exported to grid i.e. the meters installed at the grid inter-connection point measure the combined electricity generation from the project activity instances as well as

non-project activity instances project activities, apportioning procedures would be adopted for the calculating the net electricity generation attributable to the project activity instances. The project boundary in such a project activity instances consists common meters.

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity instances Owner or project activity instances Implementer does not have any control on it. Thus for project activity instances, net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

It is to be noted that metering arrangement is under control of state electricity board and PP do not have any control on it.

The schematic representation of project boundary for grid connected project activity instances is represented as below

The sources and GHG gases involved for proposed Project activity instances are as below:-

Source		Gas	Included	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Major emission sources.
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
Project activity	For geothermal power plants, fugitive emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam	CO_2	No	Project activity instances does not involve any Geothermal Power plant. Hence not applicable
		CH_4	No	Project activity instances does not involve any Geothermal Power plant. Hence not applicable
		N_2O	No	Project activity instances does not involve any Geothermal Power plant. Hence not applicable
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Project activity instances does not involve solar thermal or geothermal power plants. Hence not applicable
		CH_4	No	Project activity instances does not involve solar thermal or geothermal power plants. Hence not applicable
		N_2O	No	Project activity instances does not involve solar thermal or geothermal power plants. Hence not applicable
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Project activity instances does not involve hydro power plants. Hence neglected

2.4 Baseline Scenario

As per the applicable methodology, a Greenfield power plant is defined as "a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology (ACM0002) is the following:

As per para 23 of ACM0002 version 17.0; If the project activity is the installation of a Greenfield power plant

"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, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Hence, the baseline for the project activity is the equivalent amount of power from the INDIAN grid.

The combined margin ($EF_{grid,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) (having weightage 25%) and build margin (BM) (having weightage 75%). Calculations for this combined margin must be based on data from an official source of CEA database (where available) and made publically available.

The combined margin of the INDIAN National Grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,y}$	0.9777 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO_2 Emission Database, Version 11.0 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,OM,y}$	0.9941 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
$EF_{grid,BM,y}$	0.9285 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity

			Authority, Ministry of Power, Government of India.

2.5 Additionality

Additionality Assessment for large scale project activity Instances

In line with VCS Standard version 3.5, the additionality of the Project activity is ascertained in line with the applicable guidance from the UNFCCC. The demonstration of additionality for the proposed Project activity is being carried out in accordance with the additionality tool provided by the UNFCCC i.e. "Tool for demonstration and assessment of Additionality" Version 07.0.0,. The tool provides a step-wise approach to demonstrate additionality which is displayed below:

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first-of-its-kind. Hence not applicable.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity:
Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed VCS project activity.

The purpose of the project activity is to generate electrical power using wind energy and feed the electricity generated to the grid. Hence, the following alternatives are considered:

Alternative 1: The proposed project activity not undertaken as a VCS project activity.
The PP could proceed with the implementation of the project without Carbon credit benefits. The electricity produced from the renewable energy project would have been sold to the grid. This is in compliance with all applicable legal and regulatory requirements and can be a part of the baseline. However, the Project activity is not feasible without revenues from sale of Carbon Credits. This argument has been discussed in step 2 of the Additionality section.

Alternative 2: No proposed project activity and equivalent amount of energy would have been produced by the grid electricity system through its currently running power plants and by new capacity addition to the grid i.e. Continuation of the present situation.

The PP would have continued without investment in Project activity with usual business activities. The grid would continue with the fossil fuel based power projects and this would result in GHG emissions. Hence, the new capacity add-on from a fossil fuel based power plant is appropriate, realistic & credible baseline alternative for the project activity.

Outcome of Sub-step 1a: All the realistic alternatives for the project activity have been enlisted above.

