Component project activity design document form
(Version 10.0)

BASIC INFORMATION	
Title of the CPA	Wind power project at Chikodi, Karnataka
Scale of the CPA	☒ Large-scale ☐ Small-scale
Version number of the CPA-DD	05
Completion date of the CPA-DD	01/12/2021
Title and UNFCCC reference number of the registered CDM PoA	Title: Promotion of renewable energy generation in India Programme of Activities Reference No.: PoA 9416
Title and reference number of the corresponding generic CPA	Title: Wind power project at Chikodi, Karnataka Reference No.: CPA004
Coordinating/managing entity	General Carbon Advisory Services Pvt. Ltd
Host Party	India
Applied methodologies and standardized baselines	ACM0002- Grid-connected electricity generation from renewable sources, version 20[1] Standardized baselines: Not Applicable
Sectoral scopes	Sectoral scope 01: Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	34,465 tCO_2e

[1] https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO

SECTION A. Description of component project activity (CPA)

A.1. Purpose and general description of CPA

The project activity is a 18 MW (2 MW x 9 no. of WTG), Greenfield renewable wind energy projects in Belgaum district in the state of Karnataka. The purpose of the project activity is to generate clean power utilising wind energy and sell it to the Indian grid through a long term Power Purchase Agreement (PPA).

The details of the project activity is provided in the table below

Sr. No.	Location No	Village	Date of Commissioning
1	GCK 01	Karoshi	29/06/2013
2	GCK 02	Karoshi	
3	GCK 03	Karoshi	
4	GCK 04	Karoshi	
5	GCK 05	Karoshi	
6	GCK 06	Karoshi	
7	GCK 07	Karoshi	
8	GCK 08	Karoshi	
9	GCK 09	Karoshi	

Contribution of the project activity to sustainable development:

Ministry of Environment Forest and Climate Change, Government of India has suggested social well-being, economic wellbeing, environmental well-being and technological well-being as the four indicators for sustainable development in the host country approval eligibility criteria for Clean Development Mechanism (CDM) projects.

The project contributes to the general well-being of the region and is in line with the sustainable development policies of Government of India, as described below:

Social well-being:

The project has resulted in the investment in the rural sector of India thereby creating employment opportunities to local population (skilled and unskilled manpower) available in and around project facility for building infrastructure, installation and maintenance and managing the wind farm thus enabling improvement in the quality of life of the people.

Economic well-being:

The land prices in the neighbouring area have gone up thereby benefiting the villagers. It helps to improve the availability of electricity as the electricity generated is fed into the grid thereby curtailing the supply demand gap. This provides new opportunities for industries and economic activities to be setup in the area thereby increasing employment opportunities.

Environmental well-being:

The project activity is a cleaner means for power generation which avoids fossil fuel based thermal power generation. Therefore it positively contributes towards the reduction in demand for India's carbon intensive energy resources thereby conserving the non-renewable natural resources like coal, gas, oil. By substituting and hence decreasing the need for fossil fuel based power generation in the grid, the project activity reduces GHG emissions from the country's electricity sector. Moreover, wind power projects produce no end products in the form of solid and liquid wastes.

Power generation from renewable energy sources in the project activity creates global as well as local environmental benefits.

Technological well-being:

The project activity is an energy diversification measure where renewable energy is harnessed for generation of power in order to meet the increasing energy demand of the state. The associated technology for power generation does not have any associated GHG emission. These turbines deploy the advanced technology for generation as well as for grid interaction. Hence, the project would utilize environmentally safe and sound technologies in wind power sector. Further the project demonstrates harnessing wind potential and encourages others for setting up more such projects in future.

Thus, from the above discussion it is evident that the CPA satisfies the Sustainable Development criteria of the host country.

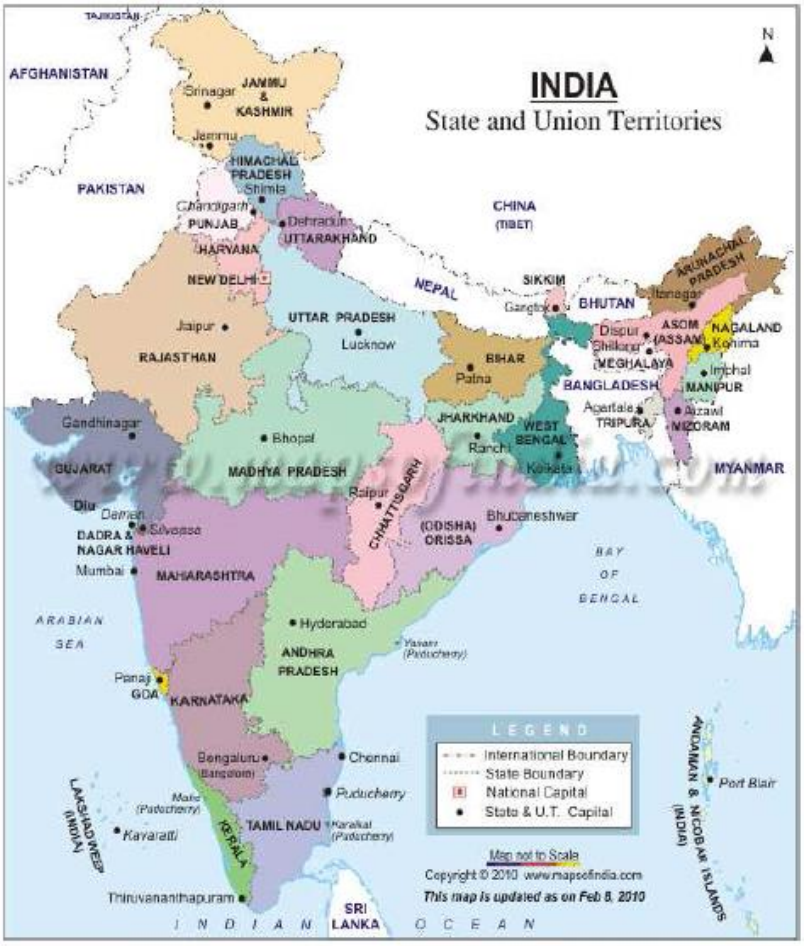
A.2. Location of CPA

The CPA is located in Karoshi Village, Chikodi Taluk, in Belgaum district of Karnataka state, India. Nearest Airport: Belgaum ~ 60 km; Nearest Railway Station: Chikodi Road ~ 20 km;

The unique geographical coordinates of the individual power units in CPA are as follows

Sr. No.	Location No	Village	Geographical Coordinates	
			Latitude	Longitude
1	GCK 01	Karoshi	16° 24' 25.4942" N	74° 37' 15.4589" E
2	GCK 02	Karoshi	16° 24' 42.5602" N	74° 38' 17.8390" E
3	GCK 03	Karoshi	16° 24' 32.2766" N	74° 38' 18.1615" E
4	GCK 04	Karoshi	16° 24' 50.8821" N	74° 39' 9.9196" E
5	GCK 05	Karoshi	16° 24' 40.3394" N	74° 39' 11.0511" E
6	GCK 06	Karoshi	16° 24' 30.6398" N	74° 39' 10.2928" E
7	GCK 07	Karoshi	16° 23' 36.9448" N	74° 37' 1.6622" E
8	GCK 08	Karoshi	16° 24' 21.1210" N	74° 37' 45.0377" E
9	GCK 09	Karoshi	16° 23' 45.1500" N	74° 37' 3.7702" E

Location map of the project activity in India and Belgaum district



A.3. Technologies/measures

The CPA consists of grid connected renewable wind power generation unit using following technology Wind turbine generators based power units

