



**Programme design document form for  
CDM programmes of activities  
(Version 06.0)**

**PROGRAMME DESIGN DOCUMENT (PoA-DD)**

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|---|---|
| <b>Title of the PoA</b>   | India Small Scale Solar PV Programme of Activities  |
| <b>Version number of the PoA-DD</b>   | <del>11.04-0</del>  |
| <b>Completion date of the PoA-DD</b>  | <del>09/07/2012</del> <b>25/07/2017</b>   |
| <b>Coordinating/ managing entity</b>  | Mabanaft Carbon India Private Limited   |
| <b>Host Party(ies)</b>  | India   |
| <b>Applied methodology(ies) and, where applicable, applied standardized baseline(s)</b> | AMS-I.D, version 17 "Grid connected renewable electricity generation"<br><u>ACM0002 Grid-connected electricity generation from renewable sources --- Version 17.0</u><br><u>Standardized baseline is not applicable for POA</u> |
| <b>Sectoral scope(s) linked to the applied methodology(ies)</b>                         | Sectoral Scope 1: <u>Energy Industries (renewable - /non renewable sources)</u>   |

## PART I. Programme of activities (PoA)

### SECTION A. General description of PoA

#### A.1. Title of the PoA

India Small Scale Solar PV Programme of Activities

#### A.2. Purpose and general description of the PoA

General operating and implementing framework of PoA

India is a country of severe contrast. With a population of 1.2 billion (2nd largest in the world)<sup>1</sup> and a geographical area measuring 3.2 million sq. km (ranked 7th in the world) the country has seen rapid economic growth since the 1990s and today ranks as the world's 5th largest economy in terms of GDP at USD 4 trillion. Yet 25% of the population continues to live below the poverty line with 52% of the labour force employed in the agriculture sector and with a per capita GDP of USD 3,500 the country ranks at a low 162nd in the world. Similarly, despite the size of the country and its population, India's electricity consumption ranks nearly equal to that of Germany, (a country of 81 million people and an area of 10% the size of India) which clearly highlights the huge gap between supply and demand of energy.

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 in May 2016 was only 14.13%<sup>2</sup>. The Indian Government<sup>3</sup> 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<sup>4</sup>. Thus, CME has started a PoA to facilitate promotion of renewable energy generation.

~~Recognising this gap, the government of India is looking at all possible options including coal, nuclear and renewable energy to sustain the high level of economic growth. Being a tropical country, the government initiated a mission under the title 'Jawaharlal Nehru National Solar Mission' (JNNSM) with the aim to "promote ecologically sustainable growth" and contribute towards "global efforts to meet the challenge of climate change"<sup>5</sup>.~~

~~Recognising the issues of high cost and scalability of solar PV, the mission recognises the need to create a policy framework to deploy 20,000 MW by 2022 in a phased manner. Paragraph 4.2~~

<sup>1</sup> Source: All number data in this paragraph are taken from the CIA website - <https://www.cia.gov/library/publications/the-world-factbook/geos/in.html> accessed 29/12/2011

<sup>2</sup> [http://www.cea.nic.in/reports/monthly/installedcapacity/2016/installed\\_capacity-05.pdf](http://www.cea.nic.in/reports/monthly/installedcapacity/2016/installed_capacity-05.pdf)

<sup>3</sup> <http://www.mnre.gov.in/schemes/support-programmes/>

<sup>4</sup>

(a) <http://economictimes.indiatimes.com/opinion/guest-writer/indias-renewable-energy-challenge/articleshow/7289421.cms> (Article paragraph no. 2)

(b) [Indian Renewable Energy Status Report, 2010 - http://www.nrel.gov/docs/fy11osti/48948.pdf](http://www.nrel.gov/docs/fy11osti/48948.pdf) (Page no. 115, 124)

(c) [http://www.ey.com/Publication/vwLUAssets/Renewable\\_energy\\_country\\_attractiveness\\_indices-Issue\\_33/\\$FILE/EY\\_RECAI\\_issue\\_33.pdf](http://www.ey.com/Publication/vwLUAssets/Renewable_energy_country_attractiveness_indices-Issue_33/$FILE/EY_RECAI_issue_33.pdf) (Page no. 22, para no.3 & page no. 27)

<sup>5</sup> ~~Source: Official JNNSM GOI document - <http://india.gov.in/allimpfrms/alldocs/15657.pdf> (page 1) accessed 29/12/2011~~

of the official 'Guidelines for Selection of New Grid Connected Solar Power Projects'<sup>6</sup> encourages project developers to "identify the role of carbon finance in their investment analysis".

#### 1. Policy/measure or stated goal of the PoA

The objective of the ~~India Small Scale Solar PV~~ PoA, being managed by Mabanft Carbon India Private Limited (MCI), the CME (Coordinating and Managing Entity), is to encourage the development of ~~grid-connected solar PV power projects~~ renewable technology in India and increase the supply of renewable energy into the country's electricity grid which is predominantly coal based as of the current situation. Mabanft Carbon B.V. based out of Rotterdam is the parent company of MCI and have an internal memorandum of understanding (MOU) with MCI. This PoA aims to facilitate easier entrance for carbon financing of ~~grid-connected solar PV~~ renewable projects in India. The CME shall be responsible for identifying potential CPAs for inclusion and the overall management of the PoA. For purpose of this documentation the terminology "CPA Developer" is used to collectively denote the CDM terminology "CPA implementer", CPA owners and/or turnkey solution provider as the case maybe. The PoA will provide a platform for CPA implementers and/or project owners of grid connected solar PV projects like solar to overcome existing barriers through additional cash-flow from carbon revenues. The PoA is limited for solar technology.

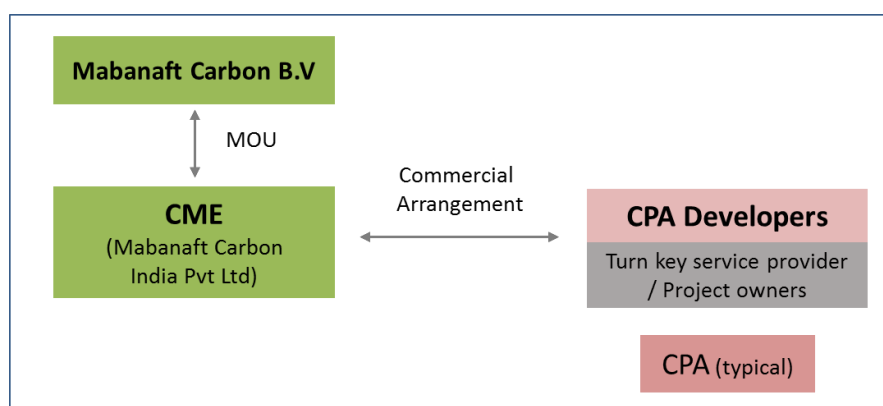


Fig 1: Schematic representation of CME and CPA Developers

While providing such a platform for potential CPAs, the CME will take care of the CDM cycle development of the project activity and receive a certain return from CERs generated from the CPAs for its efforts.

All CPAs within the PoA will consist of renewable projects ~~grid-connected solar PV projects of capacity less than 15 MW~~ and the electricity generated will be exported to the national / sub-national electricity —grid of India or supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling. By replacing electricity from fossil fuel based power plants, this project PoA will directly contribute to reduce greenhouse gas (GHG) emissions. The expected average annual emission reduction under the proposed first CPA to be registered under this PoA is 1,340 tCO<sub>2e</sub>/year that is equivalent to 9,380 tCO<sub>2e</sub> over the first crediting period of 7 years.

