

250 MW WIND POWER PROJECT BY MYTRAH ENERGY



Project Proponent is Mytrah Vayu (Sabarmati) Pvt. Ltd.



Document Prepared by EKI Energy Services Limited

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Prepared By	Anjali Asst. Manager- Operations EKI Energy Services Limited
Contact	EnKing Embassy, Office No. 201, Plot 48, Scheme 78, Part 2 Vijay Nagar, Near brilliant Convention Centre, Indore- 452010 Madhya Pradesh, India Website: www.enkingint.org Email ID: anjali@enkingint.org T: +91 731 42 89 086, M: +91 9109120940

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1 PROJECT DETAILS

1.1 Summary Description of the Project and its Implementation Status

The main purpose of this project activity is to generate clean form of electricity through renewable wind energy sources. The project activity involves installation of a 250 MW wind power project in Tamil Nadu state of India.

The 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 scale grid connected plants that export their generated output to the regional / national electricity grid in India. This project activity follows methodology ACM0002 version 19.0.

Over the 10 years of first crediting period, the project will replace average anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 506,370 tCO₂e per year, thereon displacing average electricity generation about 540,531.5 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

The details of the project and their location of installation are mentioned in the table below:-

Name of Investor	Capacity in MW	COD	Connection with Grid	State	Usage
Mytrah Vayu (Sabarmati) Pvt. Ltd.	128.79 MW	30/01/2019	Indian Grid	Tamil Nadu	Sale to State DISCOMs
	58.32 MW	16/04/2019			
	62.89 MW	11/05/2019			

The project is promoted by Mytrah Vayu (Sabarmati) Pvt. Ltd.

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, 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 paragraph 22 of Section 5.2.1 of applied methodology is the following:

If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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, pre-project scenario and baseline scenario are the same.

Total emission reductions achieved in this monitoring period:

During the Current Monitoring Period from 30/01/2019 to 30/11/2019 (Inclusive of both the dates) the project activity has supplied 308,956.77 MWh of electricity, and thus contributing to the GHG reductions 289,425 tCO₂e. Further the project underwent continued operation except for scheduled maintenance and breakdowns.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)
Project Type : I - Renewable Energy Projects
Project Category : Grid-connected electricity generation from renewable sources ACM0002-Version 19.0¹

Tools referred with above methodology are:

- Tool to calculate the emission factor for an electricity system² - Version 07.0 (EB 100, Annex 04)
- Tool for the demonstration and assessment of additionality³ - Version 07.0.0 (EB 70, Annex 08)

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Mytrah Vayu (Sabarmati) Pvt. Ltd.
Contact person	Mr. Rahul Kumar
Title	Deputy Manager-Commercial and Regulatory
Address	8th Floor, Q City, Survey No. 109, Gachibowli, Nanakramguda Village, Serilingampally Mandal, Hyderabad
Telephone	+91 9958325673
Email	rahul.kumar@mytrah.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Manish Dabkara
Title	CEO & MD
Address	EnKing Embassy, Office No 201, Plot 48, Scheme 78, Part 2, Vijay Nagar, Indore- 452010, Madhya Pradesh, India.
Telephone	+91-731-4289086

¹ <https://cdm.unfccc.int/UserManagement/FileStorage/58IAGB7SZUDEO2VN6LYM30K41HFPRQ>

² <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v7.0.pdf>

³ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf>

Email	manish@enkingint.org
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1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e. 30-01-2019. This is the date of commissioning of 128.79 MW Wind Project activity by Mytrah Vayu (Sabarmati) Pvt. Ltd.

The details of the commissioning dates of the individual project activity are mentioned in the section 1.1 of this report.

1.6 Project Crediting Period

Crediting Period Start date: 30-January-2019

Crediting Period End date: 29-January-2029

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

The project involves setting up of a 250 MW Wind power project.

Project Scale	
Project	
Large project	✓

As the estimated annual average GHG emission reductions or removal per year is 506,370 tCO₂e which is more than 300,000 tonnes of CO₂e per year, thus the project falls in the category Large Project.

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
2019	512,751
2020	557,007
2021	557,007
2022	557,007
2023	557,007
2024	557,007
2025	557,007
2026	557,007
2027	557,007
2028	557,007
2029	44,255
Total estimated ERs	5,570,069
Total number of crediting years	10
Average annual ERs	506,370

1.8 Description of the Project Activity

The project activity involves the installation of Wind project. The total installed capacity of the project is 250 MW Wind project located at Tamil Nadu state in India. The project is promoted by **Mytrah Vayu (Sabarmati) Pvt. Ltd.**

The Project activity is a new facility (Greenfield) and the electricity generated by the project will be exported to the Indian electricity grid. The project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The Project Proponent plans to avail the VCS benefits for the project.

In the Pre- project scenario the entire 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.

The project shall result in replacing average anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 506,370 tCO₂e per year, thereon displacing 540,531.53 MWh/year amount of electricity from the grid over the 10 years crediting period.

The technical specification for 250 MW Wind project is provided below:-

The Company is using GE make, 2.4 MW rated capacity WEC having rotor diameter of 116 meters and hub height of 94 Meters, at Tamil Nadu. The technical specification document of the WTG is being submitted to the DOE. The technical specifications given below:

Rotor	
Maximum Power Output	2400 kW
Diameter	116 m
Number of blades	3
Swept area	10,568 m ²
Rated wind speed	11 m/s
Rotor speed range	7.67 to 15.68 rpm
Rotational direction	Clockwise looking downwind
Tip speed @ rated power	85.4 m/s
Orientation	Upwind
Speed regulation	Pitch Control
Aerodynamics brakes	Full feathering

1.9 Project Location

The details of the project locations are mentioned in the table below

Name of Investor	Capacity (MW)	Village(s)	District	State
Mytrah Vayu (Sabarmati) Pvt. Ltd.	250 MW	Kadambur, Kuppanapuram, Ottarampatti, Vandanam, Kayathar,	Tuticorin	Tamil Nadu