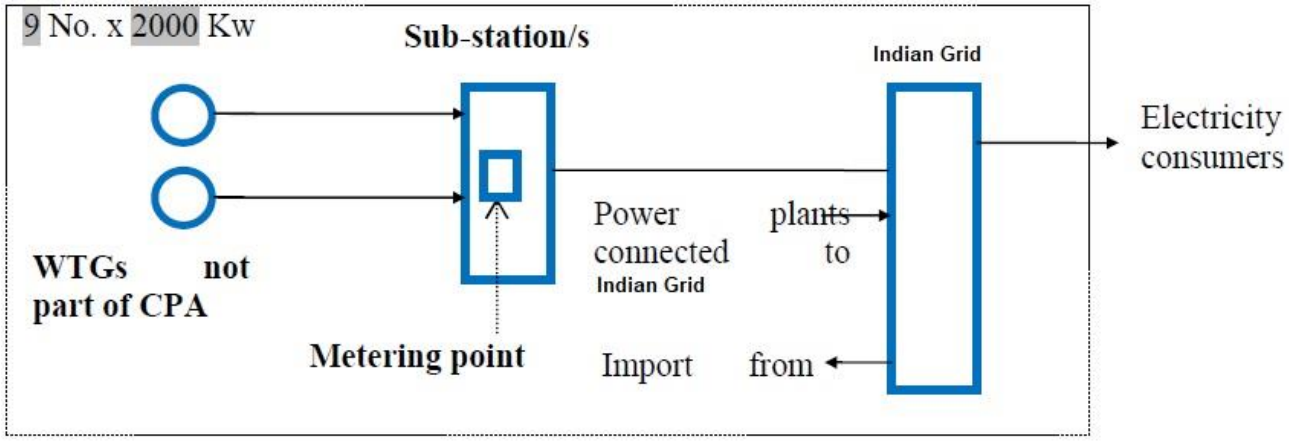
Typical specifications of the wind turbine model/s used – Gamesha Wind Turbines Private Limited make, G97/2000 kW model.

S.N.	Parameter	Specification/ Value with unit
1	Rated power	2000 kW
2	Rotor diameter	97 m
3	Hub height	90 m
4	Turbine type	Direct drive horizontal axis wind turbine with variable rotor speed
5	Power regulation	Independent electromechanical pitch system with for each blade
6	Cut in wind speed	3 m/s
7	Rated wind speed	~ 13 m/s
8	Cut out wind speed	22 m/s
9	Operational range of rot. Speed	9 – 17.3 rpm
10	Orientation	Upwind
11	No. of blades	3
12	Blade material	Glass fibre reinforced plastic
13	Gear box type	1 planetary stage 2 parallel stages
14	Generator type	Synchronous, variable speed
15	Braking	Aerodynamic
16	Output voltage	690 V
17	Tower	90 m
18	Useful life	20 years

Environmentally safe technology:

CPA has implemented Wind power plant which is a renewable energy source of energy and reduces greenhouse gas emissions by displacing fossil fuel based electricity generation. The technology used in the project, which has been used worldwide, is environmentally safe as it is free from any gas and liquid effluents like conventional power generation. The usage of this technology for power generation has no negative impacts on the ecosystem.

For CPAs with common metering point (at substation)



Flow diagram of generic wind CPA including Indian grid

List of metering points: The CPA is implemented at a single wind farm and the individual WTGs have controller meters and also connected to CMS. This data is monitored along with the bulk/ revenue meters at the connected substations and apportioning of import and losses is applied to get net export by the project activity WTGs.

Here 4 WTG's are connected in one feeder and 5 WTG's with other feeder to record energy export and import, both are connected in Karnataka Power Transmission Corporation Limited (KPTCL)

substation through which transmission losses are calculated between substation and feeder meters and based on that net energy export is calculated.

The project activity is estimated to export annually 36,877 MWh to Indian grid.

The above estimated electricity is supplied to the Indian grid and will avoid generation of equivalent electricity in the carbon intensive grid.

The CPA does not involve technology transfer from Annex I countries to the host country

A.4. Coordinating/managing entity

General Carbon Advisory Services Pvt. Ltd

A.5. Parties and CPA implementers

Parties involved	CPA implementers	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
India (host Party)	ReNew Wind Energy (AP) Private Limited (a private entity)	No

A.6. Public funding of CPA

CPA does not involve public funding, diversion of ODA from Annex 1 countries.

Confirmation from CME that the CPA is implemented by CPA implementer by equity and debt funding and no public funding / ODA from Annex 1 countries is involved.

A.7. History of CPA

CME Confirm that:

The CPA is neither registered as a CDM project activity nor included in another registered CDM PoA;

The CPA is not a project activity that has been deregistered.

A.8. Debundling

Not applicable as project activity is a large-scale CPA.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

The CPA involves renewable electricity generation projects connected to grid. Thus, applicable methodology is
ACM0002 “Grid-connected electricity generation from renewable sources” Version 20 (EB 105)[2]

Standardized baselines: Not Applicable

This methodology also refers to the latest approved versions of the following tools:

Tool to calculate the emission factor for an electricity system, version 07[3]

[2] https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO

Tool for the demonstration and assessment of additionality, version 07[4]
Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 03[5]
Combined tool to identify the baseline scenario and demonstrate additionality, version 07[6]

Each Large Scale CPA under PoA will meet the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 20.0, Sectoral Scope 1, EB 105 as described below

Applicability	Project activity vis-à-vis applicability Conditions
This methodology is applicable to grid-connected renewable energy 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 CPA 04 under PoA is installation of a new grid connected renewable energy power plant (Wind power) 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 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 CPA 04 under PoA will be an installation of a new grid connected renewable energy power plant (wind power) and hence this first condition is met. The CPA 04 under PoA does not involve any capacity additions, retrofits or replacements and therefore this second condition is not applicable.
In case of hydro power plants, one of the following conditions shall apply:[7]	The CPA 04 under PoA is installation of new wind based electricity generation plants (not

[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf
[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v7.0.pdf

Applicability	Project activity vis-à-vis applicability Conditions
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/m^2; or c) 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; 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.	a hydro power plant). Hence, this criteria is not applicable.
In the case of integrated hydro power projects, project proponent shall: a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of	The CPA 04 under PoA is a grid connected renewable energy project (Wind power). This condition is applicable only for hydro power plants and not applicable for wind power projects. Hence, this criteria is not applicable.

[7] 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.

Applicability	Project activity vis-à-vis applicability Conditions
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 of five years prior to the implementation of the CDM project activity.	
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.	The CPA 04 under PoA will be installation of a new grid connected renewable energy project (wind power) and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the PoA. This PoA 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 CPA 04 under PoA will be a new grid connected renewable energy plant (wind power) 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	Since CPA 04 under PoA activity is grid connected (wind power), this condition is applicable and the emission factor has been calculated accordingly.