<sup>6</sup>-Source: Official JNNSM Guidelines: <http://pib.nic.in/archive/others/2010/jul/jnnsbm.pdf> (page 17) accessed 29/1/2011

All CPAs within this PoA will consist of only solar renewable technology, and also use any one methodology. Also an individual CPA will either be small-scale CPA (having methodology AMS I.D version 17) or large-scale CPA (having methodology ACM0002 version 17) and not a combination of any two methodologies.

Thus below cases are represented as generic CPA DD

Case 1: Small Scale CPA or Micro scale CPA with AMS I.D methodology for Solar energy technology

Case 2: Large Scale CPA with ACM0002 methodology for Solar energy technology

Apart from generation of renewable electricity, the PoA and CPAs proposed to be included under it would contribute to the sustainable development of the region - socially, environmentally and economically. Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development in the interim approval guidelines<sup>7</sup> for CDM projects.

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

### **Social well-being**

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

### **Economic well-being**

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

### **Environmental well-being**

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

<sup>7</sup> [http://www.cdmindia.gov.in/approval\\_process.php](http://www.cdmindia.gov.in/approval_process.php)

**Technological well-being:**

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

The Host County Approval issued by India DNA declaring acceptability of the Sustainable Indicators by the PoA shall be submitted to DOE.

For large scale CPAs, the National CDM Authority has also mandated CMEs to commit a minimum of 2% earning (net realization value) from sale of CERs towards Sustainable Development activities including society and community development activities. This commitment would be realized based on the actual CER revenue received by the CMEs after meeting the statutory tax requirements and CER revenue sharing requirements with the utility as per the provisions of the PPA

~~The proposed PoA will improve energy security avoiding the use of fossil fuels and the consequent pollutant emissions and hence, promoting India's sustainable development. Moreover, the success of this project can be replicated, opening new business and social upliftment opportunities and increasing renewable energy share. Construction of solar PV power projects requires large, barren areas with excellent sunshine, which are usually, located in remote regions of India. Local unskilled population can benefit from temporary employment during the construction activity especially during the dry seasons. Land owners of non-usable tracts of land can benefit from income generation. Post construction, the project could continue to employ a small number of locals for periodic cleaning and upkeep of the solar panels and the project site.~~

~~The use of solar energy remains embryonic in the country; the proposed PoA will provide a key incentive to further boost the development of solar energy projects in India. The PoA will promote the development of solar energy in India, which will result in the reduction of emissions of NO<sub>x</sub>, SO<sub>x</sub>, particles, soot, etc, since the electricity produced by the solar energy projects will replace predominantly coal fired electricity production.~~

2. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

The proposed PoA is a voluntary action by Mabanaft Carbon India Pvt Ltd and has not been established due to any existing policy or regulation by the government of India. The company would not be developing this initiative if there will be no potential for future carbon cash flow.

**A.3. CME and participants of PoA**

Coordinating and Managing entity (CME) of PoA: Mabanaft Carbon India Private Limited

Mabanaft Carbon India Private Limited ~~and Mabanaft Carbon B.V are~~ enlisted as the focal point for communication with the EB with responsibilities distributed as outlined in the Modalities of Communication. A copy of the MOC duly signed by representatives of the entities has been submitted to the DOE.

**A.4. Party(ies)**

| Name of Party involved<br>("host" indicates host Party) | Private and/or public<br>entity(ies) project<br>participants, CME (as<br>applicable) | Indicate if the Party involved wishes<br>to be considered as project<br>participant (Yes/No) |
|---|--|--|
|---|--|--|

| Name of Party involved<br>("host" indicates host Party)  | Private and/or public<br>entity(ies) project<br>participants, CME (as<br>applicable)      | Indicate if the Party involved wishes<br>to be considered as project<br>participant (Yes/No) |
|--|---|--|
| Republic of India  | Coordinating and Managing<br>entity (CME) of PoA: Mabanft<br>Carbon India Private Limited | No   |
| <del>The Netherlands</del>   | <del>Private Entity:<br/>Mabanft Carbon<br/>B.V.</del>                                    | <del>No</del>  |
| <del>Germany</del>   | <del>Private Entity:<br/>Carbonbay GmbH &amp;<br/>Co., KG</del>                           | <del>No</del>  |
| (*) In accordance with the CDM modalities and procedures, at the time of making the PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required |   |  |

#### A.5. Physical/ Geographical boundary of the PoA

All ~~Component Project Activities~~ ~~CDM programme activities~~ (CPAs) included in the PoA will be implemented within the territorial ~~area~~ of the Republic of India. Renewable energy in India is a federal subject headed by the Ministry of New and Renewable Energy with the broad aim to develop and deploy new and renewable energy for supplementing the energy requirements of the country. ~~In June 2008, the Government announced the National Action Plan on Climate Change and identified solar technology as one of the 'national missions'. The objective of the National Solar Mission is to "establish India as a global leader in solar energy, by creating the policy conditions for its diffusion across the country as quickly as possible"~~<sup>8</sup>. Given the high cost of solar technology, the PoA will support potential project owners / CPA developers thereby supporting the objectives of the national solar mission and encourage the deployment of grid-connected solar PV projects across the territorial area of the Republic of India.

<sup>8</sup> NSM: <http://www.mnre.gov.in/solar-mission/jnnsn/resolution-2/> (accessed 6/3/2012)





Fig 2: Political map of India

Disclaimer: This map is for illustrative purposes and does not imply the expression of any opinion on the part of the project stakeholders. Users of the information displayed in this map service are strongly cautioned to verify all information before making any decisions.

#### A.6. Technologies/measures

**The CPAs under PoA will involve only solar renewable energy technology.**

(a) Solar Power Plant/Unit; or

A typical CPA under this PoA will be a solar PV energy plant/park with standard technology employed. **CPAs should be connected to the national/sub-national grid.** The boundary of the PoA is currently the host country India. If the geographical boundaries are extended to include additional countries, they will be in compliance with UNFCCC approved documentation (EB 60, Annex 26)

Even though the detailed technical characteristics might differ per CPA the following general conditions will apply to all CPAs:

CPAs are Greenfield grid connected solar PV projects which use sun's energy converted with help of photovoltaic (PV) into electricity which is supplied to the national grid/sub-national grid.

The CPAs under POA will install a new power plant (i.e. solar PV) at a site where no renewable power plant was operating prior to the implementation of the project activity (green-field plant). The generated electricity will be supplying to grid or supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.

#### **Scenario existing prior to the implementation of project activity:**

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

#### **Baseline Scenario:**

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

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodologies (AMS I.D and ACM0002) is the following:

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

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

The PoA will be open to all technology providers and projects that meet the PoA’s eligibility criteria.

A CPA under this PoA may be a single plant or a cluster of such plants employing the same technology undertaken by the same CPA developer or project community.

### **A.7 Public funding of PoA**

There is no Public funding involved in this PoA

## **SECTION B. Demonstration of additionality and development of eligibility criteria**

### **B.1. Demonstration of additionality for PoA**

- (i) The proposed PoA is a voluntary coordinated action;

The proposed PoA is a voluntary action by the CME. The CME as the key project participant with the implementation of the PoA intends to facilitate the access to CDM revenues to ~~solar-PV~~renewable project developers and to build an easier entrance for carbon financing for ~~solar-renewable~~ energy projects in India. When providing such a platform for potential CPAs the CME is taking care of the development of the CDM cycle related tasks of the project activity and will receive a certain return from CERs generated from the CPAs. The electricity generated by the PoA ( for AMS I.D and ACM002 methodology) will replace the equivalent amount of electricity generated by the operation of existing/ grid connected power plants (mostly fossil fuel based power plants) and by addition of new generation sources into the grid.