Sub-step 1b: Consistency with mandatory laws and regulations:

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using wind energy is not a legal requirement or a mandatory option.
- There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

Outcome of Sub-step 1b: Hence, both the alternatives enlisted above are found to comply with the mandatory laws and regulations taking into account the enforcement of the legislations in the region or country and EB decisions on national and/or sectoral policies and regulations. However, Alternative 2 has been selected as the appropriate baseline alternative for this project activity.

Step 2: Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of emission reductions credits. To conduct the investment analysis, use the following sub-steps:

Sub-step 2a: Determine appropriate analysis method

As per Tool for demonstration and assessment of Additionality; Sub-step 2a, Paragraph (1), as the project activity is selling the generated electricity & getting financial benefits other than CDM benefits hence, Option- I (Apply simple cost analysis) is not applicable under this situation. Also as per EB-62, Annex 5, Methodological Tool of “Investment Analysis” version 6, clause no.18 “In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market”. Hence Option-II (Apply investment comparison analysis) is also not applicable under this situation. So the project promoter has chosen Option- III or benchmark analysis as an appropriate analysis method to demonstrate the investment barrier.

This method determines the attractiveness of the project activity for the investors, as well as provides a measure of the viability of the investment to generate revenues during its operation, as compared with other avenues and investment options. Hence, the Benchmark analysis method is to be employed for analysis of the said project.

Sub-step 2b (Option III): Apply benchmark analysis

The investment analysis using Benchmark analysis approach (Option III) has been chosen. Further, this method illustrates the evaluation of the Project by the PP before the decision to undertake the project was taken and management approval granted.

Choice of Financial Indicator:

According to the "Tool for demonstration and assessment of Additionality", *the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach.* Therefore in accordance with the guidance, the relevant financial indicator for project activity has been chosen as Equity IRR.

Choice of Benchmark:

As per Guidelines on the methodological Tool of the investment analysis (Annex 5, EB 62),

The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR.

In the project activity, PP has considered the cost of equity as the benchmark for the project as per Appendix of methodological Tool of the investment analysis (Annex 5, EB 62). The default value of Return on Equity for Group-1 projects in India is 11.75%.

As per paragraph 17 of the above mentioned document, "*In situations where an investment analysis is carried out in nominal terms and the available IRR benchmarks are in real terms, project participants shall convert the real term values of benchmarks to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used".*

The investment analysis has been carried out in Nominal terms. Accordingly, Default value has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India).

Default Value Benchmark Calculations:
Appendix A in EB62 Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 11.75%

The benchmark has been computed in the following manner:

Nominal Benchmark[3] = {(1+Real Benchmark)*(1+Inflation rate)}-1

Where,
Real Benchmark = Default Value, i.e., 11.75% (as per Appendix of Annex 5, EB 62)

[3]As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

Inflation rate = Projected Inflation Rate for India in next 10 years (RBI Forecast)

Based on decision made for the project activity i.e. on 22/06/2015, the inflation rate is taken from RBI forecast.

Default Value

As per EB62, Annex 5 Dated: 15 July 2011

Equity IRR Calculation as per Default Value in EB 62 Annex 5			
Benchmark			16.00%
Benchmark Calculations	**Value**	**Sources Link**	**Document Date**
Default Value for India as per UNFCCC guidelines	**11.75%**	https://cdm.unfccc.int/EB/archives/meetings_11.html	15-07-2011
Inflation forecast (WPI Mean) as per RBI for 10yrs	**3.80%**	https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=16402	03-06-2015
Benchmark (with 10yrs Forecast)	**16.00%**	Calculated	
Benchmark	**16.00%**	Calculated	

The input values for 100 MW wind project at Ratlam site are as follows

Cost of the Project Activity	
Investor Name	**Clean Wind (Ratlam) Private Limited**
Project Location	Ratlam, Madhya Pradesh
State	Madhya Pradesh
Project Capacity (MW)	100
Date of Commissioning	31-Mar-2016
Life of Plant in years	25
	Offer Letter
	15-Jun-2015

in INR MN

Items	Cost	Tax	Cost + Tax
Supply of WTG Comprehensive cost	6,750.00	-	6,750.00
Erection & Commissioning	1,750.00	-	1,750.00
Total Cost of Project	8,500.00	-	8,500.00
O&M Expenses	130.00	**15.76**	**145.76**
	5% Escalation, starting from 3rd Yr.		