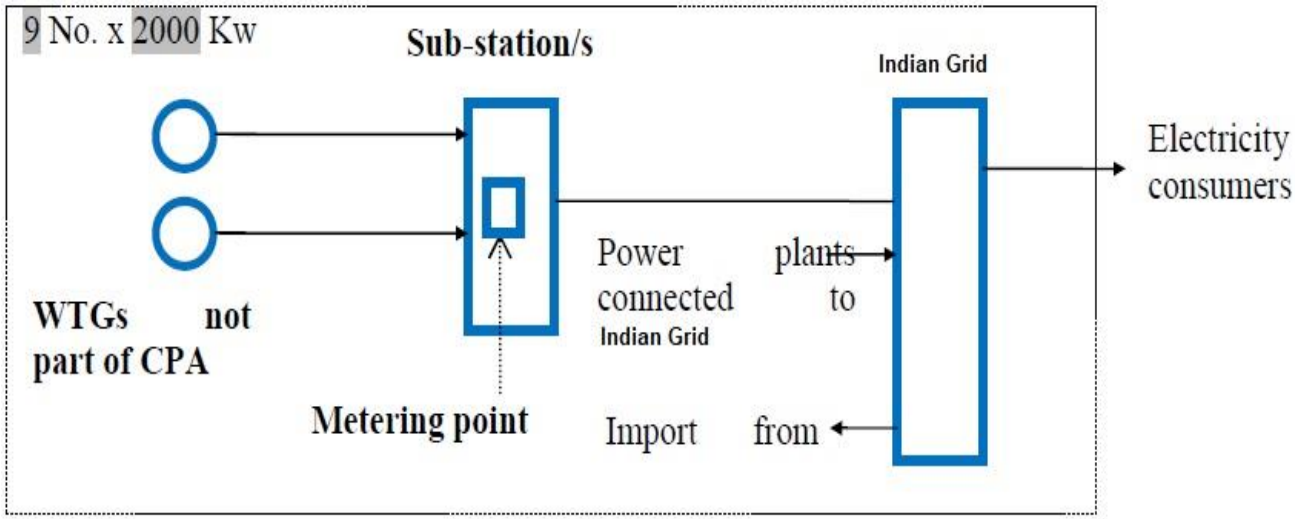
Applicability	Project activity vis-à-vis applicability Conditions
total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity 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.	
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.	CPA 04 under PoA is 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 CO_2 emission factor of biofuels is zero.	Each CPA under PoA is grid connected renewable energy project (wind power) and CO_2 emission factor is not considered for biofuels.

B.2. Project boundary, sources and greenhouse gases (GHGs)

Project boundary has ascertained using para 20 of ACM0002 (Version 20.0, EB 105, Annex 3) - "The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to".

Hence the both the project boundary includes the Wind Power Project activity, sub-station, grid and all power plants connected to grid. The project activity will evacuate power to the Indian grid.

For CPAs with common metering point (at substation)



Schematic of the project boundary

	Source	GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Main emission source
		N_2O	No	Main emission source
		---	---	---
Project activity	Wind energy project	CO_2	No	Wind energy projects do not emit GHGs and need not consider project emissions
		CH_4	No	Wind energy projects do not emit GHGs.
		N_2O	No	Wind energy projects do not emit GHGs.
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B.3. Establishment and description of baseline scenario

Baseline scenario for the second crediting period in line with the "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period." Version 03.0.1[8].

The tool stipulates the following steps to be carried out.

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or Sectoral policies

The baseline scenario remains unchanged and is in compliance with all the relevant mandatory national and/or Sectoral policies.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was 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. Thus this project activity was a voluntary investment which intends to replace equivalent amount of electricity at grid from renewable source. PP was not bound to incur this investment; hence absence of project activity (i.e. the investment) does not lead to any continued baseline practice for PP within their scope whereas the continued operation of the project activity would continue to replace equivalent amount of electricity at grid. Hence, the same baseline as identified in the previous crediting period is still valid for the project. Therefore, the assessment of the changes in market characteristics is not required for the renewal of the project's crediting period under VCS.

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 370,047.97 MW as on 31.03.2020, consisting of 230,809.57 MW Thermal, 86,759.19 MW Renew and 6,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 1[9] that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by increased use of renewable energy sources.

[8] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf
[9] https://cea.nic.in/wp-content/uploads/baseline/2021/06/User_Guide_ver_16_2021-1.pdf

Furthermore, project participant has considered the latest available CO_2 Baseline Database (CEA database, version 15) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission. As per below table, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original.

Table 1: Sector- wise installed capacity (MW) as on 31/03/2020 (CEA Database version 16)

Sector	Thermal					Nuclear	Hydro	RES	Total
	Coal	Lignite	Gas	Diesel	Total				
State	65571.50	1290.00	7118.71	236.01	74216.21	0.00	26958.50	2357.03	103531.74
Central	58990.00	3490.00	7237.91	0.00	69717.91	6780.00	15346.72	1632.30	93476.93
Private	74173.00	1830.00	10598.74	273.70	86875.45	0.00	3394.00	82769.86	173039.30
All India	198734.50	6610.00	24955.36	509.71	230809.57	6780.00	45699.22	86759.19	370047.97

It is evident from Table 1 that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO_2 emissions in the country by way of fuel substitution, increased use of renewable energy sources, and also by improving the thermal efficiency of power generation.

Thus, current baseline remain same and there is no impact if circumstances, existing at the time of requesting renewal of crediting period.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

As explained in step 1.2, the baseline scenario was the electricity import/generation from the power plants connected to the electricity grid. The project activity in green field project and there is no any baseline equipment or investment involved in project activity. Therefore this condition is not applicable to the project activity.

Step 1.4: Assessment of the validity of the data and parameters

This step stipulates that “Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the VCS project activity.”

In the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

Step 2: Update the current baseline and the data and parameters

As evident from the explanation provided above the baseline scenario remains unchanged. Only the approach used to calculate the baseline emission factor is updated as per the latest version of CEA database available at the time of PDD submission for renewal.

In line with the project standard version 02.0, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard

to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

Impact of the national and/or sectoral policies and circumstances upon the baseline scenario of the project activity

The Government of India enacted the Electricity Act in the year 2003 to harmonize and rationalize the provisions in the existing laws. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. With the Enactment of the act, the then existing laws viz, The Indian Electricity Act 1910, The Electricity Supply Act, 1948 and The Electricity Regulatory Commissions Act, 1998 were repealed. The Electricity Act 2003 was in force at the time of the completion of the baseline study for the registered PDD.

Section 3 of the said act required the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy[10] on 12th February 2005 which was in force at the time of completion of the baseline study as stated in the registered PDD of the project activity. This policy has not been revised since then and is currently in force as well.

In addition to the above policies, State Electricity Regulatory Commissions (SERCs) have announced preferential tariffs and Indian Renewable Energy Development Agency (IREDA) provides term loan assistance towards establishing biomass power projects. All these fiscal and financial incentives were in force at the time of completion of the baseline study for the registered PDD of the project activity and still continue to exist.

The state electricity regulatory commission issues tariff order in respect of procurement of power generated wind generators and there is no mandatory national and/or sectoral policies have come into effect that would affect the compliance of the current baseline. Hence, it can be concluded the current baseline complies with all relevant mandatory national and/or sectoral policies that have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period.

However, in spite of the financial incentives given by the government to renewable power projects in India the generation from the low cost must run resources connected to the Southern Grid has not increased to such an extent that this would lead to more than 50% contribution from the low cost must run resources towards the total generation from the Indian Grid.

The approved consolidated baseline methodology, ACM0002 (Version 20.0), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology “Tool to calculate the emission factor for an electricity system” (version 07.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

As per CEA database version 16, the fossil fuel dominated electricity is more than renewable sector and is continuing with same pattern. In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the Project Standard version 02.0, national and/or sectoral policies and circumstances had been considered towards formulating the

[10] http://www.cercind.gov.in/Act-with-amendment.pdf

OM & BM baseline scenario. Hence the baseline scenario as applied for the present project activity remains justified.

As per the approved consolidated Methodology ACM0002 (Version 20.0) para 22: "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".