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

The PoA is a voluntary coordinated action by the CME allowing conditional participation of CPAs. The CME is developing and coordinating the PoA due to the expected CER revenues from the underlying CPAs. The voluntary coordinated action would not be implemented by the CME in the absence of the PoA.

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

The Ministry of New and Renewable Energy<sup>9</sup> (MNRE) is the primary rule making body for renewable energy including solar technologies including photo-voltaic technologies in India. From the MNRE website, it can be understood that there are currently no mandatory policy or regulation for implementation of ~~solar PV~~renewable energy technologies in India.

The Indian government is currently promoting the growth of solar PV through a 'Jawaharlal Nehru National Solar Mission' (JNNSM) however this is not a mandatory policy as can be understood by the objective of the mission which states "the objective of the National Solar Mission is to establish India as a global leader in solar energy, by creating the policy conditions for its diffusion across the country as quickly as possible"<sup>10</sup>. Hence the focus is on creating suitable 'policy conditions' to promote solar. Hence, as there is no mandatory policy, the PoA implementing a mandatory policy/regulation is not applicable.

As per Standard for "Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities" Version 4, Annex 03, EB 87 "Additionality shall be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur."

For the proposed PoA, each CPA will be apply any one methodology out of the AMS ID (version 17), or ACM0002 (version 17) and not combination of any two methodologies.- The CPA will be of only solar technology, thus the additionality will be demonstrated on a CPA level, but complying with additionality inclusion criteria defined at PoA level. The additionality for each CPA will be demonstrated as per eligibility criteria, by demonstrating that the project activity would otherwise not be implemented due to the existence of one or more barrier(s). The demonstration of the existence of one or more barriers for the implementation of the project activity is included as the eligibility criteria for the inclusion of a CPA in PoA. Wherever applicable, the additionality will also be substantiated by the existence of investment barrier and latest version of the Methodological tool "Investment analysis" will be applied to determine the financial indicator and the benchmark for the CPA.

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

As discussed in paragraph (iii) above, there ~~are~~is currently no mandatory policy or regulation to implement ~~grid-connected solar PV~~renewable power projects in India hence the issue of PoA leading to a greater level of enforcement does not arise and is therefore not applicable.

~~The Project Proponent has chosen to demonstrate additionality at the POA level, with only demonstration of compliance with the specified "additionality criteria" (para 5 of Eligibility Criteria) required by each CPA. In line with the EB Guidance "Attachment A of Appendix B" of the~~

<sup>9</sup> Official website, MNRE: [www.mnre.gov.in](http://www.mnre.gov.in) (accessed 5<sup>th</sup> March 2012)

<sup>10</sup> JNNSM official website: <http://india.gov.in/allimpfrms/alldocs/15657.pdf> (accessed 5<sup>th</sup> March 2012), page 2

~~“Simplified modalities and procedures for small-scale CDM project activities (EB63, Annex 24), solar power projects with the installed capacity up to 15 MW are considered to be additional without the need for further demonstration.~~

~~Thus, a SSC-CPA is automatically additional if it meets the eligibility criteria for the inclusion of the CPA in the PoA, as per section A.4.2.2 of this PoA-DD.~~

## **B.2. Eligibility criteria for inclusion of a CPA in the PoA**

The eligibility criteria for inclusion of a CPA under the PoA have been provided below in accordance with the Standard “Demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities” Version 4, Annex 03, EB87.

These criteria check the applicability of CPAs under the respective methodology (AMS I.D version 17 for micro or small scale CPAs or ACM0002 version 17 for large scale CPAs) and also check the additionality of the CPAs as per the respective methodology.

~~CPAs under the PoA are required to fulfil a range of criteria for inclusion with regards to environmental, regulatory, financial and program specific eligibility criteria considering the ‘STANDARD FOR DEMONSTRATION OF ADDITIONALITY, DEVELOPMENT OF ELIGIBILITY CRITERIA AND APPLICATION OF MULTIPLE METHODOLOGIES FOR PROGRAMME OF ACTIVITIES’ (EB 65, Annex 3, Para 14)~~

The criteria have been grouped into below categories:

1. General criteria (to be fulfilled by all CPAs for inclusion in the PoA)
2. Small-scale CPA criteria (if applicable) (to be fulfilled by only small-scale CPAs for inclusion in the PoA and having methodology AMS I.D version 17)
3. Micro scale CPA criteria (if applicable) (to be fulfilled by only micro-scale CPAs for inclusion in the PoA and having methodology AMS I.D version 17)
4. Large-scale CPA criteria (if applicable) (to be fulfilled by only large-scale CPAs for inclusion in the PoA and having methodology ACM0002 version 17)

Small scale CPA follows AMS I.D version 17 methodology, however large scale CPA follows ACM0002 Version 17 methodology.

Each CPA should include only solar energy technology. Also an individual CPA will either be small-scale CPA (having methodology AMS I.D version 17) or large-scale CPA (having methodology ACM0002 version 17) and not a combination of any two methodologies.

**Table 1: Generic Eligibility criteria for inclusion of a project activity as a CPA under the PoA:**

| <b>Eligibility Criteria / Guideline as per<br/>EB <del>65</del>87, Annex 3 para 1<del>8</del>4)</b>  | <b>Yes /<br/>No</b> | <b>Information to be included in<br/>CPA-PDD and supporting<br/>evidence.</b>   |
|--|---------------------|---|
| Geographical boundary of CPA: The CPA (also referred as ‘project’ in this table) should be located within the geographic boundaries of the Republic of India and the electricity should be supplied to India’s national /regional electricity grid <u>or supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</u> | <u>Yes</u>          | <ul style="list-style-type: none"> <li>- Include description of project location (state, district, nearest town/village) and a map of India denoting the location of site.</li> <li>- Include a map of India indicating its location within the geographic boundaries of India.</li> <li>- Include GPS coordinates of the site with an accuracy of 4</li> </ul> |

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|  |            | <p>decimals or in degree / minute / second format.</p> <ul style="list-style-type: none"> <li>- Include an appropriate supporting evidence in the form of permits or approvals or commercial agreements (ex. PPA) which provide an indication of the address or location of the proposed site</li> </ul>  |
| <p>Unique identification / Double Counting: Each CPA should be uniquely identified through identifying numbers (ex. Mabanaft- IN-PV-01), name of CPA, CPA Developer, Site Location and GPS coordinates.</p> <p>To avoid any potential errors through double counting, projects already registered as a CDM project or included as a CPA under a registered PoA, the same shall NOT be eligible for inclusion under this PoA.</p>   | <u>Yes</u> | <p>Provide the following details:</p> <p>Name of the CPA</p> <p>Contact Information of the CPA Developer</p> <p>The physical location of the project but not limited to the GPS coordinates.</p> <p>General information on the project (ex. proposed technology, capacity, etc)</p> <p>Present status of legal permits as required for the execution of the CPA.</p> <p>Expected start date as defined in the PoA- PDD</p> <p>For all CPAs excluding the ones being developed by MCI and its associate companies, the CPA Developer shall include an affirmation that the proposed CPA is not registered as another CDM project or included as a CPA in another registered PoA, and sign off acknowledging the terms and conditions of the PoA.</p> |
| <p><b>Specifications of technology / Demonstration of additionality:</b> Each CPA shall generate electricity through <u>Solar PV technology (but not limited to thin film and crystalline technology)renewable energy like solar.</u> <u>For Micro-scale projects – capacity will be less than 5 MW, For small scale projects capacity will be less than or equal to 15 MW and for large scale projects capacity will be greater than 15 MW. The CPA shall employ standard technology and specifications of the manufacturer and/or best practices of the market.</u> <u>The sample key specifications for solar technology will be module capacity,</u></p> | <u>Yes</u> | <ul style="list-style-type: none"> <li>- Capacity (in MW):</li> <li>- Choice of Technology:</li> <li>- <u>Level of Implementation:</u></li> <li>- <u>Level and Type of Service:</u></li> <li>- <u>Performance Specifications:</u></li> </ul> <p>Supporting evidence can be in the form of approvals / permits / purchase orders / feasibility reports / technical brochures etc that provide an indication of the proposed technology and capacity.</p> <p><u>The connectivity to the grid ( if applicable) can be verified using the Power Purchase Agreement / Wheeling Agreement or the Approval from the relevant local authority or the Purchase Orders /Work Order / contract with party providing</u></p>                                    |

