



Programme of activities design document form
(Version 09.0)

BASIC INFORMATION

Title of the PoA	Promotion of renewable energy generation in India- Programme of Activities
Version number of the PoA-DD	05
Completion date of the PoA-DD	03/07/2020
Coordinating/managing entity	General Carbon Advisory Services Pvt. Ltd.
Host Parties	Government of India
Applied methodologies and standardized baselines	<p>Methodology: ACM0002, Grid-connected electricity generation from renewable sources, version 20.0¹</p> <p>Standardized baselines: Not Applicable</p>
Sectoral scopes	Sectoral Scope: 01, Energy industries (renewable/non-renewable sources)

¹ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

Indian power demand is increasing and so is the power generation capacity addition. However, the share of renewable energy sources in the total installed capacity as on March 2020 was 36.2%². The Indian Government and state Governments have announced many policies for the development of renewable energy. However, the capacity development is limited due to higher capital costs, lower plant load factors etc. Thus, CME has started a PoA to facilitate promotion of renewable energy generation.

1. Policy/measure or stated goal of the PoA

The objective of this PoA is to develop a platform for overcoming institutional, financial hurdles³ for the construction of a series of renewable energy power plants projects. The PoA will help reduce the CDM project development cost and reduce timeline to monetize CDM revenue compared to a standalone CDM project activity.

2. General operating and implementing framework of PoA

Promotion of renewable energy generation in India- Programme of Activities (REG-PoA) will support the development of renewable energy plants in India and delivering energy to the Indian grids. Each CPA under this REG PoA will comprise one or more renewable energy plants (i.e. either wind or solar)⁴. REG-PoA is a voluntary action being coordinated and managed by General Carbon Advisory Services Pvt. Ltd. (referred as GC further in this document), the coordinating / managing entity (CME). GC will work with other organizations such as project developers, banks and financial institutes in renewable energy sector lending, policy makers etc. to facilitate the development of new renewable energy power plants and their inclusion in the REG-PoA.

GC will take the following steps for the REG-PoA implementation:

Step 1: Collect information of Project activities.

Step 2: Scrutiny of information for eligibility as CDM Programme Activity (CPA)

Step 3: Listing eligible CPAs.

Step 4: Propose DOE and facilitate on behalf of CPA implementers for inclusion of CPAs in the PoA.

Step 5: Inclusion of the eligible CPA(s) under PoA, as per the consistency check by DOE.

Step 6: Suggestion and review of Monitoring Instruments & System to be installed at Project Site for meeting the monitoring requirement at the time of addition of CPA in the PoA

Step 7: Undertaking periodic verification by DOE.

CME will be involved in all the CPAs under this PoA in the above listed capacities/ scope during addition of CPAs in the PoA and during verification of CPAs. The CME will not be the CPA implementer in any of the CPAs under this PoA.

REG-PoA and their associated CPAs generate numerous benefits and will contribute to the sustainable development of the host country⁵: Each CPA will discuss specific contribution to

² <https://mercomindia.com/solar-share-india-installed-power-capacity-mix/>

³ POA will help new investors by reducing CDM registration timeline and reducing process costs in terms of consultant, DOE fee etc. to monetise carbon revenue

⁴ Each CPA will have either wind or solar energy projects

⁵ http://www.cdmindia.gov.in/approval_process.php

sustainable development in line with the following guidance prepared from the requirement of NCDMA.

- 1) **Social well-being:** CPAs will lead to alleviation of poverty by generating additional employment, removal of social disparities and contribution to provision of basic amenities to people leading to improvement in quality of life of people.
 - 2) **Economic well-being:** CPAs will bring in additional investment consistent with the needs of the people.
 - 3) **Environmental well-being:** CPAs will discuss impact on environment including resource sustainability and resource degradation, biodiversity friendliness; impact on human health; reduction of levels of pollution in general. CPAs should have overall positive environmental impact.
 - 4) **Technological well-being:** CPAs may lead to transfer of environmentally safe and sound technologies that are comparable to best practices in order to assist in upgradation of the technological base. Thus, the project activity meets the sustainable development criteria of NCDMA.
- 3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity (CME).**

The REG-PoA is purely a voluntary action by General Carbon Advisory Services Pvt. Ltd., which is the CME of this programme. There are no mandatory requirements in India enforcing the renewable power generation.

A.2. Physical/geographical boundary of PoA

In line with applied methodology ACM0002, version 20, “*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*”. Thus, the physical/geographical boundary of PoA consists of CPAs, state union and territories of India and national grid of India.

All CPAs included in the PoA will be implemented within the geographical boundary of India covering all the states and union territories. All CPAs will be implemented considering all applicable national/sectoral policies and regulations within states and union territories of India.

India lies to the north of the equator between 8°4' and 37°6' north latitude and 68°7' and 97°25' east longitude⁶.

⁶ <http://www.mapsofindia.com/geography/>



A.3. Technologies/measures

The PoA will implement renewable energy projects (wind and solar) for renewable electricity generation.

Sectoral scope 1 - Energy industries (renewable - / non-renewable sources)

The PoA will employ only the technologies that harvest energy from wind and solar to generate electricity. A brief of each technology overview is discussed in following section.

Wind Power:

Each CPA under REG-PoA would include the basic machinery that converts wind power to electricity and is called a wind turbine, although it has many more parts than other kinds of turbines. The wind spins blades that are attached to a hub that turns as the blades turn. Together, the blades and hub are called the rotor. The turning rotor spins a generator, producing electricity.

Solar Power:

Each CPA under RE PoA would include electricity generation from Solar using either Solar PV technology or Solar Thermal technology for electricity generation.