		Akhilandapuram & Paneerkulam		
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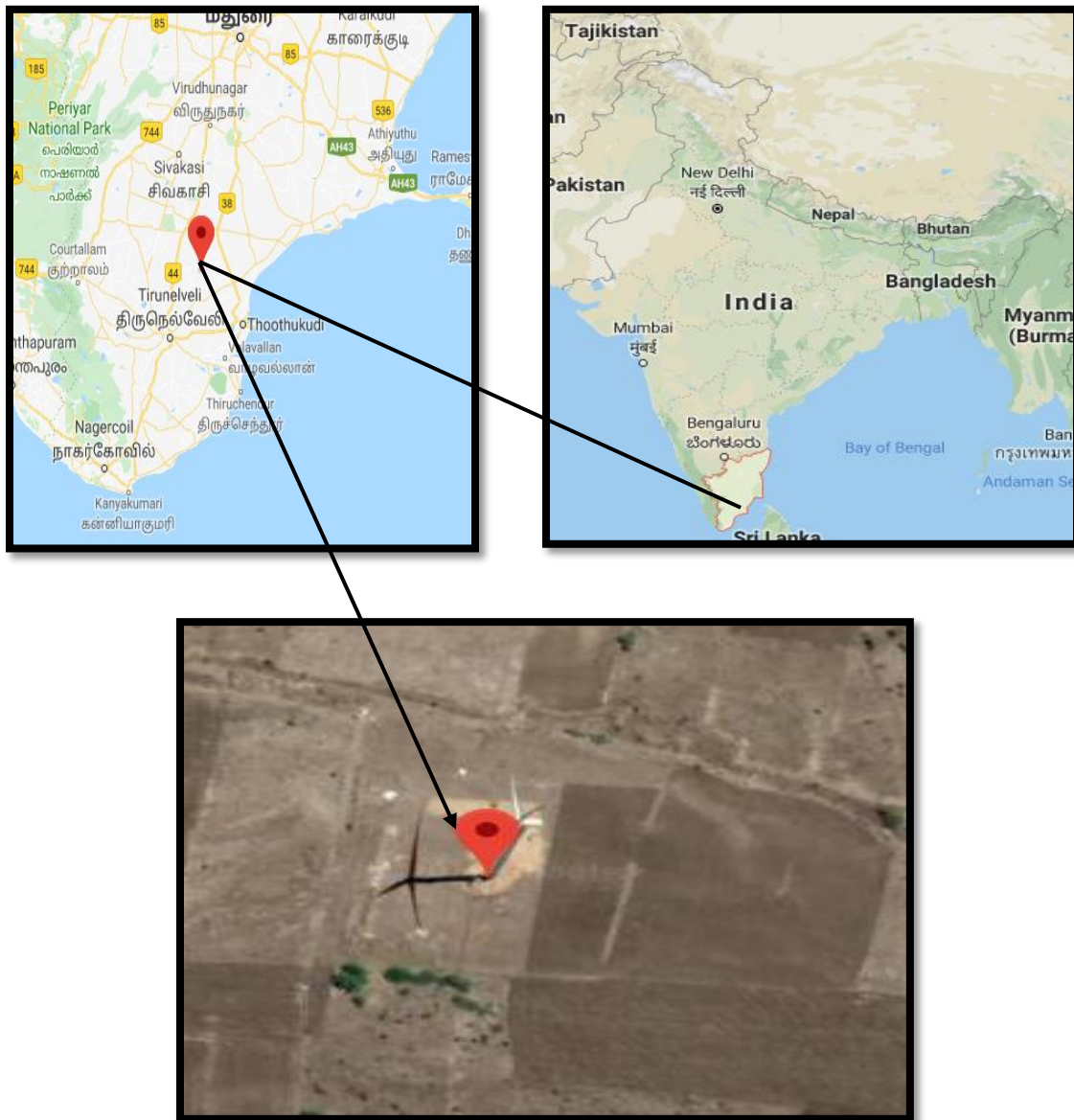
Respective WTG location along with coordinates are mentioned below:

SL. No	Name of Investor	Location Name	Latitude	Longitude
1	M/s Mytrah Vayu (Sabarmati) Pvt. Ltd.	MAN-322	8° 58' 04.93"	77° 55' 00.64"
2		MAN-321	8° 58' 24.09"	77° 55' 22.36"
3		MAN -222	8° 57' 49.51"	77° 54' 36.21"
4		MAN-215	8° 57' 04.03"	77° 53' 07.05"
5		MAN-323	8° 57' 30.49"	77° 53' 08.89"
6		MAN-199	8° 59' 57.17"	77° 52' 43.33"
7		MAN-324	8° 56' 59.21"	77° 52' 17.266"
8		MAN-197	9° 00' 44.43"	77° 52' 05.52"
9		MAN-319	8° 59' 53.26"	77° 54' 48.26"
10		MAN-196	9° 01' 06.79"	77° 52' 15.16"
11		MAN-328	9° 01' 42.51"	77° 53' 41.77"
12		MAN-326	9° 00' 17.87"	77° 54' 37.53"
13		MAN-320	8° 58' 43.03"	77° 54' 41.61"
14		MAN-353	8° 57' 22.58"	77° 54' 40.81"
15		MAN-380	8° 57' 31.83"	77° 54' 14.29"
16		MAN-311	9° 01' 24.09"	77° 53' 43.03"
17		MAN-312	9° 01' 53.19"	77° 54' 49.58"
18		MAN-349	9° 03' 04.87"	77° 55' 21.34"
19		MAN-361	9° 02' 49.37"	77° 56' 49.38"
20		MAN-379	9° 01' 40.26"	77° 52' 27.36"
21		MAN-350	9° 02' 45.455"	77° 55' 46.40"
22		MAN-362	9° 03' 10.15"	77° 56' 09.18"
23		MAN-345	9° 02' 24.90"	77° 55' 26.67"
24		MAN-305	9° 02' 15.08"	77° 51' 55.31"
25		MAN-340	9° 00' 53.28"	77° 56' 03.52"
26		MAN-378	9° 05' 18.50"	77° 56' 46.48"
27		MAN-304	9° 02' 32.51"	77° 51' 27.31"
28		MAN-377	9° 03' 59.32"	77° 57' 18.22"
29		MAN 356	9° 01' 06.19"	77° 57' 49.32"
30		MAN-366	9° 04' 34.66"	77° 55' 26.91"
31		MAN 314	9° 01' 20.72"	77° 57' 46.01"
32		MAN-159	8° 59' 46.60"	77° 49' 42.66"
33		MAN-161	9° 00' 26.84"	77° 49' 03.72"
34		MAN-160	9° 00' 12.76"	77° 49' 41.56"
35		MAN-415	8° 58' 58.96"	77° 50' 49.62"
36		MAN-412	8° 58' 28.65"	77° 50' 15.30"

37		MAN-417	8° 58' 16.30"	77° 50' 39.34"
38		MAN-388	8° 57' 13.89"	77° 47' 52.29"
39		MAN-146	8° 59' 53.96"	77° 48' 37.98"
40		MAN-280	8° 58' 57.03"	77° 47' 35.55"
41		MAN-297	9° 02' 00.42"	77° 49' 53.49"
42		MAN-189	9° 01' 11.35"	77° 51' 03.61"
43		MAN-185	9° 00' 54.47"	77° 50' 21.21"
44		MAN-184	9° 00' 32.44"	77° 50' 27.81"
45		MAN-299	9° 01' 52.73"	77° 50' 58.57"
46		MAN-301	8° 58' 19.75"	77° 46' 48.29"
47		MAN 351	9° 02' 01.39"	77° 57' 35.38"
48		MAN 194	9° 01' 59.33"	77° 52' 34.78"
49		MAN 437	9° 02' 18.69"	77° 56' 27.38"
50		MAN 370	9° 04' 14.19"	77° 56' 41.50"
51		MAN 341	9° 01' 20.09"	77° 56' 01.65"
52		MAN 416	8° 58' 30.61"	77° 51' 13.21"
53		MAN 405	8° 59' 22.95"	77° 49' 34.56"
54		MAN-201	8° 58' 59.80"	77° 51' 36.21"
55		MAN-444	8° 56' 44.56"	77° 50' 17.04"
56		MAN 398	8° 56' 30.02"	77° 50' 08.32"
57		MAN-483	8° 59' 28.03"	77° 47' 21.78"
58		MAN-486	8° 59' 54.90"	77° 47' 24.90"
59		MAN-485	8° 59' 42.49"	77° 47' 57.16"
60		MAN-480	8° 58' 09.42"	77° 47' 16.54"
61		MAN-481	8° 58' 25.50"	77° 47' 06.75"
62		MAN-443	9° 01' 12.22"	77° 49' 11.56"
63		MAN 162	9° 00' 41.42"	77° 48' 29.02"
64		MAN-127	9° 01' 34.55"	77° 49' 55.41"
65		MAN 126	9° 01' 48.64"	77° 49' 54.15"
66		MAN-494	9° 02' 02.97"	77° 50' 29.70"
67		MAN-497	9° 01' 01.99"	77° 48' 30.88"
68		MAN-17	8° 50' 24.87"	77° 53' 28.09"
69		MAN-24	8° 49' 27.46"	77° 54' 15.25"
70		MAN-22	8° 50' 35.38"	77° 54' 09.83"
71		MAN-255	8° 47' 46.68"	77° 49' 24.71"
72		MAN-253	8° 47' 11.41"	77° 49' 48.05"
73		MAN-26	8° 48' 49.65"	77° 53' 27.41"
74		MAN-55	8° 51' 19.15"	77° 52' 42.76"
75		MAN-16	8° 50' 33.64"	77° 52' 55.62"
76		MAN-79	8° 50' 21.64"	77° 48' 48.32"
77		MAN-490	8° 49' 58.53"	77° 50' 20.022"
78		MAN-20	8° 48' 56.29"	77° 52' 57.64"
79		MAN-03	8° 46' 42.12"	77° 51' 11.26"