|  |                   |  |
|--|-------------------|--|
| <p><u>make, and number of module, Inverter capacity, make, number etc as applicable.</u></p> <p><u>Level of Implementation:</u> Greenfield Power Plant and new equipment</p> <p><u>Level and Type of Service:</u> The renewable energy project installed as part of the CPA should be connected to the grid (<u>national grid</u>).</p> <p><u>In absence of POA/CPA, the electricity would have been generated from grid connected power plants (fossil fuel dominated).</u></p> <p><u>Performance Specification:</u> The CPA should install renewable energy technology that have</p> <p><u>Approval / certification from the relevant designated authority.</u></p> <p><u>All the equipment of each CPA will be complying with applicable national/ international standards.</u> Only project activities employing solar photo voltaic technology and with a capacity not exceeding the small scale threshold of 15 MW and fulfil the conditions for additionality criteria set out under this PoA shall qualify for inclusion under this PoA.</p> |                   | <p><u>equipment / construction /operation services.</u></p> <p><u>The key specifications of relevant technology and their details or numerical values should be mentioned in real case specific CPA DD.</u></p> <p><u>The level and type of service will be checked from CPA.</u></p> <p><u>The approval of the technology will be verified from relevant designated authority. All the equipment of each CPA will be complying with applicable national/ international standards.</u></p> |
| <p><u>Start date:</u> Indicate the project start date in line with the definition of the CDM glossary and verify that the project start date is not earlier than 12th January 2012, which is the start of validation (GSC start) for the PoA. If the project start date has not occurred at the time of CPA inclusion, include an indicative start date. The actual CPA start date can then be updated once necessary evidence is available.</p>   | <p><u>Yes</u></p> | <p>Start date of the project should be in line with the definition as provided by the CDM Glossary (EB 66, Annex 63)</p> <p>If no start date has been undertaken at the time of CPA inclusion, the CPA-PDD shall provide an indicative start date. The actual start date can then be later confirmed upon receipt of necessary evidence.</p>   |
| <p><u>Methodology compliance:</u> Does the CPA comply with the applicability criteria of AMS I.D <u>or ACM0002</u></p> <p><u>—Grid connected renewable electricity generation, ver 17.0 (also fulfilment of the 'additionality criteria'):</u></p> <p><u>The proposed CPA shall be a greenfield project</u></p> <p><u>Capacity Limitation:</u></p> <p><u>either small scale or large scale or micro-scale</u></p> <p><u>The total installed capacity of the CPA</u></p>  | <p><u>Yes</u></p> | <p>This condition will be considered fulfilled if the proposed CPA is a greenfield, <u>grid connected solar PVrenewable energy (solar) project, of capacity less than 15 MW</u>The information can be cross verified with paragraph 3 of this eligibility criteria table and <u>small/large/micro scale projects.</u></p>  |

|   |            |  |
|---|------------|--|
| <p><del>should not exceed 15 MW.</del></p> <p>Technology Limitation:</p> <p><del>Solar</del> Installed technology should be grid connected renewable (solar photo-voltaic) electricity generation.</p> <p><del>The CPA shall not be a combined heat and power (co-generation) system.</del></p>   |            |  |
| <p>LSC / EIA: Does the CPA comply with requirements stated in the generic CPA-PDD for the following:</p> <p>Local Stakeholder Consultation</p> <p>Environmental Impact Assessment</p>   | <u>Yes</u> | <p>As per host country regulations, EIA is not required to be undertaken for <del>solar</del> <u>PV-renewable</u> projects (<u>solar</u>).</p> <p>IF an LSC has been undertaken at the time of inclusion, provide a copy of the same. If not, a copy shall be made available by the CPA Developer upon undertaking the LSC.</p>  |
| <p>De-bundling check: Check if the CPA is NOT a de-bundled component of any other large scale project activity. <u>This need to be check only for small scale or micro scale projects.</u></p>  | <u>Yes</u> | <p>Include a description in line with relevant 'Guidelines on assessment for de-bundling'(EB 54, Annex 13)</p> <p>Provide a copy of an appropriate online database to support the description.</p>   |
| <p>CPA owner/developer to provide a written undertaking / affirmation acknowledging the following terms and conditions for the CPA inclusion:</p> <ul style="list-style-type: none"> <li>Formal application for inclusion of CPA in the PoA under consideration</li> <li>Affirm that the inclusion is a voluntary action</li> <li>Affirm that all equipment used in the project shall be new.</li> <li>Statement on diversion of ODA</li> <li>Affirmation that CPA crediting period shall not exceed <del>the small scale limit of 15MW and</del> PoA end date.</li> <li>Acceptance of terms and conditions for inclusion in the PoA</li> </ul> | <u>Yes</u> | <ul style="list-style-type: none"> <li>All CPAs excluding projects being developed by MCI shall provide a written affirmation confirming the following:</li> <li>Formal application by the CPA owner/developer for inclusion of CPA in the PoA under consideration and an affirmation that this is a voluntary action by the CPA owner/developer.</li> <li>Clarification on diversion of ODA</li> <li>Acceptance of terms and conditions for inclusion in the PoA.</li> <li>An affirmation that the CPA developer will not indulge in any activity that will lead to double counting of emission reduction generated by the project.</li> <li>If a purchase order (P.O) for equipment has already been placed, then the affirmation is not required. In that case the CME Manager shall ensure that the equipment ordered is for new equipment only. In absence of a P.O, an affirmation is required from the CPA developer and the CME Manager shall ensure that the equipment ordered are new.</li> <li>Approvals / permits which state</li> </ul> |

|  |  |  |
|--|--|--|
|  |  | the approved capacity of the CPA. An affirmation from the CPA developer to understand that CPA crediting period shall not exceed beyond 28 years from PoA start date. (This is specifically applicable for CPAs joining the PoA from year 7 onwards) |
|--|--|--|

Note: All CPAs will be monitored and verified; hence the “sampling requirement” under the eligibility criteria is not applicable. Similarly the PoA is open to all participants who comply with the requirements of the PoA hence the “target group” under the eligibility criteria is not applicable and therefore not included in the above table.