The project activity involves setting up of wind power project to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publically available. The CEA database version 16 is the latest available data at the time of PD submission to DOE for validation, hence same is considered for emission factor calculations.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9346 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 (0.25) & build margin (0.75) values, sourced from Baseline CO_2 Emission Database, Version 16.0, March 202 [11] published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9568 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2017-18, 2018-19, 2019-20) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 16.0, March 2021 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8682 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 16.0, March 2021 published by Central Electricity Authority (CEA), Government of India

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

As per the approved consolidated Methodology ACM0002 (Version 20.0) para 39:

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

[11] https://cea.nic.in/wp-content/uploads/baseline/2021/06/2019_20_CO2_database.zip

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:

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

Where:

BE_y	=	Baseline emissions in year y (tCO_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 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" (tCO_2/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.

CO_2 Baseline Database for the Indian Power Sector, Version 16, March 2021[12] published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per Methodological tool: Tool to calculate the emission factor for an electricity system (Version 07.0, EB 100, Annex 4), following six steps have been followed:

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

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 Indian grid from FY 2007-08 onwards for the purpose of this CO_2 Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the Indian 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

Indian Grid

[12] https://cea.nic.in/wp-content/uploads/baseline/2021/06/2019_20_CO2_database.zip

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	Telangana
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	Puducherry
Rajasthan		Goa	Tripura	Lakshadweep
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 **Option I:** 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)

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
India	16.8%	15.1%	14.6%	14.3%	14.5%	17.0%

Data Source: Central Electricity Authority (CEA) database Version 16, March 2021[13]

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.

[13] https://cea.nic.in/wp-content/uploads/baseline/2021/06/2019_20_CO2_database.zip

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/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.

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) (excl. Imports)			
	2017-18	2018-19	2019-20
INDIAN Grid	960,693	995,957	965,009
Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2017-18	2018-19	2019-20
INDIAN Grid	0.9543	0.9603	0.9555

Weighted Generation Operating Margin	
INDIAN Grid	**0.9568**

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

As per Methodological tool: “Tool to calculate the emission factor for an electricity system” (Version 07.0, EB 100, Annex 4) para 72:

In terms of vintage of data, project participants can choose between one of the following two options:

(a) **Option 1** - for the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of PD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

(b) **Option 2** - For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option

Option 1 as described above is chosen by PP 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 PD and is fixed for the entire crediting period.

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2019-20
INDIAN Grid	0.8682

Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$)

As per Methodological tool: "Tool to calculate the emission factor for an electricity system" (Version 07.0, EB 100, Annex 4) para 81:

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

PP has chosen option (a) i.e. weighted average CM to calculate the combined margin emission factor for the project activity.

The combined margin emissions factor is calculated as follows:

$$\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (t CO_2/MWh)
W_{OM}	=	Weighting of operating margin emissions factor (per cent)
W_{BM}	=	Weighting of build margin emissions factor (per cent)

The following default values should be used for W_{OM} and W_{BM}:

Wind and solar power generation project activities: W_{OM}= 0.75 and W_{BM}= 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods. Since project activity is of wind power generation, the above weightage has been considered for OM and BM.

Therefore, $EF_{grid,CM,y}$ = 0.9568 * 0.75 + 0.8682 * 0.25
= 0.9346 t CO_2/MWh

Project Emissions: For most renewable power generation projects activities. **Hence, PE_y =0.**

Leakage Emissions: No Leakage emissions are considered. **Hence, LE_y= 0**

Emission reduction (ER_y):
Emission reductions are calculated as follows:

$$\mathbf{ER_y = BE_y – PE_y}$$

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)

B.4.2. Data and parameters fixed ex ante

Data/Parameter	$EF_{grid\ BM,y}$
Data unit	tCO_2/MWh
Description	The Build Margin emission factor of Indian grid
Source of data	CEA CO_2 Baseline Database, version 16
Value(s) applied	0.8682
Choice of data or measurement methods and procedures	The values are taken from the database developed by Central Electricity Authority (CO_2 Baseline database for the Indian power sector, Version 16). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'.
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter was determined ex-ante and would not be monitored during the crediting period.

Data/Parameter	$EF_{grid\ OM,y}$
Data unit	tCO_2/MWh
Description	The Operating Margin emission factor of Indian grid
Source of data	CEA CO_2 Baseline Database, version 16
Value(s) applied	0.9568
Choice of data or measurement methods and procedures	The values are taken from the database developed by Central Electricity Authority (CO_2 Baseline database for the Indian power sector, Version 16). The database is Government of India's official publication based on the 'Tool to calculate the emission factor for an electricity system'.
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter was determined ex-ante and would not be monitored during the 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	CEA CO2 Baseline Database, version 16
Value(s) applied	0.9346
Choice of data or measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,\ BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$= Build margin CO_2 emission factor in year y (tCO_2/MWh) $EF_{grid,OM,y}$= Operating margin CO_2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of data	Calculation of baseline emissions
Additional comment	Parameter was determined ex-ante and would not be monitored during the crediting period.

B.4.3. Ex ante calculation of emission reductions

Formula used to calculate the net emission reduction for the CPA is

$ER_y = BE_y - PE_y$

Where,

$\mathbf{ER_y}$ = Emission reductions in year y (t CO_2e/yr)
$\mathbf{BE_y}$ = Baseline emissions in year y (t CO_2/yr)
$\mathbf{PE_y}$ = Project emissions in year y (t CO_2e/yr)

Baseline Emission (BE_y)

The baseline emissions are the product of electrical energy baseline EGfacility,y expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

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

Where,

BE_y = Baseline emissions in year y (tCO_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 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" (tCO_2/MWh)

As per para 41 of methodology, project activity is the installation of a Greenfield power plant, hence

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

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

Annual electricity supplied to the grid by the Project (EG_y) = 36,877 MWh

Annual Baseline Emissions Reduction:

$\mathbf{BE_y = EG_{PJ,y} \times EF_{grid,CM,y}}$
= 36,877 MWh * 0.9346 tCO_2e/MWh
= 34,465 tCO_2e/year

B.4.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
30/09/2021 to 29/09/2022	34,465	0	0	34,465
30/09/2022 to 29/09/2023	34,465	0	0	34,465
30/09/2023 to 29/09/2024	34,465	0	0	34,465
30/09/2024 to 29/09/2025	34,465	0	0	34,465
30/09/2025 to 29/09/2026	34,465	0	0	34,465
30/09/2026 to 29/09/2027	34,465	0	0	34,465
30/09/2027 to 29/09/2028	34,465	0	0	34,465
Total	**241,255**	**0**	**0**	**241,255**
Total number of crediting years	**7**			

Annual average over the crediting period	**34,465**	**0**	**0**	**34,465**

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

Data/Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Joint meter reading OR break up sheet provided by power purchaser (referred as 'Form B')
Value(s) applied	36,877
Measurement methods and procedures	Here 4 WTG's are connected in one feeder and 5 WTG's with other feeder to record energy export and import, both are connected in Karnataka Power Transmission Corporation Limited (KPTCL) substation through which transmission losses are calculate between substation and feeder meters (procedure in form B) and based on that net energy export is calculated. The JMR is usually taken once in month for the feeder meters and also at the common substation where non project WTG's are also connected. With the help of both the readings transmission losses are calculated between the substation and feeder meters. Net electricity export to grid is then calculated as: Export - (export*Transmission loss %) -115% Import. Measurement by: electricity meters (feeder meters, substation meters, WTG controller/ CMS) Recording: Electronic and paper Recording Frequency: Continuous monitoring and monthly recording Responsibility: The operators/ O&M team will be responsible for measurement Calibration Testing Frequency: Annually Accuracy class of meters: 0.2s/ 0.5s (as per state regulation) Archiving: Crediting Period + 2 years
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	Cross check measurement results with records for sold electricity – where electricity sale is applicable
Purpose of data	Baseline emissions calculation
Additional comment	Data will be archived for more than two years after end of crediting period or last issuance, whichever later

B.5.2. Sampling plan

Not Applicable

B.5.3. Other elements of monitoring plan

The monitoring team will include PP's employees and O&M contractor's representatives.