80		MAN-04	8° 46' 20.45"	77° 51' 21.36"
81		MAN-11	8° 49' 49.58"	77° 52' 29.67"
82		MAN-02	8° 48' 32.40"	77° 50' 59.91"
83		MAN 05	8° 46' 10.74"	77° 50' 53.70"
84		MAN 82	8° 47' 02.26"	77° 51' 32.44"
85		MAN 258	8° 48' 50.75"	77° 48' 59.17"
86		MAN 264	8° 49' 22.98"	77° 51' 50.30"
87		MAN 19	8° 49' 43.94"	77° 53' 13.25"
88		MAN 115	8° 50' 08.55"	77° 54' 35.45"
89		MAN 12	8° 49' 25.81"	77° 52' 28.67"
90		MAN 13	8° 49' 05.67"	77° 52' 16.91"
91		MAN 18	8° 49' 07.25"	77° 54' 00.83"
92		MAN 10	8° 50' 14.01"	77° 54' 05.67"
93		MAN 15	8° 50' 54.31"	77° 53' 19.72"
94		MAN 498	8° 45' 50.84"	77° 50' 44.16"
95		MAN 499	8° 46' 23.84"	77° 51' 59.74"
96		MAN-158	8° 59' 34.14"	77° 49' 09.56"
97		MAN-125	8° 57' 53.07"	77° 46' 41.11"
98		MAN-136	9° 00' 17.13"	77° 47' 53.96"
99		MAN-491	9° 02' 30.79"	77° 53' 51.52"
100		MAN-492	9° 02' 19.48"	77° 53' 09.58"
101		MAN-488	9° 00' 24.42"	77° 51' 32.88"
102		MAN-493	9° 00' 52.89"	77° 50' 57.94"
103		MAN-355	8° 58' 03.78"	77° 48' 57.02"
104		MAN-500	8° 54' 35.50"	77° 49' 39.38"
105		MAN-501	8° 54' 09.24"	77° 50' 10.31"

The project locations have been shown in the map below



1.10 Conditions Prior to Project Initiation

The project is a Greenfield wind power project and does not involve generation of GHG emissions for the purpose of their subsequent reduction, removal or destruction. Thus prior to project initiation, there was nothing at site.

In absence of project activity, the continuation of current practise i.e. generation of equivalent amount electricity would have been generated from grid connected fossil fuel dominated power plants. Thus for project activity baseline scenario is 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.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project has received all the necessary approvals for development and commissioning for the proposed 250 MW wind project from the respective State Nodal Agencies and is in compliance to the local laws and regulations.

The Project has received necessary approvals for development and commissioning for wind power project from the state Nodal agencies and is in compliance to the local laws and regulations.

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

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

As per Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India), final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (February 29, 2016).

The newly introduced White category of industries pertains to those industrial sectors which are practically non-polluting such as Biscuit trays etc. from rolled PVC sheet (using automatic vacuum forming machines), Cotton and woollen hosiers making (Dry process only without any dyeing/washing operation), Electric lamp (bulb) and CFL manufacturing by assembling only, Scientific and mathematical instrument manufacturing, Solar power generation through photovoltaic cell, wind power and mini hydel power (less than 25 MW).

There shall be no necessity of obtaining the Consent to Operate" for White category of industries. An intimation to concerned SPCB / PCC shall suffice.

Since project activity falls under white category and the non-polluting nature of project fulfils the compliance to the local laws and regulations.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

As per VCS Program Definitions version 3.7, the project ownership is the legal right to control and operate the project activities.

Mytrah Vayu (Sabarmati) Pvt. Ltd. is the project proponent (PP) of project activity and they have the legal right to control and operate the project activities.

The project ownership has been demonstrated through below supporting documents:

1. **Commissioning certificates** – The letter from respective State Nodal Agency to the M/s Mytrah Vayu (Sabarmati) Pvt. Ltd. for registration of commissioning of generation facility indicates that PP have the legal right to control and operate the project activities.

2. **Contract with EPC contractor** – The purchase order on the name of Mytrah Vayu (Sabarmati) Pvt. indicates that PP has the legal right to control and operate the project activities.

Based on above evidences, the project ownership is demonstrated and **Mytrah Vayu (Sabarmati) Pvt. Ltd.** is authorised for the project activity.

1.12.2 Emissions Trading Programs and Other Binding Limits

Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits.

1.12.3 Other Forms of Environmental Credit

The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

However it can be crosschecked that PP is not claiming REC benefits, the same can be verified with the REC accreditation body of India⁴.

1.12.4 Participation under Other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs. The project is seeking registration only in VCS program.

1.12.5 Projects Rejected by Other GHG Programs

The Project is not rejected by other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

This is not a grouped project activity. Thus, this section is not applicable for this project.

Leakage Management

Not applicable to the project activity.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

⁴ https://recregistryindia.nic.in/index.php/general/publics/accredited_regens_pdf

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

Social well-being: The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

Economic well-being: The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity will also help to reduce the demand supply gap in the state.

The project activity will generate power using zero emissions wind energy based power generation which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities.

Technological well-being: The successful operation of project activity would lead to promotion of wind power generation and would encourage other entrepreneurs to participate in similar projects

Environmental well-being: Wind being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in avoiding significant amount of GHG emissions.

Further Information

Not Applicable

2 APPLICATION OF METHODOLOGY**2.1 Title and Reference of Methodology**

Title : Grid-connected electricity generation from renewable sources
Reference : The project activity meets the eligibility criteria of large scale project as it is more than 15 MW
Methodology : ACM0002: Grid-connected electricity generation from renewable sources - Version 19.0⁵
Type I : Energy industries (renewable / non-renewable sources)
Category : Approved Consolidated Methodology (ACM0002)

Tools referred with above methodology and applicable for project activity are:

- Tool to calculate the emission factor for an electricity system⁶ - Version 07.0 (EB 100, Annex 04)

⁵ <https://cdm.unfccc.int/UserManagement/FileStorage/58IAGB7SZUDEO2VN6LYM30K41HFPRQ>

⁶ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v7.0.pdf>

- Methodological Tool- Tool for the demonstration and assessment of additionality⁷ - Version 07.0.0 (EB 70, Annex 08)

2.2 Applicability of Methodology

The project activity involves generation of grid connected electricity from renewable wind energy and wind energy. The project activity has a proposed capacity of 250 MW which will qualify for a large scale CDM project activity under Type-I of the large scale methodologies. The project status is corresponding to the methodology ACM0002 version 19.0 and applicability of methodology is discussed below.