Both these renewable power generating units will supply electricity to grid and will displace electricity that otherwise would have been generated in the carbon intensive grid of India. Thus, these CPAs will reduce GHG emissions. Also, as these wind and solar power units will not have any effluent discharges (like harmful pollutants such as SO_x, NO_x, solid waste or liquid and gaseous effluents) the technology is environmentally safe and sound.

The individual CPAs will discuss the technology used in detail also the technology transfer details from Annex I countries to the Host Country.

A.4. Coordinating/managing entity

The Coordinating / Managing Entity (CME) for this PoA is General Carbon Advisory Services Pvt. Ltd. (hereafter referred as GC). The information regarding CME and Project Participants are provided in appendix-1 of this report.

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (host Party)	General Carbon Advisory Services Pvt. Ltd. (a private entity)	No

A.6. Public funding of PoA

The total project cost will be met by CPA implementers, owners and where applicable in part by debt funding from banks and financial institutes. The PoA will not involve public funding.

SECTION B. Management system

Operational and Management plan of General Carbon Advisory Services Pvt. Ltd. (CME)

- CME has defined roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies
- CME has established procedures for technical review of inclusion of CPAs made available to the DOE in excel format.

Below mentioned point is getting covered under the Operational and management structure which is submitted to the DOE.

- CME has established operational and management arrangements⁷ for the implementation of the PoA, including a record keeping system for each CPA under the PoA, a system/procedure to avoid double accounting (e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA) as per EB 70, Annex 05, para 16.
- CME has established operational arrangements to submit to the DOE the records and documents for each CPA.
- CME has established operational arrangements to maintain existing relationship with the project implementers (e.g. conduct training for data monitoring).
- CME has set a framework for the implementation of the PoA and define the CDM programme activity (CPAs) to be included under the PoA. For this CME has prepared the preliminary data required to assess the credentials of CPA implementer.
- CME has made arrangements to communicate with UNFCCC and DNA (as focal point). CME will collect all the data and information require to communicate with UNFCCC and DNA.
- CME has made arrangements to ensure that those operating the CPA are aware and agree that their activity is being subscribed to the PoA. This is one of the responsibilities of CME which is also mentioned in the above referred document.

⁷ An Operational and management arrangement developed by CME is submitted to the DOE.

- CME has established operational arrangements to forward, after having ensured all the requirements determined in the PoA and its specific CDM-CPA-DD are met, the completed CDM-CPA-DD form to any DOE for consistency checking.
- CME has established operational arrangements to collect (periodically) monitoring data of all CPAs.
- CME has established operational arrangements to prepare monitoring reports for emission reduction verification.
- CME has established operational arrangements to maintain all monitoring reports of all CPAs in accordance with the record-keeping system identified in the CDM-POA-DD.
- CME has established operational arrangements to make available all monitoring reports requested by a DOE for verification purposes.
- CME has established operational arrangements to submit a request for forwarding of CERs issued in accordance with the modalities of communication as agreed between project participants.

In addition to the above management tasks, GC will implement the following operational elements to ensure proper management and oversight of the proposed PoA.

- (i) A record keeping system for each CPA under the PoA.

In order to clearly identify renewable energy power plants participating in the PoA, a serial numbering system will be implemented that uniquely and numerically identifies each renewable energy power plant for the CPA and the renewable energy facility. This serial numbering system will be used to record baseline and monitoring data on a continuous basis using an Excel database. The serial Numbers will start in sequence with first real case CPA being 'CPA001'. In this way, the PoA coordinating entity will be able to track the emission reduction of each renewable energy power plant over the full duration of the crediting period.

In summary, GC will record and document CPA detail information as follows:

- Name of the CPA and its installed capacity
- The name, address, and project owner details of each participating CPA
- The geographical coordinates of each CPA (GPS coordinates of the powerhouse)
- The record of technical specification of each renewable energy power plant participating in the CPA
- The verification status (number of verification and associated monitoring report)