Assumptions and values considered for Financial Analysis are as follows

Details of the project		Source
State where the project is situated	Madhya Pradesh	
Total Capacity (MW)	100.00	
Expected Date of Commissioning	31-Mar-16	Assumption
Life of the plant (Yrs.)	25	WTG manufacturer specifications and as per MPERC Tariff Order dated 26-03-2013[4]
Generation of electricity		
PLF (%)	20.00%	As per MPERC Tariff Order dated 26-03-2013[5]
Annual generation (kWh)	1752,00,000	Calculated Value
Tariff rate (INR/kWh)	5.92	As per MPERC Tariff Order dated 26-03-2013[6]
GBI Benefit (INR/kWh)	0.50	As per MNRE scheme dt. 04.09.2013,[7]
Operation and maintenance cost and Insurance		
O & M Expenses (INR Mn.)	146.07	Offer letter
O & M free for (Yr.)	2.00	Offer letter
Escalation in the operational expenses (%)	6.00%	Offer letter
Insurance (INR Mn.)	85.00	As per CERC order[8]
Financial parameters		
TOTAL COST (INR Mn.)	8,500.00	Offer letter
Loan Amount (INR Mn.)	5,950.00	Assumption
Equity Investment (INR Mn.)	2,550.00	Calculated Value
Term loan		
Loan Amount (INR Mn.)	5,950.00	assumption 70% loan and 30% equity[9]
Interest rate (%)	12.75%	As per MPERC Tariff Order dated 26-03-2013[10]
Loan Tenure (Qtr.)	40	Assumption

[4] http://www.mperc.nic.in/26032013-Wind-tariff-order.pdf

[5] http://www.mperc.nic.in/26032013-Wind-tariff-order.pdf

[6] http://www.mperc.nic.in/26032013-Wind-tariff-order.pdf

[7] http://www.mperc.nic.in/26032013-Wind-tariff-order.pdf

[8] http://www.cercind.gov.in/2012/orders/RE_35_2012.pdf

[9] http://www.mperc.nic.in/26032013-Wind-tariff-order.pdf

[10] http://www.mperc.nic.in/26032013-Wind-tariff-order.pdf

Moratorium Period (Qtr.)	-	Assumption
Repayment Period (Qtr.)	40	Calculated Value
Repayment instalments value (INR Mn.)	148.750	Calculated Value
1st instalment from (Qtr. end)	30-Jun-16	Considered from the next Quarter End
Book Depreciation (SLM Method)		
Gross Depreciable Value (INR Mn.)	8,500.00	Calculated Value
Salvage Value (%)	10.00%	Page 15 of CERC (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2012[11]
Salvage value (INR Mn.)	850.00	Calculated Value
Net Depreciable Value (INR Mn.)	7,650.00	Calculated Value
Residual Value (INR Mn.)	850.00	Calculated Value
IT Depreciation		
IT Depreciation (WDV Method) (%)	12.73%	As per companies act 2013[12]
Income Tax		
Financial Year	**FY 2015-16**	
Income tax rate (%)	30.00%	As Per Income Tax Rule, Pg 29 Para E(I)[13]
Corporate Tax (%)	33.00%	As Per IT rule[14]
Service Tax (%)	12.00%	As Per Income Tax Rule, Pg 14
Surcharge (%)	10.00%	As Per Income Tax Rule, Pg 29 Para E(I)
Education cess (%)	3.00%	As Per Income Tax Rule, Pg 5, 11 and 12
Final Tax rates		
Income tax rate (%)	33.99%	Calculated Value
Corporate Tax (%)	37.39%	Calculated Value
Service Tax (%)	12.36%	Calculated Value