⁷ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

Applicability Criterion	Project Case
1. This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s)	The project activity is a Renewable Energy Project i.e. Wind Power Project which falls under applicability criteria option 1 (a) i.e., "Install a Greenfield power plant". Hence the project activity meets the given applicability criterion.
2. The methodology is applicable under the following conditions: (a) 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; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, 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.	The option (a) of applicability criteria 2 is applicable as project is renewable energy wind power plant/unit.
3. In case of hydro power plants, one of the following conditions shall apply:⁸ (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) 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/m²; or (c) The project activity results in new single or multiple reservoirs and the power density,	The project is installation of new wind based electricity generation plants (not a hydro power plant). Hence this criteria is not applicable.

⁸ [Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the volume of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.](#)

calculated using equation (3), is greater than 4 W/m^2; or (d) 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: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
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4. 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 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.	The project is wind power project and thus the criterion is not applicable to this project activity.
5. The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	(a) The project activity is Greenfield and there is no switching of fossil fuel to renewable energy. Hence the criteria is not applicable to the project activity (b) The project is not a biomass fired power plant. Hence the criteria is not applicable to the project activity.
6. 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".	Not applicable, the wind project is a Green field project activity and this project is not the enhancement or up gradation project.

7. In addition, the applicability conditions included in the tools referred to below apply. ⁹	Please refer tables below.
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Tool to calculate the emission factor for an electricity system¹⁰ - Version 07.0 (EB 100, Annex 04)

Applicability Criterion	Project Case
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).	The project is a grid connected Greenfield wind power project and thus the tool is applicable.
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, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, 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.	Steps involved in calculation of Emission Factor is included in section 3.1 of the PD as per the requirement of the tool
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.	Project is located in non-Annex I country and hence the tool is applicable
Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero.	The project is a wind power project and there is no involvement of biofuels.

Applicability Criteria has been demonstrated in section on additionality below.

The project activity qualifies as Type I during every year of the crediting period in accordance with applicable provisions for project activity eligibility as discussed above. Also the total installed capacity of project activity is 250 MW which is applicable as per large scale project activities methodology ACM0002: Grid-connected electricity generation from renewable sources Version 19.0. The project capacity will be always remain the same and hence the project activity will always be large scale project activities throughout the crediting period and thereafter.

⁹ [The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants; does not apply to this methodology, as this methodology only refers to some steps of this tool.](#)

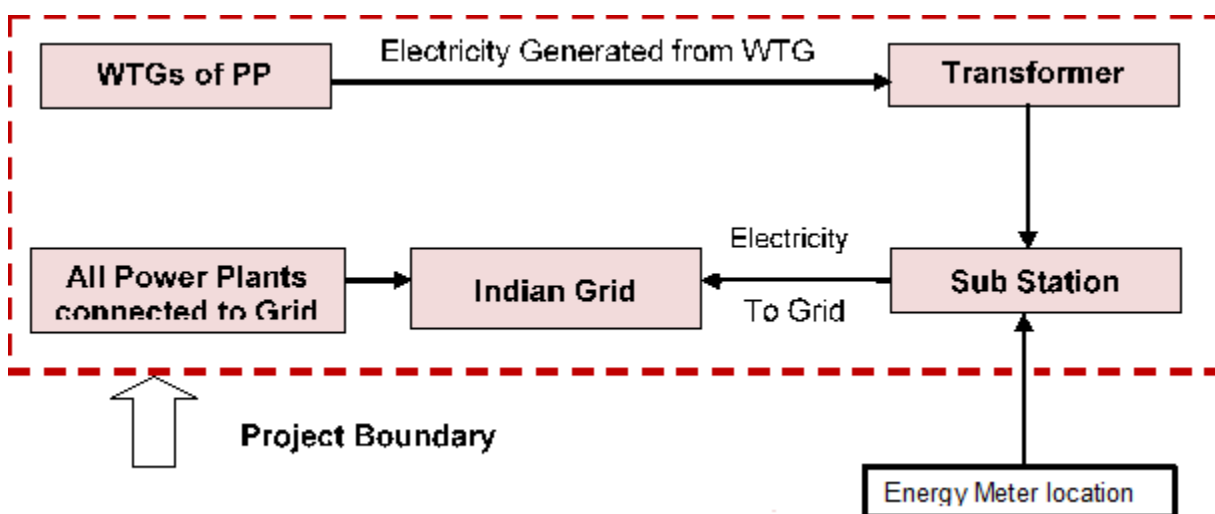
¹⁰ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

2.3 Project Boundary

As per ACM0002 version 19.0- “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”.

Project Boundary for the Wind Project

The project boundary includes the WTGs of the project, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Indian grid. Therefore the entire Indian grid and all connected power plants have been considered in the project boundary for the proposed VCS project activity.



	Source	Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	No	No other emissions are emitted
Project	Greenfield Wind Power Project Activity.	CO ₂	No	No CO ₂ emissions are emitted from the project
		CH ₄	No	Project activity does not emit CH ₄
		N ₂ O	No	Project activity does not emit N ₂ O
		Other	No	Project activity does not emit other forms of GHG emissions

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 per ACM0002 version 19.0; “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 75%) and build margin (BM) (having weightage 25%). 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
$EF_{grid,CM,y}$	0.9368 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 14.0, December 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9610 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2015-16, 2016-17, 2017-18) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 14.0, December 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8644 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 14.0, December 2018 published by Central Electricity Authority (CEA), Government of India