Net electricity supplied by the project activity to the grid. Measurement results shall be cross-checked with records for sold electricity. One metering system would be there at the feeders and

another at the WTG site. If the variation between the two meter readings is significant for the monthly recording of data, the meters would be reset and calibrated. The measurement will be taken from the feeder meters and KPTCL's energy meter which is located in the substation. Meter reading will be carried out in every calendar month. Then the same will be reported to the district electricity purchaser office.

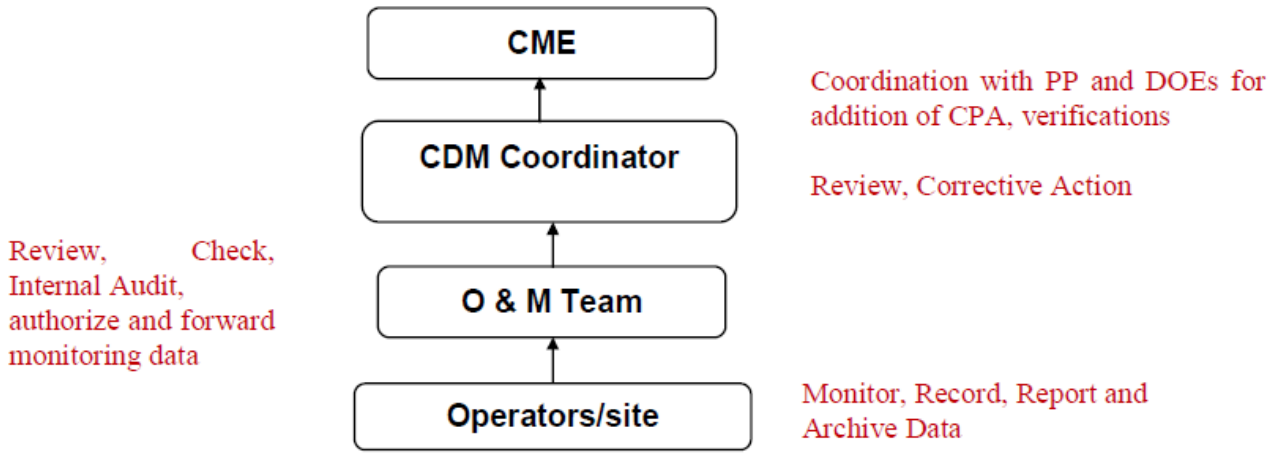
The accuracy of monitoring parameter is ensured by adhering to the calibration and testing procedure as set in the power purchase agreement. The project will adhere to all mandatory regulatory and statutory requirements at the state as well as national level. The energy meters installed are tri-vector meters of 0.2% accuracy class.

Here 4 WTG's are connected in one feeder and 5 WTG's with other feeder to record energy export and import, both are connected in Karnataka Power Transmission Corporation Limited (KPTCL) substation through which transmission losses are calculate between substation and feeder meters (procedure in form B) and based on that net energy export is calculated.

The JMR is usually taken once in month for the feeder meters and also at the common substation where non project WTG's are also connected. With the help of both the readings transmission losses are calculated between the substation and feeder meters. Net electricity export to grid is then calculated as:

Export - (export*Transmission loss %) -115% Import.

The operational and management structure implemented by PP and O&M contractor is as follows:



In some cases, if a particular feeder/ substation has other WTGs not part of this CPA connected through same electricity meter, apportioning is used. Even otherwise, to get WTG/ project owner wise electricity supplied to grid, apportioning is required and is carried out as below.

APPORTIONING PROCEDURE

Apportioning of net electricity uploading is done with reference to the electricity generated from individual WTGs. The Karnataka Power Transmission Corporation Limited (KPCL/ KPTCL) will issue a monthly Joint Energy Meter Readings sheet for actual power exported from the wind farm to the grid. Apportioning of net electricity supplied, as per the Joint Energy Meter Readings sheet, by each project owner is done based on the individual meter readings of each wind turbine. The apportioning is done by electricity purchaser (representative of DISCOM) in cases jointly with the PP. The Joint Meter Reading with electricity buyer is used to calculate actual net electricity supplied to the grid and on the basis of that GHG emission reductions by the project activity will be calculated.

It is clear that PP also has two separate meters connected respectively to four and five WTGs in this CPA. The present JMR and billing happens at these meters and same is used for the

monitoring. In future, if some reason, JMR happens at above discussed sub-station (managed by KPTCL), the same will be used for the monitoring.

Procedures for handling data uncertainty:

a. In case main meter is faulty: In the event that the main metering system is not in the service as result of maintenance, repairs or testing, then the back metering system shall be used during the period the main metering system is not in service and the provisions above shall apply to the reading of the backup metering system.
b. In case both the meters are faulty: When the Main Metering System and/or Backup Metering System and/or any component thereof is found to be outside the acceptable limit of accuracy or otherwise not functioning properly, it shall be repaired, recalibrated or replaced as soon as possible by the KPTCL. KPTCL will ensure that metering system is tested for accuracy at least once in year and report furnished along with joint meter reading.

Any meter seal(s) shall be broken only by the authorised officer of KPTCL in the presence of representative of Power Producers/ Developers, whenever the Main Metering System or the backup metering system is to be inspected, tested, adjusted, repaired or replaced.

In case, the monitoring period starts mid-month, the reading for that month will be apportioned based on the daily electricity export data give by the O&M contractor. This will be also checked with the average daily export arrived from that month's JMR and the conservative of the two will be used for the emission reduction calculation.

Apportioning Procedure:

Procedure for apportioning of electricity:

1) In case the start/end dates of monitoring period do not match with the start/end dates of Joint Meter Reading Sheets / Generation reports issued by MSEDCL, following apportioning procedure will be applied for the first and the last monitoring period within a particular crediting period:

   Apportioning will be carried out based on ratio of generation data recorded using LCS installed at the each WTG. The emission reductions of that particular period (between the start/end date of monitoring period and the end/start of the billing period) will be calculated based on percentage generation of that particular period at WTG using LCS data multiplied with the total units generated in the month as per the Joint Meter Reading Sheets / Generation report issued by MSEDCL. The calculation formula has been furnished below:

   Generation from all project WTGs for the period y1= $EG_{WTGcontroller,i,y1}$
   Generation from all project WTGs for the period y2 = $EG_{WTGcontroller,i,y2}$

   Net energy supplied used for calculation of emission reduction for the monitoring period y1, i.e $EG_{facility,\ y1}$=

$$\sum_{i=1}^{N} ((EG_{export,i,y2} - EG_{import,I,y2}) * (EG_{WTGcontroller,i,y1} / EG_{WTGcontroller,i,y2}))$$

   Where:
   y1 = No. of days within a billing period up to which generation is considered for emission reduction calculation
   y2 = No. of days in the billing period
   N = No. of feeders to which project WTGs are connected to.