Result-

	Equity IRR without CDM	**Benchmark (Equity IRR)**

[11] http://www.cercind.gov.in/2012/regulation/CERC_RE-Tariff-Regualtions_6_2_2012.pdf

[12] http://taxadda.com/companies-act-2013/depreciation-rates-as-per-companies-act-2013/

[13] http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf

[14] https://www.bankbazaar.com/tax/corporate-tax.html

Investor Name - Clean Wind (Ratlam) Private Limited	5.19%	16.00%

Sub-step 2c: Sensitivity Analysis:

As per methodological Tool "Investment Analysis" Version 07, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Guidance also states, "All parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude". The Annex also states, as a general point of departure, variations in the sensitivity analysis should at least cover a range of +10% and –10%, unless this is not deemed appropriate in the context of the specific project circumstances.

Since the project cost is already firmed up, the cost is not variable. The tariff is determined by PPA which is fixed for years mentioned as per the tariff order and hence it need not be subjected to variation. All other expenses are much less than 20% of the total cost. Hence, only PLF needs to be subjected to reasonable variation. Nevertheless, following factors have been subjected to sensitivity analysis:

(a) PLF
(b) O&M Cost
(c) Project Cost
(d) Tariff Rate

Sensitivity Analysis	**Equity IRR**

Variation %	**-10%**	**Normal**	**10%**	**Breaching Value**
PLF	3.17%	5.19%	6.82%	65.30%
O&M	5.59%	5.19%	4.75%	-392.00%
Project Cost	6.64%	5.19%	3.78%	-42.36%
Tariff Rate	3.26%	5.19%	6.80%	67.50%

It can be observed from above table that in various scenarios wherein there are changes in tariff, O&M cost, electricity generation and project's capital cost, the equity IRR does not cross the benchmark. Thus, it can be concluded that revenue from sale of VERs is important to alleviate this gap and hence the project has been considered to be additional.

	Probability to breach the benchmark
PLF	Not possible as the PLF has been reported as per the tariff order based on long term data and hence a PLF fluctuation of more than 10% is unlikely to happen. Also project activity remains additional by considering the PLF as per third party PLF report.
O&M	With the country experiencing 6.50% inflation on an average, the question of O&M coming down is ruled out. Moreover, the purchase orders provide for a 6% escalation in the cost every year.

Project Cost	The total project cost is not 10% lower than the considered at the time of decision making cost. Since the project cost is firm, there is no possibility of project cost going below this level. The actual reduction in project cost is around 6%. However, we have conducted sensitivity analysis for project cost being 10% less than that considered during decision making. Still, the IRR does not breach the Benchmark.
Tariff Rate	The tariff is determined by PPA which is fixed for years mentioned as per the State Electricity Board's tariff order. Hence, there is no probability to get variation for the same.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice Analysis

Sub-step 4a: Analyze other activities similar to the proposed Project activity:

The common practice analysis is carried out step by step as per "Methodological tool: Common Practice, version 03.1" para 5. Stepwise approach for common practice are as follows:

For the proposed VCS Grouped VCS Project activity, SPV (initial project activity instance) is working as a part of Hero Future Energies Private Limited. Thus common practise analysis is conducted considering SPV. The common practise analysis has been conducted considering the total capacity of current grouped project activity instance.
The total installed capacity of initial project activity instance is 100 MW, thus common practise analysis is demonstrated based on 100 MW wind capacity.

Step (1): *calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.*

Range	Capacity	Unit
+50%	150	MW
Capacity of the proposed all project activity instances	100	MW
-50%	50	MW

Step (2): *identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:*

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

a. Project is located in Madhya Pradesh state of India. However each state have different tariff order, thus each state have different investment climate. Therefore, Project is located in Madhya Pradesh state have been chosen for analysis.
b. The project activity is a green-field wind power project and uses measure (b) *"Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies"*.
   Therefore, all projects applying same measure (b) as the proposed project activity are candidates for similar projects.
c. The energy source used by the project activity is wind. Hence, only wind energy projects have been considered for analysis.
d. The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.
e. The capacity range of the projects is within the applicable capacity range from 50 MW to 150 MW.
f. The start date of the project activity as per CDM definition is 29- March-2016. Therefore, projects which had started commercial operation before have been identified.