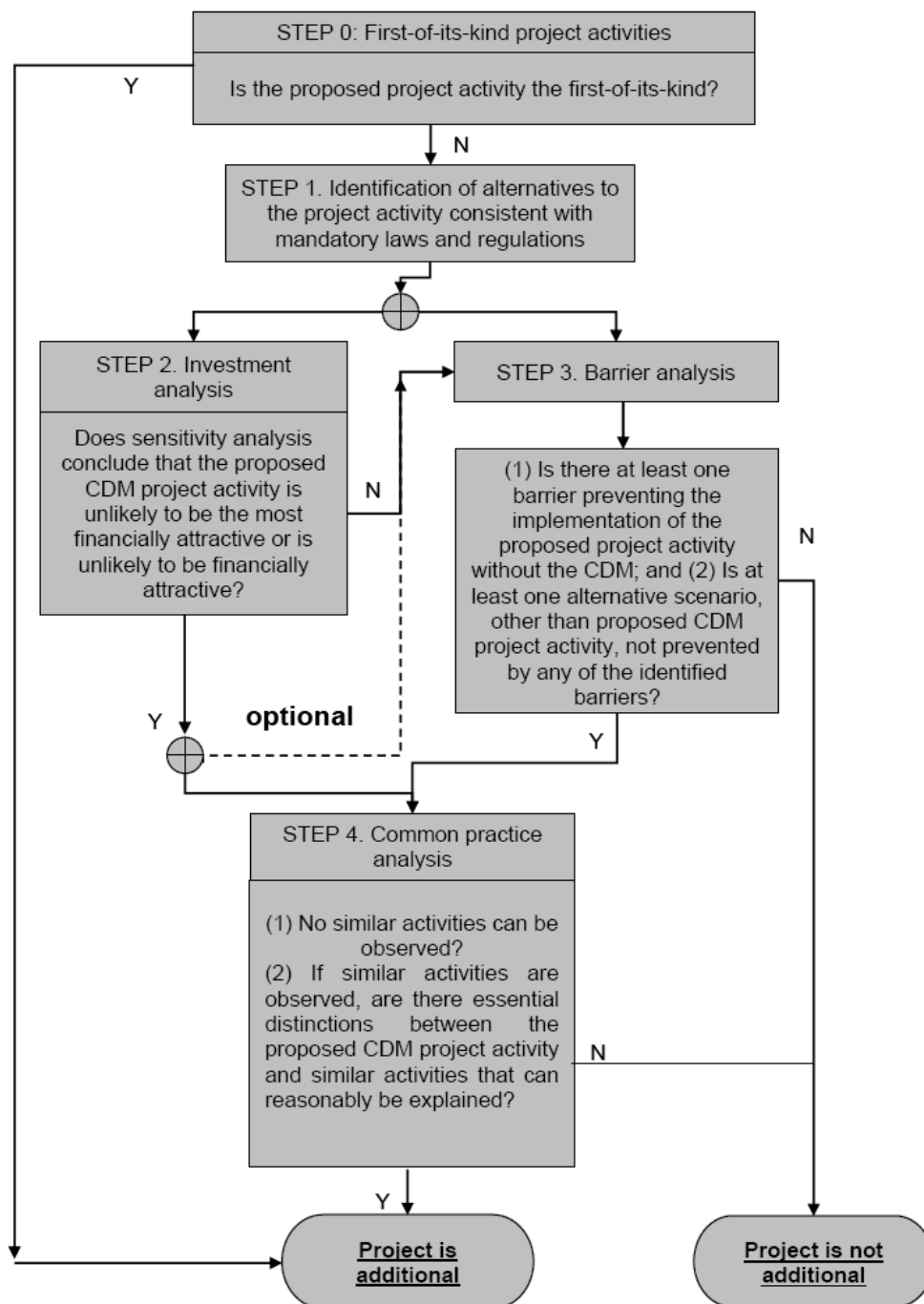
2.5 Additionality

The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology or standardized baseline.

Specify the methodology or standardized baseline that establish automatic additionality for the proposed project activity (including the version number and the specific paragraph, if applicable).	NA
Describe how the proposed project activity meets the criteria for automatic additionality in the relevant methodology or standardized baselines.	NA

The present VCS project generates power using wind energy which is a renewable, zero emission source of energy. Baseline considerations for the project are based on approved consolidated baseline methodology ACM0002 (Version 19.0). The methodology requires the project investor to determine the additionality based on “Methodological Tool- Tool for the demonstration and

assessment of additionality”, Version 7.0.0. The step-wise approach to establish additionality of the project activity has been followed, details of which are provided in the following paragraphs:



In line with VCS Standard version 3.7, 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.

Thus though two alternatives are mentioned above as per step of additionality tool, the first alternative is not possible as project activity is not viable without carbon credit benefits and second alternative is the baseline scenario for the project activity as per methodology as mentioned in section 2.4 of joint VCS PD & MR.

It is to be noted that being the green field project activity, “the baseline scenario is 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”.

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. The project activity comes under white category as mentioned in section 1.11 of this document, thus there shall be no necessity of obtaining the Consent to Operate” for White category of industries. Since project activity falls under white category and the non-polluting nature of project fulfils the compliance to the local laws and regulations (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 renewable 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.

The both alternatives are in compliance with laws and regulations required. There is no any mandatory requirement to implement the project activity.

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. Since wind projects are categorised as white category, no any consent to operate required from pollution control board.

However, Alternative 2 has been selected as the appropriate baseline alternative for this project activity in line with methodology.

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

The Project activity envisages to export the power to Indian grid and the revenues from the sale would be generated in accordance with the terms and tariffs established in the Power Purchase Agreement (PPA). Thus, simple cost analysis (Option I) cannot be used as the analysis method as the sale of the units of generated electricity shall result in a revenue stream during the operations of the Project activity.

In the absence of the project activity grid electricity would have been the obvious choice for the Project which requires no investment. Hence investment comparison analysis (Option II) is also not appropriate for the project activity.

After eliminating Option I and Option II, the use of Benchmark analysis (Option III) is the method of analysis that has been selected as the most suitable method. 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 post tax equity IRR.

Choice of Benchmark:

As per Investment Analysis tool, Required/expected returns on equity are appropriate benchmarks for equity IRR. The Equity IRR is considered as the financial indicator and the benchmarks used is cost of equity. Hence the benchmarks used are applicable to the project activity and the type of IRR calculation presented

At the time of decision made of project activity, Version 07 of methodological tool "Investment Analysis" (version 7 & 8) were the latest available tools to the PP at the time of decision making. However, the request for registration for Version 7 could be submitted till 31/10/2017 and for version 8 the registration request could be submitted till 28/11/2018. Hence, PP has used Methodological Tool for Investment Analysis version 09¹¹ (EB 101, Annex 11). Upon comparison of the detail of version 07.0, 08.0 and version 09.0 of the methodological tools it was observed that, there is no major difference in the versions except for the change of default value for benchmark calculation. The default value as mentioned in version 07 was 11.06% for the group 1 projects in India, in the version 08 it was 10.73% for group 1 project in India and Value as mentioned in version 09 is 9.79% for group 1 project in India which is clearly more conservative than version 07 & 08 values. Hence, version 09 is used which is appropriate and more conservative for benchmark calculation and PP has considered the same tool for default value of return on equity for the respective SPVs. The default value of Return on Equity for Group-1 projects in India is 9.79 % as per EB 101, Annex 11.

¹¹ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf>

As per paragraph 7 of Appendix A of the above mentioned document, “In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below 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”. For the concerned project activity, the inflation rate has been considered from the inflation forecast published by the Reserve Bank of India.

Default Value Benchmark:

As per para 17 of EB 101, Annex 11 the cost of equity is determined by selecting the values provided in the Appendix, i.e. Default values for cost of equity (expected return on equity) is presented below:

Appendix in EB 101, Annex 11 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **9.79%**

The Required return on equity (benchmark) was computed in the following manner:

$$\text{Nominal Benchmark}^{12} = \{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$$

Where:

- Default value for Real Benchmark = 9.79% (as per Appendix of EB 101, Annex 11)
- Inflation Rate forecast for by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India.

Benchmark estimation:

Appendix in EB 101, Annex 11 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **9.79%**¹³

Inflation Forecast for India as per RBI website¹⁴:

Since RBI publishes the inflation forecast for 5 years and 10 years, PP has considered the maximum 10 year inflation considering the renewable crediting period of total 30 years.

Benchmark Calculations	Value	Sources Link	Document Date	Decision making Date
Default Value for India as per UNFCCC guidelines	9.79%	EB 101 Annex 11	29-11-2018	25-05-2017
Inflation forecast (WPI Mean) as per RBI for 10yrs	4.00%	https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=17458	06-04-2017	
Benchmark (with 10yrs Forecast)	14.18%	Calculated		

¹² As per Fisher Equation, https://en.wikipedia.org/wiki/Fisher_equation

¹³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf>

¹⁴ <https://www.rbi.org.in/Scripts/PublicationsView.aspx?id=17458>

Thus benchmark of **14.18 %** has been selected for this project activity.

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):

The Post tax Equity IRR is evaluated for the entire lifetime of the project activity, i.e. 25 years. It is calculated based on the cash outflows from and cash inflows into the project activity.

Key Assumptions supporting financial projections are provided in excel spreadsheet to the DOE and the same has been summarized in Appendix-1 of this report.

Based on result of IRR excel spreadsheets, equity IRR is less than Benchmark.

This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark). Thus it can be easily concluded that project activity is additional & is not business as usual scenario.