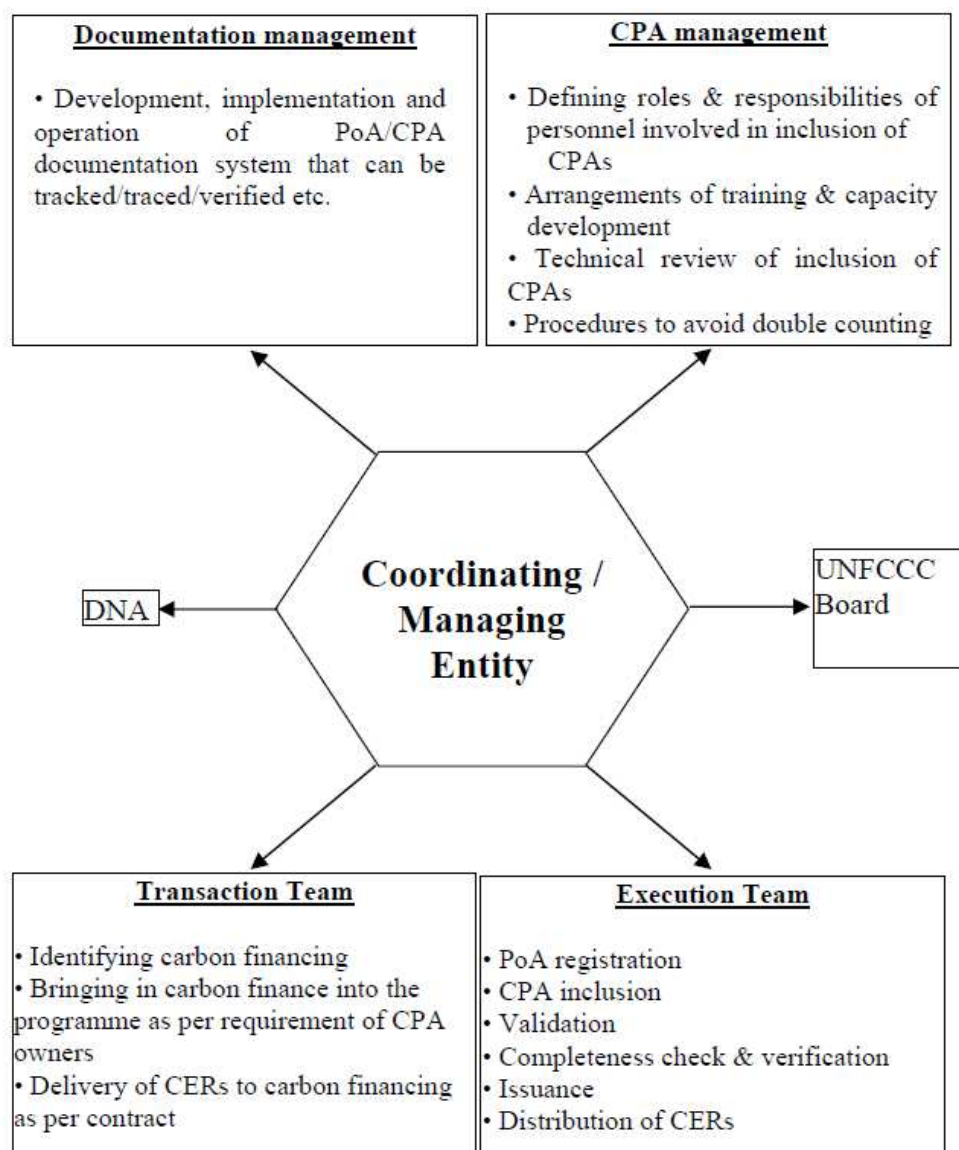
The Coordinating Entity will be responsible for the management of records and data associated with each CPA. The Excel database will be updated using the data supplied by the participating renewable energy power plants. It will form the basis for the verification of CPAs and be available for inspection by the DOE at any point in time.

- (ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as a CDM project activity or as a CPA of another PoA. The database described above will be used to perform a double accounting check. Every new CPA will be compared to the already existing database and the list of project activities that are under validation or registered at the UNFCCC. Moreover, as shown below, the project implementers will be made aware of the double accounting principle and will certify that the proposed CPA is registered under the CDM of the UNFCCC or any voluntary scheme. If a CPA is registered (or under validation) under the CDM or any voluntary scheme, the coordinating entity will not proceed with inclusion of the corresponding CPA in the PoA.
- (iii) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

In order to avoid double accounting and to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA, the project implementer of a CPA shall enter into a contractual arrangement with the coordinating entity including respective provisions that:

- The CPA has not been and will not be registered as a single CDM project activity or as a CPA under another PoA.
- The project implementer is aware that the CPA will be subscribed to the present PoA.
- A contract of services and cessation of rights will be made between GC and the renewable energy power developers, defining GC as the owner of the emission reductions under the CDM of the UNFCCC to the managing entity of the present PoA.
- The project implementer certifies that the CPA is not registered under the CDM of the UNFCCC or any voluntary scheme.

The management plan is described in the following flow diagram:



Management responsibilities and arrangement of CPA implementer

- To implement renewable energy power plant project activity (construction, daily operation, and maintenance of power plant).
- To monitor and record the plant operation data.

SECTION C. Demonstration of additionality of PoA

(i) Confirmation that the proposed PoA is a voluntary action by coordinating / managing entity;

As explained in section A.2, the proposed PoA will facilitate access to carbon revenues to renewable energy developers. These developments will encourage renewable energy electricity generation in the host country. There are no mandatory laws or regulations in the host country stipulating to implement a renewable energy power plant or development of a PoA. Likewise, no obligation exists for private entities to utilize or develop renewable energy power projects. The proposed REG-PoA can be, therefore, regarded as a voluntary coordinated action.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the CDM;

The PoA as such does not have any revenue apart from CDM and in absence of CDM, this will not be implemented. Further, in the absence of the proposed REG-PoA, the voluntary coordinated actions outlined above would not be likely to be implemented. As mentioned in the section A.2, the market share of renewable resources has grown at a very low rate in spite of the potential in the country. Moreover, the majority of future generating capacity expected to come online over the next several years will be primarily fossil-fuel plants⁸.

By providing capacity building and carbon finance platforms to renewable energy power plants that will be part of CPAs under this PoA, the proposed REG-PoA will support the CPAs in overcoming barriers. Hence the proposed CPA projects would not be implemented in the absence of the CDM.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced

There are no mandatory policy/regulations in India which insists in the implementation of renewable energy power generation.

(iv) If mandatory policy/regulations is enforced, the PoA will lead to greater level of enforcement of existing mandatory policy/regulations

As mentioned above the proposed PoA is not implementing any mandatory policy/regulations.

(v) Demonstration of the additionality on the CPA level:

According to EB 70, Annex 5 paragraph 10 of the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programmes of activities", PoAs that consist of one or more large scale projects require that CPA shall include eligibility criteria from all the relevant requirements contained in the additionality section of the large scale methodologies applied to the CPAs.

Therefore, for each CPA, additionality will be demonstrated as required by the ACM0002 and the "Tool for the demonstration and assessment of additionality" (Ver. 07.0.0, EB 70, Annex 8).