Numbers of Similar projects (CDM and non-CDM) identified, which fulfil above-mentioned conditioned are:

Particulars	No. of Projects	Source
N_{wind}	1	Publically available data from Wind power directory 2016

Step (3): *within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number* N_{all}.

Since there is single investor/parent company who has installed large scale wind installed capacity.

Thus $N_{all} = 1$

Step (4): *within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number* N_{diff}.

From the projects identified above, those projects which employ "**different technologies**" have been excluded and the number of such projects has been identified as N_{diff}.

Since there is no any investor/parent company who has installed large scale wind installed capacity. As $N_{all} = 1$; thus $N_{diff} = 0$

Step (5): *calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.*

Calculate $F=1-N_{diff}/N_{all}$

As N_{all} =1, and N_{diff} = 0, thus, $F=1-N_{diff}/N_{all}$ =1 (greater than 0.2)

Outcome of Step 5:

As,

i. F = 1; is greater than 0.20
ii. $N_{all}-N_{diff}$ = 1; is less than 3

Thus, the proposed project activity is not a "common practice" within a sector in the applicable geographical area. Please refer common practise analysis excel sheet for detail analysis.

2.6 Methodology Deviations

Not applicable

3 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

As per para 44 of ACM0002 version 17.0, Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BEy	=	Baseline emissions in year *y* (t CO_2/yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

Calculation of $EG_{PJ,y}$

The methodology ACM 0002 (Version 17.0) has procedures for calculation of $EG_{PJ,y}$ for the following cases:

(a) Greenfield plants,
(b) Retrofits and replacements, and
(c) Capacity additions.

As the proposed project activity is Greenfield plant, option (a) as provided in the methodology ACM 0002 (Version 17.0) shall be applicable and is described below:

"If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

Where:

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

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

Calculation of $EF_{grid, CM, y}$

The methodology ACM0002 (Version 17.0) requires that the combined margin for the grid be calculated in accordance with the procedure provided in the latest version of "*Tool to calculate the emission factor for an electricity system".*

CO_2 Baseline Database for the Indian Power Sector, Version 11.0, April 2016[15], published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission factor. This version is the latest available CEA database for the emission factor.

As per the "Tool to calculate the emission factor for an electricity system" Version 05.0, EB 87, Annex 9, the following steps have been followed.

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems

The tool defines that "*for determining the electricity emission factors, identify the relevant electricity system. Similarly, identify any connected electricity systems".* It also states that *"If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used".* Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern.

[15] http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

However since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

Table: Grid Classification

INDIAN GRID				
Northern	**Eastern**	**Western**	**North-Eastern**	**Southern**
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Kerala
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Tamil Nadu
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Andhra Pradesh
Jammu & Kashmir	Sikkim	**Madhya Pradesh**	Mizoram	Telangana
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants have the option of choosing between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

The Project Participant has chosen only grid power plants in the calculation.

STEP 3: Select a method to determine the operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers. The choice of other two options for

calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2010-2011	2011-2012	2012- 2013	2013-2014	2014-2015
India	18.4%	19.6%	16.9%	18.6%	16.8%

Data Source: Central Electricity Authority (CEA) database Version 11, April'2016

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the Indian grid is less than 50 % of the total generation. Thus the average emission rate method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The "Simple operating margin" has been calculated as per the weighted average emissions (in tCO_2/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation;

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- **Ex-ante option:** If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. **Or**

- **Ex-post option:** If the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex-ante option for the calculation of OM with 3 years generation weighted average of the most recent years available at the time of submission of VCS PD to the DOE for validation.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the first crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method

The simple operating margin emission factor has been calculated using a 3 year data vintage. The CEA database has followed the approach of simple OM in line with tool to calculate emission factor for an electricity system.