### Small Scale CPA Criteria:

| <u>Sr. No</u> | <u>Criteria</u>   | <u>Response required for eligibility for inclusion in PoA</u> | <u>Means of Verification / Documentary Evidence</u>  |
|---------------|---|---|--|
| <u>1</u>      | <u>Will the aggregate installed capacity of the CPA remain less than the 15 MW threshold throughout the crediting period of the CPA in accordance with the “General Guidelines to SSC CDM methodologies”?</u>   | <u>Yes</u>  | <ul style="list-style-type: none"> <li>• <u>Detailed Project Report Prepared by third party / Submitted to banks for financing, Clearances,</u></li> <li>• <u>Purchase Orders</u></li> <li>• <u>Commissioning reports</u></li> </ul>   |
| <u>2</u>      | <u>Does the CPA comply with the applicability conditions of AMS I.D Version 17?</u>   | <u>Yes</u>  | <ul style="list-style-type: none"> <li>• <u>Detailed Project Report Prepared by third party / Submitted to banks for financing, Clearances,</u></li> <li>• <u>Purchase Orders</u></li> <li>• <u>Power Purchase agreement</u></li> <li>• <u>Commissioning certificate</u></li> <li>• <u>Grid evacuation approval if applicable</u></li> </ul> |
| <u>3</u>      | <u>In order to determine the occurrence of debundling in accordance with the Methodological tool “Assessment of debundling for small-scale project activities” <sup>11</sup> Version 04, does the CPA satisfy both of the following conditions?<br/>(a) <u>Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same</u></u> | <u>No</u>   | <ul style="list-style-type: none"> <li>• <u>Detailed Project Report prepared by third party / submitted to banks for financing,</u></li> <li>• <u>Clearances,</u></li> <li>• <u>Purchase Orders,</u></li> <li>• <u>Contract with CME</u></li> </ul>  |

<sup>11</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-20-v1.pdf>



|   |   |            |   |
|---|---|------------|---|
|   | <u>technology/measure, and:</u><br><u>(b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.</u>  |            |   |
| 4 | <u>Is the CPA additional as per the Methodological tool “Demonstration of additionality of small-scale project activities”<sup>12</sup> version 10 by fulfilling one of the following criteria:</u><br><u>(a) forms part of positive list of grid connected renewable electricity generation technologies; or</u><br><u>(b) faces investment barrier demonstrated as per the Methodological tool “Investment analysis”.</u> | <u>Yes</u> | <u>(a) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders</u><br><u>(b) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders, calculations of project financial indicator and benchmark using Benchmark Analysis as per the Methodological tool “Investment analysis”</u> |

If any small scale CPA follows micro scale guidance, then below Micro-scale CPA criteria to be fulfilled for inclusion in the PoA

#### **Micro Scale CPA Criteria:**

In line with methodological tool “Demonstration of additionality of micro-scale project activities” version 7.1 (Annex 14 of EB86)<sup>13</sup>

| <b><u>Sr. No</u></b> | <b><u>Criteria</u></b>   | <b><u>Response required for eligibility for inclusion in PoA</u></b> | <b><u>Means of Verification / Documentary Evidence</u></b>  |
|----------------------|--|--|---|
| 1                    | <u>Will the aggregate installed capacity of the CPA remain less than the 5 MW threshold throughout the crediting period of the CPA in accordance with the Methodological tool “Demonstration of additionality of microscale project activities”?</u> | <u>Yes</u>   | <ul style="list-style-type: none"> <li><u>Detailed Project Report</u></li> <li><u>Prepared by third party / Submitted to banks for financing, Clearances,</u></li> <li><u>Purchase Orders</u></li> </ul>  |
| 2                    | <u>Does the CPA comply with the applicability conditions of AMS I.D Version 17?</u>  | <u>Yes</u>   | <ul style="list-style-type: none"> <li><u>Detailed Project Report</u></li> <li><u>Prepared by third party / Submitted to banks for financing, Clearances,</u></li> <li><u>Purchase Orders,</u></li> <li><u>Power Purchase Agreement and</u></li> <li><u>Grid Evacuation approval / agreement if applicable</u></li> </ul> |
| 3                    | <u>In order to determine the occurrence of debundling in accordance with the</u>   | <u>No</u>  | <u>Detailed Project Report prepared by third party / submitted to banks for financing,</u>  |

<sup>12</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v1.pdf>

<sup>13</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-19-v7.1.pdf>

|   |  |            |  |
|---|--|------------|--|
|   | <p><u>Methodological tool “Assessment of debundling for small-scale project activities”<sup>14</sup> Version 04, does the CPA satisfy both of the following conditions?</u></p> <p><u>(a) Has the same activity implementer as the proposed micro scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;</u></p> <p><u>(b) The boundary is within 1 km of the boundary of the proposed micro-scale CPA, at the closest point.</u></p>   |            | <ul style="list-style-type: none"> <li>• <u>Clearances,</u></li> <li>• <u>Purchase Orders,</u></li> <li>• <u>Contract with CME</u></li> </ul>  |
| 4 | <p><u>Does the CPA fulfill one of the following criteria:</u></p> <p><u>(a)The project activity employs specific renewable energy technologies/measures recommended by the host country designated national authority (DNA) and approved by the Board to be additional in the host country</u></p> <p><u>(b) form part of positive list of grid-connected renewable electricity generation technologies in the Methodological tool “Demonstration of additionality of small-scale project activities”; or</u></p> <p><u>(c) face investment barrier demonstrated as per the Methodological tool “Investment analysis”.</u></p> | <u>Yes</u> | <p><u>(a) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders</u></p> <p><u>(b) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders</u></p> <p><u>(c) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders, calculations of project financial indicator and benchmark using Benchmark Analysis as per the Methodological tool “Investment analysis”</u></p> |

### Large Scale CPA criteria

Each CPA should be treated as same type due to involvement of renewable energy power generation technology and Green field type of project activity. This is in line with para 62 of ACM0002 version 17.

| <u>Sr. No</u> | <u>Criteria</u>  | <u>Response required for eligibility for inclusion in PoA</u> | <u>Means of Verification / Documentary Evidence</u>  |
|---------------|--|---|--|
| 1             | <u>Does the CPA comply with the applicability conditions of ACM0002 Version 17</u> | <u>Yes</u>  | <u>Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders, Power Purchase Agreement and</u> |

<sup>14</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-20-v1.pdf>

|          |  |            |  |
|----------|--|------------|--|
|          |  |            | <u>Grid Evacuation approval / agreement if applicable</u>  |
| <u>2</u> | <u>Does CPA follows simplified procedure to demonstrate additionality as per positive list and relevant conditions of auto additional as mentioned in methodology ACM0002 Version 17</u> | <u>Yes</u> | <u>Detailed Project Report ,</u><br><u>Clearances,</u><br><u>Purchase Orders,</u><br><u>National statistics or other official data</u><br><u>Publicly available documents</u>  |
| <u>3</u> | <u>Is the CPA additional in accordance with the “Tool for the demonstration and assessment of additionality” Version 07</u>  | <u>Yes</u> | <u>Applied methodology ACM0002,</u><br><u>Detailed Project Report prepared by third party / submitted to banks for financing,</u><br><u>Clearances,</u><br><u>Purchase Orders,</u><br><u>calculations of project financial indicator and benchmark using Benchmark Analysis as per the “Tool for the demonstration and assessment of additionality” and Methodological tool “Investment analysis” or other documents required to demonstrate barriers as per the tool,</u><br><u>capacity of plants of various technologies installed in the country</u> |

If required by the eligibility criteria provided above for inclusion of a proposed CPA in PoA, the Benchmark Analysis would be conducted as follows:

A financial indicator (project IRR or equity IRR) would be chosen for the proposed CPA and justification for its selection would be provided. The IRR in nominal terms will be applied for CPA. Subsequently, a benchmark would be adopted which is appropriate to the type of financial indicator calculated and could be chosen as either of the following:

| <u>Financial Indicator</u> | <u>Benchmark options</u>   |
|----------------------------|--|
| <u>Equity IRR</u>          | <u>Any one option from below</u><br><br><u>a. Default value for the expected return on equity for India as per the Methodological tool “Investment analysis” (increased by applicable inflation as financial indicator is calculated in nominal terms )</u><br><br><u>Or</u><br><br><u>b. Government/official approved benchmark where such benchmarks are used for investment decisions</u> |
| <u>Project IRR</u>         | <u>Any one option from below</u><br><br><u>a. Local commercial lending rates applicable in the country (pre-tax rate used in case of pre-tax IRR). The Prime lending Rate (PLR) of Reserve Bank of India (RBI) will be considered for local commercial lending rates. RBI is the relevant national authority for its statistical database and same will consider for PLR value.</u>          |

|  |   |
|--|---|
|  | <p><u>Or</u></p> <p>b. <u>Weighted Average Costs of Capital (WACC) calculated as:</u><br/> <math display="block">WACC = \{D/(D+E)\} * \{1-T/100\} * \text{Cost of Debt} + \{E/(D+E)\} * \text{Cost of Equity (tax-rate not applied in case of pre-tax IRR)}</math> <u>Where, Cost of Debt is determined as local commercial lending rate applicable in the country.</u><br/> <u>The Prime lending Rate (PLR) of Reserve Bank of India (RBI) will be considered for local commercial lending rates. RBI is the relevant national authority for its statistical database and same will consider for PLR value.</u><br/> <u>Cost of Equity is determined from any of the options listed above under Equity IRR.</u><br/> <u>'D' represents the debt component for the CPA and 'E' represents the equity component of the CPA. 'T' represents the tax rate applicable to the project activity.</u></p> <p><u>Or</u></p> <p>c. <u>Government/official approved benchmark where such benchmarks are used for investment decisions</u></p> |
|--|---|

Financial indicator calculations will be done using a financial model based on a list of economic parameters provided by the CPA implementing agency and in accordance with Methodological tool "Investment analysis". This list of parameters as applicable would include the following:

| <u>Details Input parameters of the CPA</u>          |  | <u>Source</u>   |
|---|--|---|
| <u>Investment decision made date</u>                |  | <u>Board resolution or equivalent document</u>  |
| <u>State where the project is situated</u>          |  | <u>DPR, or offer, or Purchase Order or equivalent document</u>  |
| <u>Total Capacity of CPA(MW)</u>                    |  | <u>Calculated Value</u>   |
| <u>Expected Date of Commissioning</u>               |  | <u>Assumption</u>   |
| <u>Life of the plant (Yrs.)</u>                     |  | <u>As per manufacturer specifications or relevant equivalent document</u>   |
| <u>Generation of electricity</u>                    |  | -   |
| <u>PLF (%)</u>                                      |  | <u>Publicly available data or third party PLF report or PLF as per CDM EB guidance "Guidelines for the reporting and validation of plant load factors".</u> |
| <u>Annual generation (kWh)</u>                      |  | <u>Calculated Value</u>   |
| <u>Tariff rate at the decision making (INR/kWh)</u> |  | <u>Tariff order, or PPA or Electricity Bills or relevant equivalent document</u>  |
| <u>Escalation in Tariff (if applicable)</u>         |  | <u>Tariff order, or PPA or Electricity Bills or relevant equivalent document</u>  |

|   |   |  |
|---|---|--|
| <u>Revenues ( If applicable)</u>                    |   | <u>To be included in the calculation only if applicable to CPA and not covered under tariff. This could be Generation Based Incentive from Indian Renewable Energy Development Agency Ltd. (IREDA) or any other revenue as per state/national regulatory policies applicable on the date of investment decision.</u> |
| <u>Subsidy ( If applicable)</u>                     |   | <u>National or state-specific policy applicable for solar technologies</u>   |
| <u>Operation and maintenance cost and Insurance</u> |   | -  |
| <u>O &amp; M Expenses (INR Mn.)</u>                 |   | <u>DPR , or offer or relevant equivalent document</u>  |
| <u>Escalation in the operational expenses (%)</u>   |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>O &amp; M free for (Yr.)</u>                     |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Administrative expenses</u>                      |   | <u>Administration and Miscellaneous expenses were worked out by PP during investment decision</u>  |
| <u>Escalation in Administrative expenses</u>        |   | <u>Escalation for Admin Expenses</u>   |
| <u>Insurance (INR Mn.)</u>                          |   | <u>DPR , or offer or tariff order or relevant equivalent document</u>  |
| <u>Financial parameters</u>                         |   | -  |
| <u>TOTAL COST (INR Mn.)</u>                         |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Loan Amount (INR Mn.)</u>                        |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Equity Investment (INR Mn.)</u>                  |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Term loan</u>                                    |   | -  |
| <u>Loan Amount (INR Mn.)</u>                        |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Interest rate (%)</u>                            |   |  |
| <u>Loan Tenure (Qtr.)</u>                           |   |  |
| <u>Moratorium Period (Qtr.)</u>                     |   |  |
| <u>Repayment Period (Qtr.)</u>                      |   | <u>Calculated Value</u>  |
| <u>Repayment instalments value (INR Mn.)</u>        |   | <u>Calculated Value</u>  |
| <u>1st instalment from (Qtr. end)</u>               |   | <u>Considered from the next Quarter End</u>  |
| <u>Book Depreciation (SLM Method)</u>               |   | -  |
| <u>Land</u>   | - | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Gross Depreciable Value (INR Mn.)</u>            |   | <u>Calculated Value</u>  |
| <u>Salvage Value (%)</u>                            |   | <u>DPR or offer or tariff or relevant equivalent document</u>  |
| <u>Salvage value (INR Mn.)</u>                      |   | <u>Calculated Value</u>  |

|  |  |   |
|--|--|---|
| <u>Net Depreciable Value (INR Mn.)</u> |  | <u>Calculated Value</u>                 |
| <u>Residual Value (INR Mn.)</u>        |  | <u>Calculated Value</u>                 |
| <u>IT Depreciation</u>                 |  | -                                       |
| <u>IT Depreciation (%)</u>             |  | <u>As per publically available data</u> |
| <u>Income Tax</u>                      |  | -                                       |
| <u>Financial Year</u>                  |  | -                                       |
| <u>Income tax rate (%)</u>             |  | <u>As Per Income Tax Rule,</u>          |
| <u>MAT (%)</u>                         |  | <u>As Per IT rule</u>                   |
| <u>Service Tax (%)</u>                 |  | <u>As Per Income Tax Rule</u>           |
| <u>Surcharge (%)</u>                   |  | <u>As Per Income Tax Rule,</u>          |
| <u>Education cess (%)</u>              |  | <u>As Per Income Tax Rule,</u>          |
| <u>Final Tax rates</u>                 |  | -                                       |
| <u>Income tax rate (%)</u>             |  | <u>Calculated Value</u>                 |
| <u>MAT (%)</u>                         |  | <u>Calculated Value</u>                 |
| <u>Service Tax (%)</u>                 |  | <u>Calculated Value</u>                 |

Input values used in all investment analysis for the calculation of both the financial indicator and the Benchmark should be valid and applicable at the time of the investment decision taken by the CPA Implementer. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is chosen the fair value of the project activity assets at the end of the assessment period will be included. The financial indicator should be lower than the benchmark to demonstrate additionality.

Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to variation of +/- 10% and the results of this variation should be presented in the CPA DD

The following parameters need to be subjected to the sensitivity analysis:

- Energy generation or Plant load factor
- Capital Cost
- Operation & Maintenance cost
- Tariff rate

In case the financial indicator remains lower than the benchmark in spite of favourable variations, it can be concluded that the CPA is unlikely to be financially attractive and would not have been implemented without CDM revenues.