⁸ Report of the Working Group on Power for Twelfth Plan (2012-2017), Pg. 3 of Executive Summary (pg. 32 of pdf file) http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_power1904.pdf

SECTION D. Start date and duration of PoA**D.1. Start date of PoA**

23/05/2012⁹

The POA start date is the date of publication of PoA-DD for the global stakeholder consultation i.e. public comment period has been started for the PoA-DD.

D.2. Duration of PoA

Duration of PoA is from 23/05/2012 to 22/05/2040.

SECTION E. Environmental impacts**E.1. Level at which environmental impacts analysis is undertaken**

Environmental Analysis is done at CPA level. Present PoA include only wind and solar power projects that are excluded from conducting detailed EIA as per the EIA Notification 2006¹⁰. Thus, only for any specific CPAs if EIA is required or in case of change in national regulation, then EIA will be conducted.

E.2. Analysis of environmental impacts

Presently solar and wind project are not required to conduct EIA as they do not have any adverse environmental impact. Thus, the individual CPAs only where required will report the environmental impacts.

E.3. Environmental impact assessment

If environmental impacts are identified after above assessment, the impact assessment and mitigation plans will be discussed at CPA level.

SECTION F. Local stakeholder consultation**F.1. Level at which local stakeholder consultation is undertaken**

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at CPA level ☒

Local and focalized impacts of each renewable energy project (depending on the location, capacity, and construction and others) justify a LSC at CPA level.

F.2. Modalities for local stakeholder consultation

Local stakeholder consultation will be held at CPA level.

F.3. Summary of comments received

Local stakeholder consultation will be held at CPA level.

⁹ <https://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/DRT35R0N987GB2AKUK886QYJCCY7QY/vie w.html> (accessed on 23/05/2012)

¹⁰ <http://envfor.nic.in/legis/eia/so1533.pdf>

F.4. Consideration of comments received

Local stakeholder consultation will be held at CPA level.

SECTION G. Approval and authorization

The letter of approval from NCDMA of India is received on 12/12/2012¹¹.

PART II. Generic component project activity (CPA)**SECTION H. Description of generic CPA****H.1. Title of generic CPA**

Title: INSERT title

H.2. Reference number of generic CPA

Version: INSERT version number of CPA document

H.3. Purpose and general description of generic CPA

The PoA will involve CPA of following types

- 1) grid connected wind energy projects
- 2) grid connected solar energy projects

The purpose of the CPAs to generate renewable electricity and supply to grid or to displace grid by using electricity for captive consumption and third party sale to grid connected customers, as applicable.

H.4. Technologies/measures

The CPA will implement renewable energy projects (wind and solar) for renewable electricity generation.

Sectoral scope 1 - Energy industries (renewable - / non-renewable sources)

The CPA will employ all technologies that harvest energy from wind and solar to generate electricity. A brief of each technology overview is discussed below.

Wind Power: Each CPA would include the basic machinery that converts wind power to electricity and is called a wind turbine, although it has many more parts than other kinds of turbines. The wind spins blades that are attached to a hub that turns as the blades turn. Together, the blades and hub are called the rotor. The turning rotor spins a generator, producing electricity.

Solar Power: Each CPA would include electricity generation from Solar using either Solar PV technology or Solar Thermal technology.

Both these renewable power generating units will supply electricity to grid and will displace electricity that otherwise would have been generated in the carbon intensive grid of India. Thus, these CPAs will reduce GHG emissions. Also, as these wind and solar power units will not have

¹¹ Copy is submitted to the DOE

any effluent discharges (like harmful pollutants such as SO_x, NO_x, solid waste or liquid and gaseous effluents) the technology is environmentally safe and sound.

The individual CPAs will discuss the technology used in detail also the technology transfer details from Annex I countries to the Host Country.

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

All the CPAs under this PoA will apply ACM0002, Version 20 “Grid-connected electricity generation from renewable sources”¹²

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

- Tool to calculate the emission factor for an electricity system- Version 07.0 (EB 100, Annex 4)¹³
- Tool for the demonstration and assessment of additionality- Version 07.0.0 (EB 70, Annex 8)¹⁴
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion- Version 03 (EB 96, Annex 4)¹⁵

The methodology also refers to the “Combined tool to identify the baseline scenario and demonstrate additionality”, however that is not used here.

I.2. Applicability of methodologies and standardized baselines

The justification of selected baseline methodology is discussed below for generic CPAs.

Sr. No.	Applicability condition as per methodology	Condition of generic CPA
1	<p>This methodology is applicable to grid-connected renewable power generation project activities that</p> <p>(a) install a greenfield power plant;</p> <p>(b) involve a capacity addition to (an) existing plant(s);</p> <p>(c) involve a retrofit of (an) existing operating plants/units;</p> <p>(d) involve a rehabilitation of (an) existing plant(s)/unit(s) or</p> <p>(e) involve a replacement of (an) existing plant(s)/unit(s)</p>	<p>The CPAs will consist of grid connected renewable (wind or solar) power generation activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant). Thus, the condition is met.</p> <p>As per the registered POA-DD, the CPAs will not consist of any project that (b) involve capacity addition; or (c) retrofit of (an) existing plant(s); or (d) involving replacement of existing plant(s).</p>
2	The project activity may include renewable energy power plant/unit of	The CPAs will consist of installation of either wind or solar power projects in each CPA/

¹² <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

¹³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

¹⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

¹⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf>

	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;	sub-project in it. Thus, the applicability condition is met.
3	In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant 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 addition, rehabilitation or retrofit of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	The CPAs will consist of only Greenfield projects. Hence, this condition is not applicable.
4	<p>In case of hydro power plants: At least one of the following conditions shall apply:</p> <ul style="list-style-type: none"> (a) The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in an existing single or multiple reservoirs, where the volume of the reservoirs is increased and the power density, calculated using equation (7), 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 (7), 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 (7), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: <ul style="list-style-type: none"> • The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m^2 ; • Water flow between reservoirs is not used by 	The CPAs include wind or solar energy power projects and not hydro. Thus, this condition is not applicable.