Sub-step 2d: Sensitivity Analysis

Addressing Guidance of EB 101, Annex 11, following factors has been subjected to sensitivity analysis:

1. PLF
2. O&M Cost
3. Project Cost
4. Tariff

The rationale of sensitivity is, "The ultimate objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to provide a cross-check on the suitability of the assumptions used in the development of the investment analysis."

The results of sensitivity analysis show that even with a variation of +10% & -10% in project cost, O&M cost, PLF and Tariff Rate Equity IRR is significantly lower than the benchmark. And it is evident from the results given above; the project remains additional even under the most favourable conditions.

Probability to breach the benchmark:
Sensitivity Parameter 1 : PLF
PLF considered in financials for is as per Third Party DPR in line with "Guidelines for the reporting and validation of Plant load factors" stated in EB48 Annex11 option 3(a).
Hence, variation in PLF of more than 10% is unlikely to happen as the PLF has been reported as per the Third Party Report based on long term data.
Sensitivity Parameter 2 : O&M
The sensitivity analysis reveals that O&M will breach the benchmark at negative values and is hypothetical case. Since the O&M cost is subject to escalation (as evidence by the O&M agreement) and also subject to inflationary pressure, any reduction in the O&M costs is highly unlikely. Hence, the reduction in the O&M cost is highly unlikely.
Sensitivity Parameter 3 : Project Cost
Project Cost for financial analysis is considered from DPR of the project activity, being available at the time of investment making decision to go ahead with the project activity. The actual project cost is lower than the DPR cost. Since the Purchase Order cost is firm, there is no possibility of

project cost going below this level. However, Sensitivity is carried out for threshold level below which benchmark is not breached.

Sensitivity Parameter 4 : Tariff Rate
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The tariff is determined by DPR and SEB Tariff order which is fixed for entire lifetime of the project activity. Hence, there is no probability to get variation for the same. However, Sensitivity is carried out for +/-10% even then the benchmark is not breached.
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Outcome of Step 2:

This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark Equity IRR) for any of the investor. Thus it can be easily concluded that project activity is additional & is not business as usual scenario.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice analysis

For the concerned project activity, Common Practice Analysis has been carried out for 250 MW capacity Wind Power Project at Tamil Nadu which is developed by **Mytrah Vayu (Sabarmati) Pvt. Ltd.**

Stepwise approach for common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB84, Annex 7:

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%	375	MW
Capacity of the proposed project activity	250	MW
-50%	125	MW

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

- The projects are located in the applicable geographical area;
- The projects apply the same measure as the proposed project activity;
- 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;
- 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;
- The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
- 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). As the project is located in Tamil Nadu state of India, therefore, projects in the geographical area of Tamil Nadu has been chosen for analysis. The project activity involves generation of electricity from wind energy. The project activity is located in the state of Tamil Nadu in India and the policy applicable for the wind projects is regulated by respective state policy. The policies/tariff for each state is regulated by State Electricity Regulatory Commissions of respective states and they differ for respective states. The project implemented in Tamil Nadu state is claimed as different since the policies and regulations differ in each state. Each state has different policies regarding renewable energy, hence Tamil Nadu state is considered as geographical region for common practise 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, projects applying same measure (b) 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 125 MW to 375 MW.
- (f). The start date of the concerned project activity is 30-January-2019. Therefore projects, which have started commercial operation before 30-January-2019, have been considered for analysis.

Number of Similar projects, which fulfil above-mentioned conditions, have been identified from the list of State wise wind power projects from WIND POWER DIRECTORY 2017.

Hence, the Numbers of Similar projects identified, which fulfil above-mentioned conditioned are
 $N_{\text{wind}} = 3$

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} .

CDM project activities, which have got registered or are under validation have been excluded in this step. The list of the power plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects.

$N_{\text{all}} = 0$

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} .

As per the tool on Common Practice, the project activities have been separated from the different technologies on the basis two criteria:

1. Size of Installation – Since project activity is large scale project, small and micro scale projects are considered as different technology project. Based on this criteria, there are no any different technology project out of similar identified projects.

2. Investment climate on the date of the investment decision – For proposed project activity, there are no any different technology project considered out of similar identified projects.

Hence, projects where either of the conditions is satisfied those projects are counted for calculating N_{diff} projects.

$N_{\text{diff}} = 0$

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.

$$\begin{aligned} \text{Calculate } F &= 1 - N_{diff}/N_{all} \\ F &= 1 - (0/2) = 1 \end{aligned}$$

As per methodological tool “common practise” version 03.1, the proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all} - N_{diff}$ is greater than 3.

Thus if both conditions are fulfilled, then project activity will be a common practise otherwise, the project activity is treated as not a common practise.

Outcome of Common Practise analysis:

As,

- i. $F = 1$; is greater than 0.2
- ii. $N_{all} - N_{diff} = 2$; is not greater than 3

Thus, the proposed project activity is not a “common practice” within a sector in the applicable geographical area.

The above discussions show that wind power development is not a common practice and the project activity is not financially attractive; hence the project activity is additional.

2.6 Methodology Deviations

There is no methodology deviation.

3 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 version 19.0 the Baseline emissions include only CO₂ 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:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (\text{para 42, ACM0002 V19})$$

Being as a green field plant, $EG_{PJ,y} = EG_{facility,y}$ (para 44, ACM0002 V19)

Therefore,

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

Where:

BE_y = Baseline emissions in year y (tCO₂/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 CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ 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” (tCO₂/MWh)

As per methodology, combined grid emission factor as per the “Tool to calculate the emission factor for an electricity system” version 07 is calculated as below.

CO₂ Baseline Database for the Indian Power Sector, Version 14¹⁵ published in December 2018 by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 07.0, EB 100, Annex 4, 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 systems

As described in tool “For determining the electricity emission factors, identify the relevant project 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.

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: Geographical Scope of Indian Electricity Grid

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

¹⁵ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

Uttar Pradesh				
Uttarakhand				

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

Project participants may choose 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)

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 and Dispatch data analysis OM is not possible due to lack of availability of data to project developers. The choice of other two options for calculating operating margin emission factor depends on 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)

	2013-14	2014-15	2015-16	2016-17	2017-18
India	18.6%	16.8%	15.1%	14.6%	14.3%

Data Source: Central Electricity Authority (CEA) database Version 14, December'2018¹⁶

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 OM method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

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:

- (a) **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.

¹⁶ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

OR

- (b) **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 calculation of Simple OM emission factor using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the 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 crediting period.

Step 4: Calculate the operating margin emission factor ($EF_{grid,OMSimple,y}$) according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage

Net Generation in Operating Margin (GWh) (incl. Imports)			
	2015-16	2016-17	2017-18
INDIAN Grid	871,753	916,278	960,693

Simple Operating Margin (tCO ₂ /MWh) (incl. Imports)			
	2015-16	2016-17	2017-18
INDIAN Grid	0.9655	0.9636	0.9543

Weighted Generation Operating Margin	
INDIAN Grid	0.9610

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)	
	2017-18
INDIAN Grid	0.8644

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 07.0.0, EB 100, Annex 4, 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)

$$\text{Baseline Emission factor (INDIAN Grid)} = 0.75 * 0.9610 + 0.25 * 0.8644 \\ = 0.9368 \text{ tCO}_2/\text{MWh}$$

The baseline emission factor is ex-ante parameter and will remain constant throughout the crediting period.

$$BE_y = 540,531.5 \times 0.9368 = 506,370 \text{ tCO}_2 \text{ e/year}$$

3.2 Project Emissions

As per the approved consolidated Methodology ACM0002 (Version 19.0) para 36: "For most renewable energy power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y = Project emissions in year y (t CO₂e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO₂/yr)

$PE_{GP,y}$ = Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO₂e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO₂e/yr)

As the project activity involves installation of Wind Power plant and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{FF,y}$, $PE_{GP,y}$, $PE_{HP,y}$ are equal to zero and thus, $PE_y = 0$.