For large scale CPA, the common practice analysis will be carried out as per methodological tool "Common practice" Version 03.1.

### **B.3. Application of technologies/measures and methodologies**



The PoA involves development of new grid-connected renewable energy power plants in India and will cover solar power renewable **energy technologies**.

The CPAs will be grid connected and will install a new power plant at a site where no renewable power plant was operating prior to the implementation of the project activity (green-field plant). The generated electricity would be exported to the NEWNE regional grid or Southern regional grid (or an integrated national grid) or supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling-.

In proposed PoA, each CPA will apply **only one technology and only single methodology**. Thus each CPA will be either small scale or large scale and not combination of two. Accordingly,

(a) In case of large scale projects, i.e. CPAs with total installed capacity > 15 MW:

Title: ACM0002 Grid-connected electricity generation from renewable sources --- Version 17.0  
Reference: ACM0002 Version 17

(b) In case of small scale projects, i.e. CPAs with total installed capacity ≤ 15 MW:

The project activity applies UNFCCC approved SSC baseline and monitoring methodology; AMS-I.D, version 17 "Grid connected renewable electricity generation".

The methodology AMS I.D was approved for use for PoAs in EB 33, Annex 23 - "Revision of the approved small-scale methodology AMS I.D to allow for its application under a programme of activities (PoA)"

There is no sampling plan involved for the PoA.

List of tools associated with the above stated methodology:

~~Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion (version 2.0)~~

Latest version of Tool to calculate the emission factor for an electricity system ~~(version 2.2.1)~~

#### **B.4. Date of completion of application of methodology and standardized baseline and contact information of responsible person(s)/ entity(ies)**

The date of completing the baseline study and applying the monitoring methodology:  
~~30/12/2014~~ 28/12/2016

Further, the standardized baseline is not applicable for this project activity.

EKI Energy Services Ltd. is the entity responsible for the application of the selected methodology for this project activity. This entity is not acting as CME as mentioned in Appendix 1 below.

Responsible entity:

Perspectives GmbH, Baumeisterstrasse 2, 22099 Hamburg, Germany ([www.perspectives.cc](http://www.perspectives.cc))

Contact persons:

Marc André Marr (Head of Carbon Project Services; [marr@perspectives.cc](mailto:marr@perspectives.cc)),

Arindam Basu (Carbon project Consultant; [basu@perspectives.cc](mailto:basu@perspectives.cc))

## SECTION C. Management system

The CME shall develop an operational and management plan (e.g. CME Manual) documentation which shall elaborate further on the following arrangements:

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

The CME will operate a 'PoA Monitoring Database' for every CPA that is included under the PoA. This PoA Monitoring Database is a record keeping system and will consist of the following set of information:

1. Name of CPA (identical to the name as stated in the CPA-PDD) along with a unique identification / numbering system (ex. Mabanft-IN-PV-01 or Mabanft-IN-RE-01)
2. Contact information, including the name of CPA developer/owner, contact address (including postal code), name and designation of contact person, phone number including regional codes and email address.
3. The completed table for the 'Eligibility Criteria' including required supporting documents and evidences.

In addition to the above information, copies of all preceding monitoring records, monitoring reports and verification status shall be retained through subsequent crediting periods.

The CPA developer will record the required monitoring data (CPA monitoring records) and will ensure that the CPA monitoring records are made available to the CME.

The CME will be responsible for the management of the PoA monitoring database, consisting of the basic data for inclusion and retain copies of all CPA monitoring records.

All data will be retained for a period of 2 years after the completion of crediting period or after the last issuance whichever is later. Relevant data capture, verification and storage procedures will be followed in maintaining the data to ensure its accuracy, validity and completeness.

- (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,

There is a provision in the PoA Monitoring Database where a CPA developer will provide an affirmation to ensure against double counting.

Prior to inclusion of a new CPA within the proposed PoA, the CME will check the UNFCCC CDM project database to verify whether a CDM project activity or CPA of another PoA for **grid-connected solar-renewable** power generation has already been registered within the host country.

In an instance where a CPA of another PoA or CDM project activity is already registered, the CME will ensure through cross-checking the PoA monitoring database of the other CPA or CDM project that there is no double counting of the individual CPA for this PoA.

- (iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

There is a provision in the PoA Monitoring Database where a CPA developer will provide an affirmation in line with Methodological tool "Assessment of debundling for small-scale project activities" <sup>15</sup> Version 04 the stated guideline (EB-54, Annex 13) to ensure that the CPA is not a de-bundled component of another CPA, PoA or CDM project activity.

<sup>15</sup> <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-20-v1.pdf>

~~As per EB 54, Annex 13 para 8 'GUIDELINES ON ASSESSMENT OF DEBUNDLING FOR SSC PROJECT ACTIVITIES'<sup>46</sup> a proposed small scale activity shall be deemed as a de-bundled component of a large scale activity if there is already an activity, which satisfies both conditions (a) and (b) below:~~

- ~~a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;~~
- ~~a) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.~~

Mabanaft Carbon India (MCI) is the CME and is currently developing its first PoA in India for ~~Solar~~ PVrenewable projects. Individual CPA owners will be required to go through the most recent CDM pipeline at the time of CPA inclusion and submit an affirmation along with a list of solar PV projects in the respective state that the CPA is not a de-bundled component of a large scale activity.

This has also been tackled under the eligibility criteria.

- (iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

There is a provision in the PoA Monitoring Database where a CPA developer will provide an affirmation to ensure that the CPA developer is aware of and agreed that their activity is being subscribed to the PoA.

This has already been considered under the eligibility criteria.

Monitoring Plan:

- (i) Description of the proposed statistically sound sampling method/procedure to be used by DOEs for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPAs under the PoA.

The PoA implementing solar-renewable energy projects applies the monitoring methodology~~iesy~~ AMS I.D. or ACM0002 and all CPAs will be monitored and verified.

- (ii) In case the coordinating/managing entity opts for a verification method that does not use sampling but verifies each CPA (whether in groups or not, with different or identical verification periods) a transparent system is to be defined and described that ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA;

The CME will implement a monitoring protocol that allows the Designated Operational Entity (DOE) to verify all CPAs in the PoA. As described, a PoA Monitoring database will be established that contains all the CPA specific data required to identify and locate each CPA and avoid double counting.

Monitoring will be carried out by each CPA developer. For each CPA, all parameters included in EB.7.1 of relevant Part II Generic CPA will be monitored and recorded in the CPA monitoring records by the CPA developer according to the procedures established in EB.7.2 of relevant Part II Generic CPA. Each CPA is responsible to appropriately measure the net electricity supplied to the grid and assuring the correct operation and maintenance of the measuring equipment. The CME will store all the data submitted by the CPA developer in an electronic database (PoA monitoring database). Primary data will be stored by the developer as back-up.

<sup>46</sup> ~~Source: [http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC\\_guid17.pdf](http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf)~~

Verification initiated by the CME will occur either separately for each CPA or for several CPAs at the same time. The CPA developer will be typically responsible for the preparation of the monitoring reports with support from the CME, based on the CPA monitoring records using a monitoring report form.

The monitoring reports will aggregate all required monitoring information, i.e. CPA monitoring records, in order to allow the DOE to verify the emission reductions for each monitoring period of each CPA. Each monitoring report will unambiguously set out the data on emission reductions generation by each CPA during the monitoring period consistent with the requirements of this PoA-DD and the corresponding CPA-DD. The use of the PoA monitoring database of CPA information and QA/QC procedures will ensure that double counting is not possible.