	<p>any other hydropower unit which is not a part of the project activity;</p> <ul style="list-style-type: none"> • Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: <ul style="list-style-type: none"> ○ Lower than or equal to 15 MW; and ○ Less than 10 per cent of the total installed capacity of integrated hydro power project. 	
5	<p>In the case of integrated hydro power projects, project proponent shall:</p> <ul style="list-style-type: none"> • 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 of five years prior to the implementation of the CDM project activity. 	<p>The CPAs include wind and solar energy power projects and not hydro. Thus this condition is not applicable.</p>

6	<p>The methodology is not applicable to the following:</p> <ul style="list-style-type: none"> Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; Biomass fired power plants/units 	<p>The CPAs will not involve switching from fossil fuels to renewable energy sources at the site of the project activity.</p> <p>Also, the CPAs include wind or solar energy power projects and not biomass fired power plant or hydro power plants. Thus, this condition is not applicable.</p>
7	<p>In the case of retrofits, 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, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.</p>	<p>The CPAs in this PoA will consist of only Greenfield power projects. Hence, this condition is not applicable here.</p>

Tool to calculate the emission factor for an electricity system¹⁶ - Version 07.0 (EB 100, Annex 04)

Applicability Criterion (with Para number reference)	Project Case
<p>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).</p>	<p>Each CPA will be a grid connected Greenfield wind or solar power projects and thus the tool is applicable.</p>
<p>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</p>	<p>Steps involved in calculation of Emission Factor is included in section I.6.1 of the POA-DD, as per the requirement of the tool.</p>

¹⁶ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

Applicability Criterion (with Para number reference)	Project Case
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.	The CPAs will be located in non-Annex I country and hence the criteria is not applicable.
Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero.	The CPAs will be wind or solar project and there is no involvement of biofuels.

Thus, all generic CPAs comply with the applicability conditions of the methodology.

I.3. Application of multiple methodologies

The PoA/CPA does not involve application of multiple methodologies.

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

As per applicable methodology ACM0002, 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.

Thus, the project boundary of each CPA will include the project power plant and all power plants connected physically to the respective regional grids of India (southern or NEWNE which are now part of the Indian grid, depending on each CPA).

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in tables below.

1) For a CPA involving solar power projects

Source		GHG	Included?	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation due to operation of power plants in the existing grid mix that are displaced due to the project activity	CO ₂	Yes	Main emission source
		CH ₄	No	Main emission source
		N ₂ O	No	Minor emission source
Project activity	CO ₂ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants	CO ₂	Yes	Renewable energy projects do not emit GHG as per ACM0002 project emission section. However, if solar PV projects use fossil fuels, same will be considered in the project emission calculation.
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source

2) For a CPA involving wind power projects

Source		GHG	Included?	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation due to operation of power plants in the existing grid mix that are displaced due to the project activity	CO ₂	Yes	Main emission source
		CH ₄	No	Main emission source
		N ₂ O	No	Minor emission source

Source		GHG	Included?	Justification/Explanation
Project activity	Wind energy project	CO ₂	Yes	Wind energy projects do not emit GHGs and need not consider project emissions ¹⁷
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source

I.5. Establishment and description of baseline scenario

The PoA involves grid connected wind and solar energy projects. However, as required by the methodology, the projects depending on their type whether the project is a Greenfield project the baseline discussion will be developed here.

The baseline for the second crediting period is updated in line with the tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”, Version 3.0.1¹⁸.

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 274 to 295 of Project Standard version 02.0.

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 CDM.

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 356,100.20 MW as on 31.03.2018, consisting of 226,279.34 MW Thermal, 77,641.63 MW Renew and 6,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 1¹⁹

¹⁷ as per ACM0002, Version 13.0.0, project emission section (pg. 6) ‘For most renewable power generation project activities, P_{Ey} = 0.

¹⁸ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>

¹⁹ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

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 CO₂ emissions in the country by increased use of renewable energy sources.

Furthermore, project participant has considered the latest available CO₂ 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 31/03/2019 (CEA Database version 15)

Sector	Thermal				Nuclear	Hydro	RES	Total
	Coal	Gas	Diesel	Total				
State	65366.50	7118.71	363.93	72849.14	0.00	29878.80	2347.93	105075.86
Central	58820.00	7237.91	0.00	66057.91	6780.00	12126.42	1632.30	86596.63
Private	76518.00	10580.60	273.70	87372.30	0.00	3394.00	73661.40	164427.70
All India	200704.50	24937.22	637.63	226279.34	6780.00	45399.22	77641.63	356100.19

Note: In the above table, the last column “Total” includes the total summation of installed capacity of thermal, Nuclear, Hydro and Renewable Energy.

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 CDM 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

Step 2.1: Update the current baseline

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 Policy²⁰ 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 Indian 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 large-scale consolidated methodology for grid connected electricity generation from renewable sources, ACM0002 (Version 20), 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 15, 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

²⁰ <http://www.cercind.gov.in/Act-with-amendment.pdf>

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

As per the approved large-scale consolidated methodology for grid connected electricity generation from renewable sources, 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 solar project to harness the power of sun 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.

Step 2.2: Update the data and parameters

As per the Step 1.4, in the context of the present project activity the emission factor has been updated along with the approach used to calculate the emission factor.