3.3 Leakage

No other leakage emissions are considered as per applied methodology ACM 0002 version 19.

3.4 Estimated Net GHG Emission Reductions and Removals

Reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year y (t CO ₂ e/yr)
BE_y	=	Baseline emissions in year y (t CO ₂ /yr)
PE_y	=	Project emissions in year y (t CO ₂ e/yr)

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

$$ER_y = BE_y - PE_y$$

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 2019	512,751	0	0	512,751
Year 2020	557,007	0	0	557,007
Year 2021	557,007	0	0	557,007
Year 2022	557,007	0	0	557,007
Year 2023	557,007	0	0	557,007
Year 2024	557,007	0	0	557,007
Year 2025	557,007	0	0	557,007
Year 2026	557,007	0	0	557,007
Year 2027	557,007	0	0	557,007
Year 2028	557,007	0	0	557,007
Year 2029	44,255	0	0	44,255
Total	5,570,069	0	0	5,570,069

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh
Description	Operating Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 14, December 2018 ¹⁷
Value applied	0.9610

¹⁷ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

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 07” as 3-year generation weighted average using data for the years 2015-2016, 2016-2017 & 2017-2018. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 14, 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 crediting period.

Data / Parameter	EF _{grid,BM,y}
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 14, December 2018 ¹⁷
Value applied	0.8644
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 07” as per the latest data available for the most recent year 2018. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” version 14, 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 crediting period.

Data / Parameter	EF _{grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 14, December 2018 ¹⁷
Value applied	0.9368
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} \cdot W_{OM} + EF_{grid,BM,y} \cdot W_{BM}$ Where: EF_{grid,BM,y}= Build margin CO₂ emission factor in year y (tCO₂/MWh) EF_{grid,OM,y}= Operating margin CO₂ emission factor in year y (tCO₂/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25% Calculated as per “Tool to calculate the emission factor for an electricity system, version 07.0.0”. The data is obtained from “CO₂ Baseline Database for Indian Power Sector” Version 14, December

	2018, 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 crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project (Wind) plant/unit to the grid during the monitoring period
Source of data	Deviation Settlement Account statement issued by SRPC
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 Class of meter: 0.2s. Calibration frequency: One in five years¹⁸ Electricity exported by the project to the grid at project site switch yard is the actual generation recorded and monitored by the metering system installed at the project site switch yard. The metering system comprises of three individual special energy meters (SEMs) (acts as standby meters) installed at the power station, for each generating units. These are connected via four transmission lines of 220 kV, each having its own SEM meter (main meter and check meter). In case, anyone transmission line in not in service than complete load will be shifted to other transmission line which is in operation. The energy meters are special energy meters which are installed and sealed by the Power Grid Corporation of India Limited in the presence of the representatives of the power producer. The check meter shall be used during the period the main metering system is not in service. Further in case of failure of both main meter and check meter, sum of the net electricity generation recorded by three individual special energy meters (SEMs) and individual auxiliary meters shall be used for accounting and billing purpose. This can be cross-checked from the monthly Invoices raised by the PP which is the scheduled power being feed into the grid. The crosscheck mechanism can be referred from the actual ER sheet.
Frequency of monitoring/recording	Continuous monitoring and monthly recording

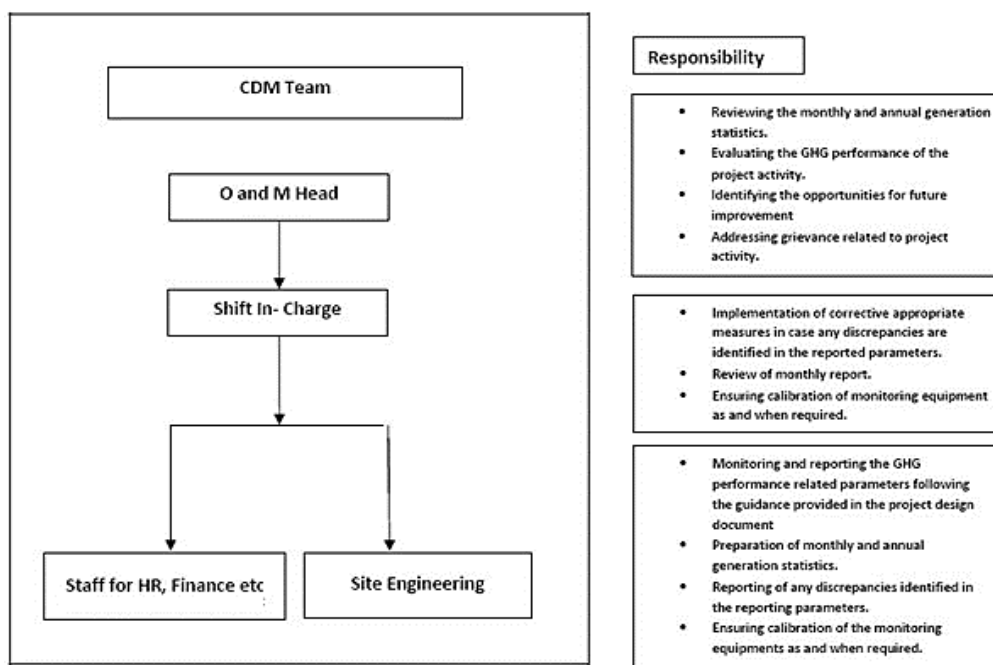
¹⁸ http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

Value applied:	540,531.533
Monitoring equipment	Special Energy Meters (SEMs) of 0.2s accuracy class
QA/QC procedures applied	Energy meters will be calibrated once in a five year and faulty meters will be duly replaced immediately. For detailed schedule of energy meters used in project activity please refer Annexure 2. This data may be cross checked with the Monthly Generation Reports
Purpose of data	Calculation of Baseline emissions
Calculation method	N/A
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

4.3 Monitoring Plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for wind energy power project. The monitoring plan, which will be implemented by the project participant 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 rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:



Data Measurement

The electricity supplied or transmitted is sourced from “Deviation Settlement Account document” and is cross checked from “Monthly Generation Reports”. “Deviation Settlement Account document” which are publically available documents issued by the ‘Southern Regional Power Committee¹⁹. Readings of meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement, invoices will be raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of VERs for the project activity whichever occurs later.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff will be trained. The plant helpers will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

5 SAFEGUARDS

5.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the WTGs, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that wind project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same²⁰.

Thus there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

5.2 Environmental Impact

The guidelines on Environmental Impact Assessment have been published by Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India (GOI) under

¹⁹ <http://www.srpc.kar.nic.in/html/index.html>

²⁰ <http://mnre.gov.in/file-manager/UserFiles/report-on-developmental-impacts-of-RE.pdf>

Environmental Impact Assessment notification 14/09/2006²¹. Further amendments to the notification have been done on 14/07/2018²². As per the notification:

“The following projects or activities shall require prior environmental clearance from the concerned regulatory authority, which shall hereinafter referred to be as the Central Government in the Ministry of Environment and Forests for matters falling under Category ‘A’ in the Schedule and at State level the State Environment Impact Assessment Authority (SEIAA) for matters falling under Category ‘B’ in the said Schedule, before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity:

- (i) All new projects or activities listed in the Schedule to this notification;
- (ii) Expansion and modernization of existing projects or activities listed in the Schedule to this notification with addition of capacity beyond the limits specified for the concerned sector, that is, projects or activities which cross the threshold limits given in the Schedule, after expansion or modernization;
- (iii) Any change in product - mix in an existing manufacturing unit included in Schedule beyond the specified range.”