SECTION C. Start date, crediting period type and duration

C.1. Start date of CPA

13/03/2013[14]
This is the date of supply agreement with ReGen Powertech Pvt. Ltd. for supply of WTGs under this CPA (This date is selected as start date as real action on project activity started from this date only).

Confirmation from CME that the start date is after the start date of the PoA.

C.2. Expected operational lifetime of CPA

20 years and 00 months

C.3. Crediting period of CPA

C.3.1. Type of crediting period

7 years and 0 months
Renewable crediting period is chosen

The crediting period can be renewed twice (7 + 7 years) after the end of first crediting period. The crediting periods even after second renewal will not exceed the life of project WTGs and the end of duration of the PoA i.e. 22/05/2040.

C.3.2. Start date of crediting period

30/09/2021

C.3.3. Duration of crediting period

7 years and 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The present CPA includes wind energy projects and these renewable power projects are excluded from conducting detailed EIA as per the EIA Notification 2006. Thus, environmental impact assessment has not been required for the CPA.

D.2. Environmental impact assessment

This CPA is not envisaged to have environmental impacts as seen in section above.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

The CPA implementer identified local population leaving near CPA power plants, employees, elected representatives of nearby areas etc. as potential stakeholders. A local stakeholders' meeting was held on 4/12/2013 and invitation was given by a news paper ad (Hasiru Kranti

[14] First PO towards implementation of the CPA project

Kannada Daily on 20/11/2013) and few individual invitations in (local language). The meeting was held at Venue – Project site, Umarani Village

The meeting was held at 10.00 am and attended by 28 people. Mr. Arun Prasad from Gamesha (WTG supplier and O&M contractor for this project) welcomed all. Mr. Praveen B. Kamble, a local advocate was appointed meeting chairman unanimously. Mr. Rohit Joshi from ReNew Power introduced about the project activity and its role in reducing GHG emissions. He also told that the project will be developed as a CPA in the registered CDM-PoA. Then the Chairman shared his views on project and invited stakeholders for the queries/ suggestions.

E.2. Summary of comments received

Sr. No.	Query / comments from stakeholders	Response from PP
1	Mr. Maruti Magadum Can the electricity generation from this project be directly supplied to the local community?	The generated electricity is supplied to the state electricity distribution company which distributes it as per the state policy. PP can not supply electricity directly to the local community.
2	M. Sidaram Magadum How wind farms help mitigate climate change?	Wind farms generate clean renewable electricity without any GHG emissions or waste by products. This electricity displaces electricity generation in fossil fuel dominated grid resulting in savings of coal. Thus, lower GHG emissions help mitigate climate change.
3	Mr. Praveen Kamble How can local communities assist in reducing global warming.	Everyone can contribute by using renewable energy like solar, wind biogas etc. and avoiding emission of GHGs.
4	Mr. Dundappa Sambaji Is it true that wind mills move away rain clouds?	The clounds are mush higher than the height of wind mills and hence it is not likely to have any imapct on rain. Further reference was made to studies from Indian Institute of Tropical Meteorology and Center fo Wind Energy Technology on same conclusion.
5	Mr. Balappa Hukkeri Local shopkeepers and suppliers are benefitted due to the project.	CPA Implementer thanked the stakeholder for comment.
6	Mr. Ashok Kadded Few local people got employment due to the project.	CPA Implementer thanked the stakeholder for comment.

E.3. Consideration of comments received

The organisers gave vote of thanks to the stakeholders and requested to contact PP in case of any further queries.

SECTION F. Eligibility for inclusion

Confirmation of additionality of CPA

The POA requires each CPA to demonstrate additionality using applicable CDM guidelines. The CPA has chosen to demonstrate additionality using 'Tool for the demonstration and assessment of additionality' (Ver. 07.0.0, EB 70, Annex 08). Accordingly step wise analysis is presented below.

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

Sub-step 1a: Define alternatives to the project activity:

1) Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity.

a) The proposed project activity undertaken without being registered as CDM project activity.

This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline. However, in the absence of the CDM revenue it would have been difficult for the project proponent to implement the project activity on account financial unviability (please refer to Step 2: Investment Analysis in the following section for details).

b) Continuation of existing situation
In this alternative, the project activity would not be implemented and an equivalent amount of energy (power) would have been produced by the project grid electricity system through its currently running power plants and by new capacity addition to the grid. i.e. continuation of current situation

Outcome of Sub-step 1a: The following are the possible alternatives for the project activity:

1) The proposed project activity undertaken without being registered as CDM project activity.
2) Continuation of existing situation

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

Both the alternatives are in compliance with all applicable legal and regulatory requirements as

- The implementation of the project activity is a voluntary initiative as taken by the project proponent and is not mandatory or a legal requirement;
- The Electricity Act, 2003, does not restrict or allow any authority to restrict the fuel choice for power generation; and
- The applicable Environmental Regulations do not restrict the use of wind energy and there is no legal requirement on the selection of a particular technology.

Outcome of Step 1b: The identified alternatives in sub step 1 a are in compliance with all applicable legal and regulatory requirements.

Step 2 Investment analysis OR Step 3 Barrier analysis

Investment Analysis

CPA implementer has chosen Investment analysis to prove the Additionality

Sub-step 2a Determine appropriate analysis method

Option 1 Simple Cost Analysis would not be an appropriate analysis method as the project incurs revenue from sale of electricity (export of power to grid). As per guidance 19 of Annex 5 of EB 62,

Project is grid connected power plant and is selling electricity. Thus,

Investment Comparison Analysis is not applicable as the investment in the alternative number 1 (identified in sub-step 1 b) is not in control of PP. As the project is supplied power to the grid, benchmark analysis is suitable to the project activity as per guidance 19 of Annex 5 of EB 62.

As the project is supplied power to the grid, benchmark analysis is suitable to the project activity as per guidance 19 of Annex 5 of EB 62.

Outcome of Sub-step 2a – The benchmark analysis option has been chosen.

Sub-step 2b: Option III. Apply benchmark analysis

Selection of financial indicator

The project activity involves considerable amount of capital investment. The project activity aims to supply electricity to Indian grid and thus generating revenue from sale of electricity. The Internal Rate of Return is a rate of return used in capital budgeting and compare the profitability statements and is found to be suitable indicator in capital intensive projects. PP had used equity IRR at the time of investment decision time. Thus in the context of the project activity, Equity IRR is deemed to be the suitable indicator for assessing the financial attractiveness of the project activity.

Now, here PP has evaluated post-tax equity IRR to assess the financial viability of the project activity.

Chosen financial indicator: Equity IRR

Selection of benchmark

Selection of benchmark and use following example if financial indicator chosen is equity IRR, delete if not applicable

Choice of Benchmark: Expected/ required return on equity (as per EB 62, Annex 5, Appendix)

As per Para 12 of Annex 5 of EB 62,
Required/expected returns on equity are appropriate benchmarks for an equity IRR.

Thus, as per the above guidance CPA implementer has chosen required rate of return (ROE) as a benchmark.

As per guidance 13 of Annex 5 of EB 62,
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.
Since the project activity can be developed by any other entity, ROE is calculated based on the standard parameters in the market.

As per guidance 15 of Annex 5 of EB 62,
If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors.

As per the above guidance PP has used option (a) i.e. default values as provided in the Appendix A. The project activity belongs to sectoral scope 1 i.e. Energy Industries and thus falls under Group 1. The real term value of ROE for group 1 projects of India is 11.75%. As per guidance 7 of Appendix A, the nominal value can be converted to real term value by adding target inflation rate provided by central bank. Therefore, the real term value of ROE has been converted to the nominal term by adding inflation rate forecasted by RBI for year 2012-13 by taking average for 4 consecutive quarters which is 7.18%10. Thus, the benchmark ROE comes to 18.93%.