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 15 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
$EF_{grid,CM,y}$	0.9419 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 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9622 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8811 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

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

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:

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

Where:

BE_y = Baseline emissions in year y (t CO₂/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” (t CO₂/MWh)

Calculation of EG_{PJ,y} (a) Greenfield renewable energy power plants

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

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

Where:

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

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

Project emissions

For most renewable 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, by using the following equation:

$$PE_y = PE_{FF,y}$$

Where: PE_y = Project emissions in year y (tCO₂e/ yr)

PE_{FF,y} = Project emissions from fossil fuel consumption in year y (tCO₂/ yr)

If any fossil fuel is used for the projects e.g. solar thermal power plant, CO₂ emissions from the combustion of fossil fuels shall be accounted for as project emissions (PE_{FF,y}). PE_{FF,y} will be calculated as per the latest version of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”.

Leakage emission

No leakage emissions are considered.

The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected. As per ACM 0002 version 20.0 Leakage emission is neglected for renewal project.

Emission reductions Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e)

BE_y = Baseline emissions in year y (t CO₂)

PE_y = Project emissions in year y (t CO₂e)

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 15, Dec 2019²¹ 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.

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

²¹ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

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	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 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
India	16.8%	15.1%	14.6%	14.3%	14.5%

Data Source: Central Electricity Authority (CEA) database Version 15, Dec'2019²²

²² http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

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.

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)			
	2016-17	2017-18	2018-19
INDIAN Grid	916,278	960,693	995,957

Simple Operating Margin (tCO ₂ /MWh) (incl. Imports)			
	2016-17	2017-18	2018-19
INDIAN Grid	0.9636	0.9543	0.9685

Weighted Generation Operating Margin	
INDIAN Grid	0.9622

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 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

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)	
	2018-19
INDIAN Grid	0.8811

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:

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

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 solar power generation, the above weightage has been considered for OM and BM.

$$\begin{aligned} \text{Therefore, } EF_{grid,CM,y} &= 0.9622 * 0.75 + 0.8811 * 0.25 \\ &= 0.9419 \text{ t CO}_2\text{/MWh} \end{aligned}$$

Baseline emission factor (EF_y):

The baseline emission factor is calculated using the combined margin approach as described in Step 6 above:

Therefore, $EF_y = EF_{grid,CM,y} = 0.9419 \text{ t CO}_2/\text{MWh}$.

I.6.2. Data and parameters fixed ex ante

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 15, Dec 2019 ²³
Value(s) applied	0.8811
Choice of data or Measurement methods and procedures	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 2017-18. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector” version 15, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data/Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019 ²⁴
Value(s) applied	0.9622
Choice of data or Measurement methods and procedures	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	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 15, Dec 2019 ²⁵
Value(s) applied	0.9419
Choice of data or Measurement methods and procedures	<p>The combined margin emissions factor is calculated as follows:</p> $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ <p>Where:</p> <p>$EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)</p> <p>$EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂/MWh)</p> <p>W_{OM} = Weighting of operating margin emissions factor (%) = 75%</p> <p>W_{BM} = Weighting of build margin emissions factor (%) = 25%</p>
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

I.6.3. Modalities for ex ante calculation of emission reductions

This will be done on CPA level. The electricity export estimate using CPA size, annual operating days, PLF estimated and the emission factor of the grid will be used.

²³ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

²⁴ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

²⁵ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

The electricity generation can be calculated as below

$$EG_{\text{facility},y} = \text{plant capacity (MW)} \times \text{plant operation hours in year } y \times \text{PLF}$$

The baseline emission reduction can be calculated as

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

Sample Calculation

A sample calculation as per the CPA-16 (9416-P1-0016-CP1) of the POA is presented below. The CPA is a 60 MW solar project.

Calculation of Electricity generation

$$\begin{aligned} EG_{\text{facility},y} &= 60 \text{ MW} \times 8760 \times 19.01\% \\ &= 99,916 \text{ MWh} \end{aligned}$$

Calculation of Emission Reduction

$$\begin{aligned} BE_y &= 99,916 \times 0.9419 \\ &= 94,113 \text{ tCO}_2\text{e} \end{aligned}$$

FOR ESTIMATION, $PE_y=0$ and LE_y is neglected as per the approved methodology.

$$\begin{aligned} \text{Hence, } ER_y &= BE_y - PE_y \\ &= 94,113 - 0 = 94,113 \text{ tCO}_2\text{e} \end{aligned}$$

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

For Wind Projects

Data/Parameter	EG _{facility,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the wind project plant/unit to the grid in year y
Source of data	Joint meter reading or break up sheet or B-forms or Share certificates provided by power purchaser/State electricity board
Value(s) applied	-
Measurement methods and procedures	<p>The JMR is usually taken once in a month for the bulk/revenue meter at the common substation. Also with the individual WTG controller electricity meters (both import and export) or CMS data, the JMR also gives electricity export and import of each WTG and losses till metering point. By using these data, net export by the WTGs in the CPA will be calculated.</p> <p>The export and import calculation is in the hand of State electricity board and hence CPA implementer will have no say on it. The JMR report/B-form/credit report etc will be the primary source of the data for Net electricity supplied to the grid. The same source will be used for emission reduction calculation.</p> <p>Measurement by: Electricity meters (bulk, 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</p>
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

For Solar Projects

Data/Parameter	EG _{facility,y}
Data unit	MWh
Description	Quantity of net electricity generation supplied by the solar project plant/unit to the grid in year y
Source of data	Joint meter reading or break up sheet provided by power purchaser
Value(s) applied	-