Option A of tool has been selected. The operating margin, therefore, can be calculated by dividing the grid's total CO2 emissions by the net generation of all thermal stations. In other words, it represents the weighted average emissions rate of all thermal stations.

Net Generation in Operating Margin (GWh) (excl. Imports)			
	2012-13	2013-14	2014-15

INDIAN Grid	6,97,187	7,21,632	8,08,417

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2012-13	2013-14	2014-15
INDIAN Grid	0.99	1.00	0.99

Weighted Generation Operating Margin	
INDIAN Grid	**0.9941**

STEP 5: Calculate the build margin emission factor ($EF_{BM,y}$)

Option 1 as described above is chosen to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2014-15
INDIAN Grid	**0.9285**

(With sample group constituting most recent capacity additions to the grid comprising 20% of the system generation)

STEP 6: Calculate the combined margin (CM) emissions factor

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system, Version 05.0.0, EB 87, Annex 9, allows to weigh the operating margin and Build margin at 75% and 25%, respectively for wind and solar projects and 50% and 50%, respectively for hydro and biomass projects.

The baseline emission factor is calculated using the combined margin approach as described in the following steps:

Calculation of Baseline Emission Factor EF_y

The baseline emission factor **EF_y** is calculated as the weighted average of the Operating Margin emission factor **($EF_{OM,y}$)** and the Build Margin emission factor **($EF_{BM,y}$)**:

$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$$

Where,

w_{OM}	75% weight for wind energy projects
w_{BM}	25% weight for wind energy projects
$EF_{OM,y}$	calculated as described in Steps 3&4 above (tCO_2/MWh)
$EF_{BM,y}$	calculated as described in Steps 5 above (tCO_2/MWh)

Baseline Emission factor (INDIAN Grid) **= 0.75*0.9941 + 0.25*0.9285**
= 0.9777 tCO_2/MWh

The emission reduction calculation is shown below

Investor Name	Capacity (MW)	PLF	Net Generation (MWh/year)	Baseline Emission factor (tCO_2/MWh)	Baseline emissions (tCO_2e/ year)	Project emissions (tCO_2e/ year)	Leakage Emissions (tCO_2e/ year)	Emission reductions (tCO_2e/ year)
Clean Wind Power (Ratlam) Private Limited	100	20.00%	1,75,200	0.9777	1,71,293	0	0	1,71,293
Total			**1,75,200**		**1,71,293**	**0**	**0**	**1,71,293**
In Ten Years								**17,12,930**

Therefore, Baseline Emissions:

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

BE_y **= 175,200 x 0.9777 = 171,293 tCO_2**

3.2 Project Emissions

For most renewable power generation projects activities PEy =0. As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity instances is not geo-thermal or solar thermal, project emissions are not applicable for wind power projects.

Hence PEy= 0

3.3 Leakage

As per methodology, No Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

As per methodology, for renewable energy projects, there is no any leakage emissions occurred.

Hence, LEy= 0

3.4 Estimated Net GHG Emission Reductions and Removals

As per methodology ACM0002 (version 17.0), net GHG emission reductions are calculated as follows:

ERy = BEy – PEy

= 171,293-0

= 171,293 **tCO_2**

ERy = Emission reductions in year y (tCO2e/yr)

BEy = Baseline emissions in year y (tCO2e/yr)

PEy = Project emissions in year y (tCO2e/yr)

Ex-ante calculation (estimate) of net GHG emission reductions:

Ex-ante emission reduction calculations are calculated based on current project activity instances to be included in the grouped project activity under consideration. Summary of ex-ante emission reduction calculations is as follows:

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 1	171,293	0	0	171,293
Year 2	171,293	0	0	171,293
Year 3	171,293	0	0	171,293
Year 4	171,293	0	0	171,293
Year 5	171,293	0	0	171,293
Year 6	171,293	0	0	171,293
Year 7	171,293	0	0	171,293
Year 8	171,293	0	0	171,293
Year 9	171,293	0	0	171,293
Year 10	171,293	0	0	171,293
Total	1,712,930	0	0	1,712,930

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin CO2 emission factor in year y

Source of data	Calculated from CEA database, Version 11, April 2016
Value applied:	0.9941
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire first crediting period.