As the wind power generation projects are not listed in any of the categories of the schedule, So, the project is considered environmentally safe and as per Host party- India no EIA is required.

5.3 Local Stakeholder Consultation

The local stakeholder consultation for the project activity have been carried out. The Local Stakeholder consultation documents have been provided to DOE during validation of project activity.

SPVs Name	Invitation Notice Date	LSHM Meeting Date
Mytrah Vayu (Sabarmati) Pvt. Ltd.	25-07-2017	01-08-2017

Project representatives explained the project benefits and how project would help to fight against climate change and no any negative comments received during the local stakeholder round. The Minutes of meeting with commenting sheet from LSH, invitation letter receipt copy is submitted to the DOE for further check. Few queries raised during local stakeholder consultation are addressed satisfactorily.

Villagers were totally in support for setting up of these kinds of projects in the region. The PP also placed a grievance register onsite in where the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately. Also, regular stakeholder engagement is one the key focus at the site. Some of the pictures of stakeholder consultation are depicted below:

²¹ EIA Notification 2006: <http://envfor.nic.in/legis/eia/so1533.pdf>

²² EIA Notification 2018: <http://www.egcipl.com/Doc/Gazette%20Notification.pdf>



Figure 1. Local Stakeholder Consultation photos

5.4 Public Comments

The Meeting started with opening speech by representative of project participant. He introduced all guests on dais. The representative of project participant explained Technical aspects of project to stakeholders. He also explained about social, environmental & economical benefits of the project. He also elaborated about carbon mechanism & its requirement for the current project. After the detailed discussions, the session was open for questions from stakeholders.

Most of the questions were related to employment opportunities, economic development, benefits from project to villagers and other development activities. The question raised by the villagers are summarised below:

Q: Will there be free supply of power to the local people?

A: The generated power will be fed in the grid. Project promoter can't supply directly power to the local people. They have to get authorized connection from Govt. body. But due to the project activity the supply of power in the area will increase.

Q: Will there be employment generation due to the project activity for youth from the adjoining areas?

A: Responding about the increased possibilities for employment of local youth due to the project activity, it was pointed out that preference would be given for locals in the employment opportunities.

Q: Will it impact the underground water level in the nearby area?

A: No, it will not impact the underground water level of the nearby area.

Also the project was listed for global stakeholder commenting and no comments received during the above period²³.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	EG _{PJ,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project (Wind) plant/unit to the grid
Values applied:	308,956.772
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

6.2 Baseline Emissions

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

Where:

BE_y : Baseline emissions in year y (tCO₂e/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 CO₂ 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" (tCO₂e/MWh)

Parameter	Unit	Value
EG _{PJ,y}	MWh	300734.662
EF _{grid,CM,y}	tCO ₂ e	0.9368
BE _y	=	308956.772* 0.9368
	=	289,425 (Round down value)

6.3 Project Emissions

Not Applicable, since emissions from the project activity is zero as per ACM0002 methodology.

6.4 Leakage

²³ https://www.vcsprojectdatabase.org/#/pipeline_details/PL2020

Not Applicable, since leakage emissions are not to be considered as per ACM0002 methodology.

6.5 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
30/01/19 to 30/11/19	289,425	0	0	289,425
Total	289,425	0	0	289,425

It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 423,131 tCO₂e, whereas actual emission reductions achieved are 289,425 tCO₂e, which is approximately 31.6% lower than the estimated emission reductions. The generation of electricity depends upon many other climatic conditions, and not within the control of the project participant. The lower generation during the current verification period is hence due to certain natural conditions and hence acceptable.

APPENDIX 1: Input Parameters and Assumptions for Additionality Assessment

Assumptions and Values considered for Financial and Sensitivity Analysis of 250 MW Wind Project by Mytrah Vayu (Sabarmati) Pvt. Ltd.

Details of the project		Source
State where the project is situated	Tamil Nadu	As per DPR
Total Capacity (MW)	250.00	As per DPR
Expected Date of Commissioning	1-Feb-19	As per DPR
Life of the plant (Yrs.)	25	TERC order ²⁴
Generation of electricity		
PLF (%)	27.15%	TERC Tariff Order on WIND ENERGY ²⁵
Annual generation (kWh)	594,585,000	Calculated Value
Deartion after 10th year	1.00%	TERC Tariff Order on WIND ENERGY ²⁶
Tariff rate at the decision making (INR/kWh)	3.46	As per DPR dated 23/05/2017
Operation and maintenance cost and Insurance		
O & M Expenses (INR Mn.)	84	As per DPR
O & M free for (Yr.)	2	
Insurance (INR Mn.)	141.75	TERC order ²⁷
Financial parameters		
TOTAL COST (INR Mn.)	18,900.00	As per DPR
Loan Amount (INR Mn.)	15120.00	As Per DPR
Equity Investment (INR Mn.)	3780.00	As Per DPR
Term loan		
Loan Amount (INR Mn.)	15120.00	As Per DPR
Interest rate (%)	13.50%	TERC Tariff Order on WIND ENERGY ²⁸
Loan Tenure (Qtr.)	40	Assumption
Moratorium Period (Qtr.)	-	Assumption
Repayment Period (Qtr.)	40	Calculated Value
Repayment instalments value (INR Mn.)	378	Calculated Value

²⁴ <http://www.tnecr.gov.in/orders/Tariff%20Order%202009/2016/Wind/Wind%20-%203%20of%202016.pdf>

²⁵ <http://www.tnecr.gov.in/orders/Tariff%20Order%202009/2016/Wind/Wind%20-%203%20of%202016.pdf>

²⁶ <http://www.tnecr.gov.in/orders/Tariff%20Order%202009/2016/Wind/Wind%20-%203%20of%202016.pdf>

²⁷ <http://www.tnecr.gov.in/orders/Tariff%20Order%202009/2016/Wind/Wind%20-%203%20of%202016.pdf>

²⁸ <http://www.tnecr.gov.in/orders/Tariff%20Order%202009/2016/Wind/Wind%20-%203%20of%202016.pdf>

1st instalment from (Qtr. end)	31-Dec-18	Considered from the next Quarter End
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Sensitivity Analysis

Variation %	-10%	Normal	10%	Breaching Value
PLF	4.68%	6.67%	8.85%	33.11%
O&M	6.75%	6.67%	6.60%	-1034.11%
Project Cost	9.28%	6.67%	4.92%	-25.47%
Tariff Rate	4.68%	6.67%	8.85%	33.11%

Final Result

Equity IRR without CDM	Benchmark (Equity IRR)
6.67%	14.18%

APPENDIX 2: METER DETAILS

Meter Sl.No.	Make	Class	Initial Meter calibration date	Due date for Calibration	Installed at location
SA0011,SA0012,SA0013,SA0013,SA0014,SA0015,SA0016	Secure	0.2 s	05/02/2016	04/02/2021	230/33 kV Maniyachi Pooling Sub-station.
SA0011,SA0012,SA0013,SA0013SA0014,SA0015,SA0016	Secure	0.2 s	25/10/2018	24/10/2023	230/33 kV Maniyachi Pooling Sub-station.