Measurement methods and procedures	<p>The electricity exported / supplied by the project activity will be measured through meters (ABT Meters) having accuracy class of 0.2s/ 0.5s (as per state regulation) It is difference of export and import of project activity. The monthly electricity supplied by the project activity in the JMR report will be cross checked with the monthly Invoices raised.</p> <p>However, as per the usual practice in a few states, the monthly invoices are raised upon the export values as obtained from the monthly JMR. Import bills are paid at HT rate and no separate invoicing is done for import billing as those are part of monthly bills at HT tariff rate. Hence, the export values of the JMR can be cross checked from the monthly Invoices raised by PP and the Import values can be cross checked from the monthly bills.</p> <p>Measurement by: Electricity meters 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</p>
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

The data/parameters to be monitored for projects using fossil fuel are:

Data/Parameter	PE_{FF,y}
Data unit	tCO ₂ /yr
Description	Project emissions from fossil fuel consumption in year y
Source of data	Calculated as per the “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion” from the parameters following this Table
Value(s) applied	-
Measurement methods and procedures	As per the “Tool to calculate project or leakage CO ₂ emissions from fossil fuel combustion”
Monitoring frequency	Once for a monitoring period or monthly – depending on data availability
QA/QC procedures	This is a calculated value. NO QA/QC is required.
Purpose of data	Project emission calculation
Additional comment	Data will be archived for more than two years after end of crediting period or last issuance, whichever later

Data/Parameter	FC_{i,j,y}
Data unit	ton/ yr OR litre/ yr
Description	quantity of fuel type i combusted in process j during the year y
Source of data	plant log sheets/ stores inventory
Value(s) applied	
Measurement methods and procedures	The fuel consumption will be measured using mass/ volumetric flow meters as per National standard/ industry practice
Monitoring frequency	Continuous monitoring with monthly recording
QA/QC procedures	Quantity of fuel measured will be cross checked with the fuel purchase invoices
Purpose of data	Project emission calculation

Additional comment	Data will be archived for more than two years after end of crediting period or last issuance, whichever later
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Data/Parameter	NCV_{i,y}
Data unit	GJ/ton OR GJ/m ³
Description	weighted average net calorific value of the fuel type i in year y
Source of data	Supplier invoices/ third party lab reports
Value(s) applied	
Measurement methods and procedures	If supplier invoice gives NCV, it will be used as such If supplier invoice does not give NCV, then quarterly two samples will be sent for the third party nationally accredited laboratory analysis
Monitoring frequency	Two samples in three months
QA/QC procedures	The NCV values will checked for consistency with publically available values/ range
Purpose of data	Project emission calculation
Additional comment	Data will be archived for more than two years after end of crediting period or last issuance, whichever later

Data/Parameter	EF_{CO₂,i,y}
Data unit	tCO ₂ /GJ
Description	weighted average CO ₂ emission factor of fuel type i in year y
Source of data	National GHG inventory communication of India to UNFCCC or latest available IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	
Measurement methods and procedures	Default value from above mentioned sources will be used
Monitoring frequency	Annually once the parameter will be fixed based on above mentioned sources
QA/QC procedures	Not required since default value as per guidance of monitoring methodology will be used
Purpose of data	Project emission calculation
Additional comment	Data will be archived for more than two years after end of crediting period or last issuance, whichever later

I.7.2. Sampling plan

Not Applicable

I.7.3. Other elements of monitoring plan

The CME will implement monitoring plan for each CPA in association with the CPA implementer/ O&M contractors appointed by them. The CME will maintain central monitoring system to enable DOE single point coordination for verification of the monitored data. The following generic roles and responsibilities are planned for the monitoring plan.

Data collection (under unique identification given to CPA)

General data:

- 1) unique ID and name of the CPA
- 2) Name of the CPA implementer and contact details (postal address, phone No., email ID)
- 3) Capacity and technology details (mass, energy balance, metering arrangement for monitoring)
- 4) Location of CPA (if different from CPA implementer address) including geographical coordinates

Data for verification:

- 1) Date of CPA addition to PoA and crediting period start
- 2) Verification status – last monitoring period and future expected monitoring period
- 3) Monitoring records as per CPA-DD and all monitoring reports

Responsibilities:

1) Monitoring and data recording, calibration and archiving – The CME will provide standard (tailored to extent possible for each CPA) monitoring plan for each CPA. The individual CPA implementer and its representative including O&M contractors will be responsible for the monitoring of applicable data as mentioned in Section B.7 above. The calibration of meters will also be under CPA implementers' scope.

The monitored data, cross check data, calibration reports will be made available to CME in electronic format. The further requested specific data and inconsistencies identified if any will be responded by the CPA implementers. The original document and back up documents will be archived by CPA implemented in paper form.

2) Quality control – The quality control and uncertainty reduction will be jointly dealt by the CME and CPA implementer. The cross check for each parameter will be provided by the CPA implementer and in document review, if CME identifies inconsistencies, the appropriate action for conservative emission reduction calculation will be taken and documented.

The emission reduction for each CPA and monitoring period will be cross checked by CME.