The key assumptions applied for the calculation of equity IRR are provided in the table below:

Table B.5.1: Assumptions made for the calculation

Parameter	Unit	Value	Reference / Remarks
No. of wind turbines	Nos	9	Extracts of Project Appraisal Committee

Parameter	Unit	Value	Reference / Remarks
			Meeting Dated 26th February 2013
Capacity of each wind turbine	MW	2	Extracts of Project Appraisal Committee Meeting Dated 26th February 2013
Plant load factor	%	23.51	Calculated as per Assessment of Energy Production Study by third party, dated 22 February 2013, Pg 19
Total capacity of CPA	MW	18	Extracts of Project Appraisal Committee Meeting Dated 26th February 2013
Total project cost	Rs. Million	1215.00	Purchase order of similar WTGs for some other project by PP before investment decision
Total estimated annual electricity generation	MWh	37,073.7	Assessment of Energy Production Study by third party
O&M cost	%	1.25% of capital cost	Pg. 28, KERC RE tariff order_2009
Tariff for sale	Rs./kWh	6.30 for first 10 years 4.0 for later	HT 2(b) tariff in state 2012 (http://gescom.in/tariff/ht-intro.html) for 10 years, present preferential tariff from 11th year onward (KERC, RE Tariff order 2009) and historic escalation in it
Income tax rate of depreciation on plant and machinery	%	7.69	Appendix IA of IT Rules http://taxguru.in/income-tax/rates-ofdepreciation-as-per-income-tax-act-for-a-y-2010-11.html
Income tax rate of depreciation on civil work	%	10	
Total income Tax	%	32.45	Indian IT Act FY 2012-13
Income tax	%	30	Indian IT Act FY 2012-13
Surcharge	%	5	Indian IT Act FY 2012-13
Cess	%	3	Indian IT Act FY 2012-13
Debt-Equity ratio	%	70:30	Pg. 8, KERC RE tariff order_2009
Interest rate	%	14.49%	Average lending rate before investment decision
Repayment	Years	10	Page 13, KERC RE tariff order_2009
Moratorium	Year	0	
Salvage Value	%	10	As per Companies Act 1956
GBI benefits	Rs./kWh	No	GBI notification[15] with cap of Rs. 6.2 million/ MW

The equity IRR has been worked out for this project based on the above assumptions. The assumptions made to calculate equity IRR are conservative and were applicable at the time of investment decision. The equity IRR comes to 10.29% and is below the benchmark used. Therefore, it can be concluded that project is not viable without CDM revenue.

Sensitivity analysis:

As per Para 20 of Annex 5 of EB 62, the variables that constitute more than 20% of the total project cost as well as total project revenue are:

1. O & M
2. PLF

[15] http://www.ireda.gov.in/forms/contentpage.aspx?lid=744

3. Project cost
4. Tariff

Hence, all these parameters are subjected to ±10% of variation to confirm the robustness of the equity IRR.

Outcome of sensitivity analysis:

The result of the sensitivity analysis carried out for the parameters O&M, PLF and project cost are provided in the table B.5.2 below.

Table B.5.2: Results of sensitivity analysis

Parameter	Variation	Without CDM revenues (%)	Required variation in parameter to breach the benchmark	Benchmark (%)
O&M	+10%	9.93	Not possible to meet benchmark even with -100% decrease in O&M cost	18.93%
	-10%	10.65		
PLF	+10%	13.81	+24.5%	
	-10%	7.02		
Tariff rate	+10%	13.81	+24.5%	
	-10%	7.02		
Project Cost	+10%	7.12	-18.5%	
	-10%	14.45		

It is shown through the above analysis that the equity IRR without CDM revenue does not meet the benchmark.

Step 4: Common practice analysis

The 'Guidelines on common practice', version 02.0, EB 69, Annex 8 is used here.
Stepwise approach for common practice

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

The CPA project activity is 18 MW and hence the applicable capacity for this analysis is 9 – 27 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;

The default applicable geographic area as per the guidelines on common practice is host country i.e. India. Within Host Country India different States have different policies for renewable energy projects and the tariff varies from state to state. The tariff calculation depends on generation estimates of different states and different project sites. The PLF varies significantly based on the location (state) and so is the variation in tariff which is governed by the state electricity regulatory commission. In case of Karnataka the tariff is determined by 'Karnataka Electricity Regulatory Commission'[16]. Different PLF and tariff rate can impact investment decision in each state, hence state as the applicable area will give equal weightage to comparable projects hence selected for further analysis. Hence, for further analysis the 'Applicable geographical area' chosen is Karnataka state.

[16] https://www.merc.gov.in/

(b) The projects apply the same measure as the proposed project activity;

As discussed at the start of analysis, the measure applied by the CPA project is 'power generation based on renewable energy generation'. Thus, all renewable energy generation projects are studied.

(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;

This is not applicable as CPA project does not involve a feedstock. Hence renewable energy technologies that use fuel/feed stock like biomass will not be considered for analysis.

(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;

The CPA project is implemented to produce electricity and all project considered here are also electricity generation units.

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

As seen above, the applicable capacity range for this analysis is 9 – 27 MW.

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

Here, the real case CPA-DD is part of PoA and hence will not be published for global stakeholder consultation. Thus, projects commissioned before the start date of CPA i.e. 13/03/2013 will be considered.

Based on the above explanation we have three renewable technologies for analysis which are wind, solar and hydro.

There are no solar power plants public database published by Karnataka Electricity Development Agency or any other sources. Thus these projects are not studied here. For all other grid connected hydro power plants, an authentic public database published by CEA[17] is used here.

Hydro projects are studied through CEA database and wind projects are taken from Indian wind power directory.

By analysing these three databases, total projects observed were 42 (21 hydro, 0 solar and 21 wind).

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 Nall.

None of hydro projects in above analysis were in CDM. However, 20 out of 21 wind projects are under CDM leaving 1 project for further analysis. Thus,

$N_{all} = 21 + 1 = 22$

[17] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm (Version 08, database, 'Data' worksheet)

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 Ndiff.

Here, since hydro power plant have different technology (including working principle), these are considered as different. Thus,

N_{diff} = 21

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.

F = 1 – (21/22) = 0.05
N_{all} - N_{diff} = 1

As per the guidance, the 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. However, here, both these conditions are not fulfilled and hence project is not a common practice.

Outcome of Step 4:

CPA wind power project is not a common practice.

As can be seen from above, the project activity without the CDM revenue is not a financially viable option and it is additional.