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016
Value applied:	0.9285
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire first crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined Margin CO2 emission factor in year y
Source of data	Calculated from CEA database, Version 11, April 2016
Value applied:	0.9777
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0". The data is obtained from "CO2 Baseline Database for Indian Power Sector" Version 11, April 2016, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire first crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the project activity instances in year y
Source of data	Credit Report /JMR as per Monthly Generation Report
Description of measurement methods and procedures applied	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: One in five years[16] Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation: $EG_{facility,y} = EG_{Export} - EG_{Import}$ The joint reading at metering point is carried out once in a month in presence of O&M officials and state electricity board personnel. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the PP/Project activity Instance owner has no role on it. PP/Project activity Instance owner will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value applied:	175,200
Monitoring equipment	Monitoring equipment will be energy meter installed at each of the project activity instance site. Readings will be cross checked with back up meter. The accuracy class of meters, calibration frequency of meters is totally under purview of state electricity board and PP do not have any control on it.
QA/QC procedures applied	The calibration of all the meters will be undertaken once in five years[17] and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.5s or higher. The meter accuracy

[16] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

[17] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

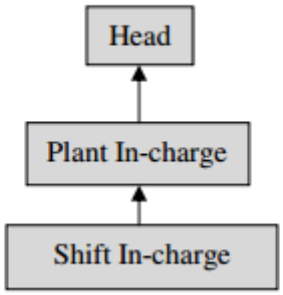
	class and calibration interval is under purview of state electricity board and PP/Project Activity Instances owner do not have any control on it. It is also noted that apportioning procedure (if applicable for project activity instances) is under control of state electricity board and PP do not have any control on it. The available parameter to PP/project activity instance owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Calculation method	The parameter is measured and if any calculation is required, the calculation is based on measured parameters.
Comments	Data will be archived electronically for a period of 2 years beyond the end of crediting period

4.3 Monitoring Plan

The monitoring plan, which is implemented by the PP describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data results with the PP. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity instances. The team comprises of the following members:

Organisational Structure for Monitoring



PP has assigned the responsibility of operation and maintenance of project activity instances with relevant and authorised O&M contractors. The Plant In-charge and Shift In-Charge would be deployed by O&M contractors.

Responsibilities of Head: Overall functioning and maintenance of the data.
Responsibilities of Plant In-charge: Responsibility for Maintains the data records, ensures completeness of data, and reliability of data (calibration of equipments).
Responsibilities of Shift In-charge: Responsibility for day to day data collection and maintains day to day log book for monitored data.

In the event when the individual verification period dates and billing cycle dates of the project activity do not coincide, then the electricity export will be apportioned based on number of days. The ratio of number of days under monitoring period and total number of days under billing cycle will multiplied to total electricity export to billing cycle.
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In general wind projects does not involve common metering, however for project activity instances which involves wind projects with common metering, apportioning will be followed to determine net electricity export to grid. The apportioning procedure is not under control of PP, thus value of net electricity supplied to grid is available to PP and same is mentioned as monitoring parameter. The value of net electricity supplied to grid is used for ER calculations.
It is to be noted that the metering arrangement, accuracy class of meters, feeder arrangements, calibration frequency of meters are under control of state electricity board and PP do not have any control on it. Thus any deviation at actual site or during verification is accepted.

QA & QC Procedures to be followed
Necessary check meters as required would be installed, to operate in standby mode or when the main meters are not working. All meters will be calibrated at least once in five year as per CEA notification. Records of calibration certificates will be maintained for verification. Hence, high quality is ensured with the above parameters. The calibration of meters is under purview of state electricity board and CME/ project activity instances owner do not have any control on it.