SECTION J. Crediting period type and duration

Start date of the Crediting Period	31/12/2019
Length of the Crediting Period	7 years
Duration of the Crediting Period	31/12/2019 to 30/12/2026
Type of Crediting Period	Renewable

SECTION K. Eligibility criteria for inclusion of CPAs

As per the “Standard for the demonstration of additionality, development of eligibility criteria and application of multiple methodologies for Programmes of Activities”²⁶ - version 02.1, following criteria must be met by each CPA to be included under the PoA:

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
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²⁶ https://cdm.unfccc.int/Reference/Standards/meth/meth_stan04.pdf

1	Geographical Boundary	The geographical boundary of the CPA must be consistent with the geographical boundary set in the PoA. Hence, the CPA must be located within India.	This will be evident from any of the following documents: <ul style="list-style-type: none"> • supply order/ purchase order/ MOU with supplier • commissioning certificate/land ownership/ lease OR regulatory clearance • Geo-coordinates of the project
2	Double counting of emission reductions	Each CPA will not be involved in another registered or under validation as a CDM project activity or as a CPA under proposed or another PoA or as another GHG reduction projects related to wind or solar power project	This will be evident from following: <ul style="list-style-type: none"> • Unique identification numbers allocated to CPA. • Unique Geo-coordinates allocated for each CPA • Declaration of no double counting of emission reductions.
3	Technology/Measure	Each CPA implementer will provide description of the technologies including expected lifetime, capacity, plant load factor, and any other manufacturer specifications, etc. must be included in CPA-DD.	Details of technology used will be evident from following: <ul style="list-style-type: none"> • Product Brochure/ Manufacturer brochure of the equipment used • Detailed Project report/Feasibility Report Plant Load Factor can be evident from 3 rd Party PLF report or 3 rd party DPR.
4	Start date of the CPA	The start date of CPA should be in the format of dd/mm/yyyy. The start date of the CPA should be after the start date of the PoA.	The start date of the CPA will be evident from: <ul style="list-style-type: none"> • supply order/ purchase order placed with the supplier • start of construction of project plant • any other commitment to implement project
5	Compliance with applicability conditions and other requirements of ACM0002	Each CPA will satisfy the applicability conditions for simplified baseline and monitoring methodologies as specified in the ACM0002 (Ver. 20.0)	Applicability conditions of ACM0002 (Ver.20.0) Section B of CPA-DD

6	Demonstration of Additionality	Each CPA will demonstrate the additionality as per the “Tool for the demonstration and assessment of additionality” (Ver. 07.0.0, EB 70, Annex 8) at the time of inclusion of each CPA.	The CPA will establish additionality using “Tool for the demonstration and assessment of additionality” (Ver. 07.0.0, EB 70, Annex 8). IRR calculation sheet along with all supporting documents for the financial parameters for demonstrating the additionality of the CPA shall be provided.
7	Local Stakeholder Consultation and Environmental Impact Analysis.	Each CPA will hold local stakeholder consultation before the inclusion in PoA and before project construction. Each CPA will conduct environmental impact analysis as per the national compliance.	For local stakeholder meeting, each CPA must provide the following: <ul style="list-style-type: none"> • Invitations evidences (public notice, letters, posters) • meeting photographs or video • list of attendees • feedback forms or evaluation forms • minutes of meeting For Environment Impact assessment, the EIA study report must be provided for each CPA (if conducted).
8	Public funding or ODA	Each CPA will provide an affirmation that funding from Annex I party, if any, does not result in a diversion of official development assistance.	Each CPA shall provide declaration of no public funding or no ODA from annex-1 party.
9	Target group	The target group of each CPA will be connected to Indian electricity grid	This can be checked from the PPA for each CPA.
10	Sampling	No sampling method is applicable.	Not Applicable
11.	Other PoAs or projects	There is no other registered CDM project activity, included in another registered PoAs, deregistered project activities with the same identification data.	Declaration of double counting check, GPS coordinates, Analysis of projects in the CDM pipeline
12	Small-Scale Thresholds	The capacity of each hydro power project will not exceed 15MW over the entire crediting period as small-scale CDM project activities. In case of microscale CPA, the installed capacity of each hydro power project will not exceed 5MW over the entire crediting period.	Not applicable for the POA as Large Scale meth will be used and hence capacity of the CPA should be more than 15 MW.

13	De-bundling Check	Each CPA is not a de-bundled component of a large scale project activity as per Para.15 of Methodological tool Assessment of de-bundling for small scale project activities	Not applicable for the POA as Large Scale meth will be used and hence de-bundling creteria is not applicable for the POA.
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Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	<input checked="checked" type="checkbox"/> Coordinating/managing entity <input type="checkbox"/> Project participant
Organization name	General Carbon Advisory Services Pvt. Ltd.
Country	India
Address	5th Floor, Great Social Building, Sir PM Road, Fort, Mumbai, Maharashtra- 400001
Telephone	+91 22 2266 3201
Fax	+91 22 2266 3201
E-mail	info@general-carbon.com
Website	www.general-carbon.com
Contact person	Satish Kashyap, Director

Appendix 2. Affirmation regarding public funding

The PoA does not involve use of public funding.

Appendix 3. Applicability of methodologies and standardized baselines

Please refer to section I.1 and I.2 of this document.

Appendix 4. Further background information on ex ante calculation of emission reductions

Please refer section I.6 of this document.

Appendix 5. Further background information on monitoring plan

Please refer section I.7.3 of this document.

Appendix 6. Summary report of comments received from local stakeholders

Please refer section F.3 of this document.

Appendix 7. Summary of post-registration changes

Not Applicable.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
09.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Make editorial improvements.
08.1	28 June 2017	Revision to: <ul style="list-style-type: none"> • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Improve consistency with the “CDM project standard for programmes of activities” and with the PDD and CPA-DD forms; • Make editorial improvement.
07.0	25 May 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the “Programme design document form for small-scale CDM programmes of activities” (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: <ul style="list-style-type: none"> • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	<p>Revision to:</p> <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.
03.0	3 December 2012	<p>EB 70</p> <p>Revision to reflect changes to the <i>Guideline: Completing the programme design document form for CDM programmes of activities</i> (EB 70, Annex 6).</p>
02.0	13 March 2012	<p>EB 66</p> <p>Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).</p>
01.0	27 July 2007	<p>EB 33, Annex 41</p> <p>Initial publication.</p>
<p>Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: programme of activities, project design document</p>		