Demonstration of eligibility for a CPA

The project activity is eligible to be included in the PoA because it fulfils the following criteria defined for inclusion of a CPA in the PoA

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
1	The geographical boundary of the CPA area is uniquely defined and located in India. For Emission factor for electricity generation, the boundary will be Indian Grid.	Yes	Commissioning Certificate, PPA and DPR have been submitted for the evidence.	The below documents indicate that CPA is located in Rajasthan state of India • Commissioning Certificate • DPR • Purchase Order
2	The CPA is not part of any other PoA or will not be registered as individual project activity. The installed technology (ies) of the CPA will constitute unique geographical location to avoid double counting. The proposed CPA will be located at a site where there was no renewable energy power plant operating prior to the implementation of the proposed CPA (Greenfield plant)	Yes	List of PoA project available at UNFCCC https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/H8ZL9NPDCF0B76JQM5XVTGKI1YU4AO/viewCPAs?s=10	Based on UNFCCC project cycle, the CPA is not a part of any other PoA or will not be registered as individual project activity. The same can be verified through Undertaking from the CPA implementing body confirming that project activity is not an individual CDM project or part of any other PoA. CPA provided with the unique geographical location in terms of latitude and longitude. The unique geographical location can be cross verified by any one document mentioned for geographical boundary

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
				confirm that the CPA has been located at a site where there was no renewable energy power plant operating prior to the implementation of the CPA (Greenfield plant).
3	Does the proposed CPA comprise of only one type of methodology - either AMS I.D, AMS I.F or ACM0002?	Yes	https://cdm.unfccc.int/methodologies/PAmethodologies/approved	The CPA follows ACM0002, version 20 methodology.
4	**Technology Employed by the CPA**: Wind Power Technology. The CPA shall employ standard technology and specifications of the manufacturer and/or best practices of the market. The sample key specifications for wind technology will be make, capacity, turbine type etc as applicable. **Installed Capacity size** – either small scale (capacity less than 15 MW) or large scale (capacity more than 15 MW up to 500 MW) or micro scale (capacity less than 5 MW)	Yes	• Technical specification • DPR	DPR proves that the CPA is greenfield project activity of wind technology. The project activity is planned to sell the generated electricity to Indian grid network and contractual PPA. Please refer section A.3 for technical specification of CPA. The manufacturer of equipment's follows the national/international certification/standards.
5	Does the CPA supply electricity to the national / regional grid? Or uses national grid for captive or third-party sale.	Yes	Power Purchase Agreement (PPA) signed with state utility and third parties.	The project activity is planned to sell the generated electricity to either directly to state electricity board or third party through grid network and contractual arrangement with third party (Option b of meth applicability). The Power Purchase Agreement (PPA) is submitted to DOE.
6	Has the CPA owner entered into a contractual agreement with CME at the CPA level?	Yes	Service agreement between CME and CPA developer.	There is contractual agreement between CPA developer and CME for inclusion in PoA and it can be verified from service agreement
7	Is the proposed CPA a voluntary initiative, not mandated by any policy and/or regulation in the host country?	Yes	State nodal agency approval	Central Pollution Control Board (Ministry of Environment Forest and Climate Change, Govt. of India), final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (February 29, 2016) The project activity falls under white category, and the non-polluting nature of project fulfils the compliance to the local laws and regulations.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
				There shall be no necessity of obtaining the Consent to Operate'' for White category of industries. An intimation to concerned SPCB / PCC shall suffice. The state nodal agency approval is submitted to DOE
8	Is the CPA in conformance with mandatory laws and regulations? The legal and regulatory framework of CPA implementation is promotional policies and not legal regulation	Yes	State nodal agency approval	Public or regulatory sources or clearances / approvals from state/central Govt. regulatory bodies to demonstrate that project is in compliance with laws and regulations in host country. In India, there is no legal regulation to install wind power plant.
9	Is the start date of the proposed CPA prior to the start date of PoA. The start date of the PoA is considered as 23/05/2012 which is the intimation of prior CDM consideration to UNFCCC & NCDMA.	No	Order of the CPA is was 13/03/2013.	Purchase orders /contracts for equipment or construction / operation services indicates start date as 13/03/2013.
10	Can the electricity generated from the individual CPA be accurately measured and recorded to calculate actual emission reductions according to the applied baseline and monitoring methodology?	Yes	• Monitoring plan of CPA-DD • Metering regulations of CEA • DPR	Yes, The electricity generated from the CPA will be accurately measured and recorded to calculate actual emission reductions according to the applied baseline and monitoring methodology. Please refer Monitoring plan of CPA DD, Procedure or measurement of net electricity supplied by project activity. It can further be verified from Metering regulations published by CEA and from DPR of the project.
11	Has the CPA conducted an environmental impact assessment and achieved clearance / approval from the environmental agency, if required by host country regulations?	Yes	Not applicable	As the wind power plant falls under white category, EIA is not required for current CPA. ESIA has been conducted by CPA implementer voluntary. Also consent to establish the power plant has been submitted to assessment team.
12	Has the CPA conducted a local stakeholder consultation? Is Local stakeholder consultation is carried out before start date of CPA?	Yes	• Meeting Invitation • Minutes of meeting • Attendance records	Yes, Minutes of meeting of local stakeholder consultation, attendance records, invitation letters etc are submitted to DOE. Refer section E.1 for meeting dates.
13	Does the CPA involve	No	Not Applicable	Undertaking from CPA Owner

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
	funding from Annex I parties that results in a diversion of official development assistance?			or CPA Implementer is submitted.
14	Does the CPA comply with the applicability conditions of ACM0002 Version 20.	Yes	The methodology applicability criteria has now been mentioned in section B.1	Yes, CPA is complying with the applicability conditions of ACM0002 Version 20.
15	Is the CPA additional in accordance with the "Tool for the demonstration and assessment of additionality" Version 07	Yes	DPR https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf	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. Refer above investment IRR calculation details to confirm the same and submitted IRR calculation sheet. Thus, it can be easily concluded that project activity is additional & is not business as usual scenario.

Appendix 1. Contact information of CPA implementers

Organization name	ReNew Wind Energy (AP) Private Limited
Country	India
Address	Tower 4A, 6th Floor, DLF Corporate Park, MG Road, Gurgaon (NCR Delhi), Delhi-122002
Telephone	+91 124 4489 6670/80
Fax	+91 124 4489 6670
E-mail	info@renewpower.in
Website	http://renewpower.in/
Contact person	Mr. Parag Sharma, Chief Operating Officer

Appendix 2. Affirmation regarding public funding

The PoA does not involve diversion of ODA or public funding from Annex 1 countries.

Appendix 3. Further background information on ex ante calculation of emission reductions

Please refer section B of the CPA-DD for the same.

Appendix 4. Further background information on monitoring plan

Please refer to section B.4.2.of the CPA-DD for the same.

Appendix 5. Summary report of comments received from local stakeholders

Please refer to section E.2.of the CPA-DD for the same.

Appendix 6. Summary of post-registration changes

Not Applicable.

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Document information

Version	*Date*	*Description*
10.0	8 October 2021	Revision to: • Ensure consistency with version 03.0 of the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN).
09.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN); • Make editorial improvements.
08.1	20 October 2017	Editorial revision to remove appendix "Applicability of methodologies and standardized baselines" from the main part of the form which had been mistakenly kept in the previous version.
08.0	28 June 2017	Revision to: • Remove appendix "Applicability of methodologies and standardized baselines" as the appendix is not relevant at the CPA level; • Make editorial improvement.
07.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and PoA-DD forms; • Make editorial improvement.
06.0	24 May 2017	Revision to: • Ensure consistency with the "Standard: CDM project standard for programme of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Component project activity design document form for small-scale component project activities" (CDM-SSC-CPA-DD-FORM); • Make editorial improvement.
05.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
04.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.
03.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the component project activity design document form for CDM component project activities (these instructions supersede the "Guidelines for completing the component project activity design document

Version	*Date*	*Description*
		form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a CPA implementer and/or responsible person/ entity for completing the CDM-CPA-DD-FORM in A.13. and Appendix 1; • Add general instructions on post-registration changes in paragraph 4 and 5 of general instructions and Appendix 6; • Change the reference number from F-CDM-CPA-DD to CDM-CPA-DD-FORM; • Make editorial improvement.
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project activity design document form" (EB 66, Annex 16).
01.0	27 July 2007	EB 33, Annex 42 Initial adoption.

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