Data Recording and Storage
For measuring the net energy supplied to grid by the project activity instances at the interconnection point, one set of Main meter and Check Meter shall be provided. Representatives of both project activity instances Owner and State Utility will be present to record the monthly meter readings. The state utility will prepare the credit report for the net energy supplied to the grid and same will be used as a basic document for monitoring and verification of the net energy supplied to the grid. Based on the monthly credit report, the project activity instances Owner shall raise an invoice to the utility. Utility will pay to the project activity instances Owner based on this document.

The above document will be kept at safe storage for verification of emission reductions generated from the project activity. The period of data storage will be 2 years beyond crediting period.

Emergency preparedness
The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. However, in case monitoring equipment get failed or found faulty, they shall be replaced with calibrated meters as quickly as possible. In case main meter get failed or found faulty, the reading of check meter will be considered.

Personnel training
In order to ensure a proper functioning of the project activity instances and a properly monitoring of emission reductions, the staff will be trained. The Shift In-charge and Plant In-charge will be trained in equipment operation, data recording, operation and maintenance and emergency procedures in compliance with the monitoring plant.

5 SAFEGUARDS

5.1 No Net Harm

As per VCS Guidelines, this section is not mandatory being project is under validation and DOE Contract is prior to 19/04/2017.

5.2 Environmental Impact

According to Indian regulation, the implementation of the renewable energy power project does not require an Environmental Impact Assessment (EIA). As all the project activity instances involved in the grouped project activity involves installation of the renewable energy power project and as the Indian regulation on the Environmental Impact Assessment is the same for all the renewable energy

Power Projects, it is decided to analyze the environmental impacts at the groped project activity Level.

As per the Ministry of Environment and Forests (Government of India) notification dated September 14,2006 regarding the requirement of environmental Impact Assessment (EIA) studies as per the Environmental Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of Environment and Forests), any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. The renewable energy power Projects are not included in this list and thus an EIA is not required. Hence, environmental impact analysis is not required for the groped project activity and also for the project activity instances.

5.3 Local Stakeholder Consultation

As per VCS Guidelines, this section is not mandatory being project is under validation and DOE Contract is prior to 19/04/2017.

5.4 Public Comments

As per VCS Guidelines, this section is not mandatory being project is under validation and DOE Contract is prior to 19/04/2017.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

. Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the project activity instances in year y
Value applied:	163,712.36
Comments	Quantity of net electricity supplied (MWh) to the grid is the difference of export and import.

6.2 Baseline Emissions

The baseline emission calculation for the project activity instances is attributable to the CO_2 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 Indian grid will be multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y	**=**	Baseline Emissions in year y; tCO_2
$EG_{facility,y}$	**=**	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,CM,y}$	**=**	CO_2 emission factor of the grid in year y; tCO_2/MWh

Thus,

BE_y = 163,712.36 * 0.9777

= 160,061 tCO_2e

6.3 Project Emissions

As per methodology, for renewable energy projects, there is no any project emissions occurred. Hence, PEy= 0

6.4 Leakage

As per methodology, for renewable energy projects, there is no any leakage emissions occurred. Hence, LEy= 0

6.5 Net GHG Emission Reductions and Removals

$ER_y = BE_y – PE_y$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$ER_y = BE_y – PE_y$

ER_y = 160,061-0

= 160,061 **tCO_2**

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2016	117,744	0	0	117,744
2017	42,317	0	0	42,317
Total	160,061	0	0	160,061

APPENDIX 1: METER DETAILS

The meter details of the project activity is mentioned below.

Main Meter Details		Check Meter Details		Initial Meter Calibration Date	Due Date for Calibration
Make	Secure	**Make**	Secure	13/03/2016	12/03/2021
Meter Serial no	MPC74061	**Meter Serial no**	MPC74060		
Accuracy Class	0.2s	**Accuracy Class**	0.2s		