The start and end date of each monitoring period for each individual CPA, together with the CPA monitoring records attributable to that monitoring period will be recorded in the PoA monitoring database. Record keeping procedures undertaken by the CME will ensure that the CPA monitoring records attributed to a monitoring period can be clearly attributed to an individual CPA and will furthermore prevent double counting of emission reduction data.

The monitoring plan for parameters included in section EB.7.1 of relevant Part II Generic CPA will be implemented for each CPA with assistance from the CME as follows:

- CPA developer will implement each CPA individually and monitor and record all parameters included in section BE.7.1 -of relevant Part II Generic CPA (CPA monitoring record).
- The CME will provide guidance to the CPA developer on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations.
- The CPA developer will provide data on monitored parameters included in section EB.7.1 of relevant Part II Generic CPA, required calculations, if any, and any documentary evidence to the CME.
- The CME will document and store all data related to parameters included in section
- EB.7.1 of relevant Part II Generic CPA provided by CPA developer in a central electronic database (PoA monitoring database), while primary data will be stored by each CPA developer. The data will be retained for a period of 2 years after the completion of crediting period or after the last issuance whichever is later
- The CME will review relevant CPA monitoring records, conduct a QA/QC to ensure that it follows the required format and provide the monitoring report to the DOE.
- The CME will also be responsible for all communications with the DOE.

**SECTION D. Duration of PoA****D.1. Start date of PoA**

31/12/2012 or date of registration whichever is later.

**D.2. Duration of the PoA**

28 years

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

1. Environmental Analysis is done at PoA level ☒
2. Environmental Analysis is done at ~~SSC~~-CPA level ☐

~~Environmental analysis is undertaken at PoA level as solar PV technology is a renewable source of energy and the proposed technology is expected to remain homogenous across different CPAs. According to Indian regulation, the implementation of the renewable energy power project does not require an Environmental Impact Assessment (EIA). As all the CPAs involved in the PoA consist of installation of the renewable energy power project and as the Indian regulation on the Environmental Impact Assessment is the same for all the renewable energy Power Projects, thus there is no any requirement of environmental impacts at the PoA Level or CPA level.~~

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

**E.2. Analysis of the environmental impacts**

As per the official documentation<sup>17</sup> on 'Jawaharlal Nehru National Solar Mission' released by the Government of India, para 3 states "Environmental impact: Solar energy is environmentally friendly as it has zero emissions while generating electricity or heat", which highlights the official stand of the government regarding the environmental impact of solar energy projects.

Harnessing energy from the sun has no environmental impact, and there are no environmentally harmful end products are produced from the generation of electricity or heat through solar panels both within and outside the project boundary. The environmental benefits in terms of CO<sub>2</sub> emissions reduction through the deployment of solar power generating units can be quantified as is the objective of this project activity.

<sup>17</sup> Source: <http://india.gov.in/allimpfrms/alldocs/15657.pdf> (accessed 29/12/2011)



Also Refer section E.3 below.

Proposed PoA is using renewable energy generation technology which is free from any kind of anthropogenic emission. PoA is not having any negative environmental impact.

There are no negative environmental effects envisaged for the PoA. Renewable energy projects are considered as zero GHG emission projects, so there will be no pollution caused by the PoA. Hence the proposed PoA doesn't fall under the list of activities requiring EIA as it will not involve any negative environmental impacts. Thus no EIA study was conducted

### **E.3. Environmental impact assessment**

As per the prevailing host party laws, (Notification by Ministry of Environment and Forests, Government of India notification dated September 14, 2006, Schedule 1)<sup>18</sup>, 38 activities are required to undertake environmental impact assessment studies.

As clear from the document, Environmental Impact Assessment study is not required for solar renewable energy (solar) project as there is no negative environmental impact due to the project activity and it is one of the cleanest sources of energy. Hence no further EIA is required to be carried out at either PoA or CPA level.

## **SECTION F. Local stakeholder consultation**

### **F.1. Solicitation of comments from local stakeholders**

- |  |                                     |
|--|-------------------------------------|
| 1. Local stakeholder consultation is done at PoA level                 | <input type="checkbox"/>            |
| 2. Local stakeholder consultation is done at <del>SSC</del> -CPA level | <input checked="" type="checkbox"/> |

Local stakeholder consultation will be done at the CPA level. This is considered appropriate since the stakeholders associated with the different CPAs in India would be different and specific to each CPA, as the CPA locations are different.

### **F.2. Summary of comments received**

Undertaken at CPA level

### **F.3. Report on consideration of comments received**

Undertaken at CPA level

## **SECTION G. Approval and authorization**

LoA India: 4/10/2012- CCC dated 12<sup>th</sup> November 2012

LoA Netherland: ANL2012-605 dated 05<sup>th</sup> June 2012

LoA Germany: LoA dated 11<sup>th</sup> March 2014

<sup>18</sup> Source: GOI notification: <http://envfor.nic.in/legis/cia/so1533.pdf> (accessed 29/12/2011)



## **Case 1: Small Scale CPA or Micro scale CPA with AMS I.D methodology for Solar energy technology**

### **PART II. Generic component project activity (CPA)**

#### **SECTION A. General description of a generic CPA**

##### **A.1. Purpose and general description of generic CPAs**

The proposed CPA is the installation of a new grid-connected “xx” MW “solar” power plant/unit at a site where no renewable power plant was operating prior to the implementation of the project activity (green-field plant). The project is being implemented in “location (village, tehsil, district, state)” by “CPA implementing agency”.

The electricity generated from CPA [would be exported to the Indian grid] or [will be supplied to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling] there by displacing the consumption of electricity from the regional grid electricity distribution system.

The electricity generated by the CPA xxx will thus replace the equivalent amount of electricity generated by the operation of existing/ grid connected power plants (mostly fossil fuel based power plants) and by addition of new generation sources into the grid. The CPA xxx thus reduces the anthropogenic emissions of greenhouse gases (GHGs) in to the atmosphere associated with the equivalent amount of electricity generation from the existing grid connected power plants (mostly fossil fuel) and by addition of new generation sources into the grid.

Mabanaft Carbon India Private Limited is the coordinating/managing entity (“CME”) for this PoA and [Name of the CPA implementer] will be implementing the CPA xxx. The crediting period chosen for the CPA xxx is Renewable Crediting Period. The annual estimated emission reductions from CPA xxx is [Annual estimated emission reductions in tCO<sub>2</sub>e/annum].

The CPA contributions to the sustainable development of the local area as well as the host country are as follows:

Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development in the interim approval guidelines<sup>19</sup> for CDM projects.

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

##### **Social well-being**

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

<sup>19</sup> [http://www.cdmindia.gov.in/approval\\_process.php](http://www.cdmindia.gov.in/approval_process.php)

**Economic well-being**

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

**Environmental well-being**

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

**Technological well-being:**

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

**SECTION B. Application of a baseline and monitoring methodology and standardized baseline****B.1. Reference of methodology(ies) and standardized baseline(s)**

The project activity applies UNFCCC approved SSC baseline and monitoring methodology; AMS-I.D, version 17 "Grid connected renewable electricity generation".

~~The methodology AMS I.D was approved for use for PoAs in EB 33, Annex 23 – "Revision of the approved small-scale methodology AMS I.D to allow for its application under a programme of activities (PoA)"~~

~~List of tools associated with the above stated methodology:~~

~~Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion (version 2.0) Tool to calculate the emission factor for an electricity system (version 2.2.1)~~

In case of small scale projects, i.e. CPAs with total installed capacity ≤ 15 MW and for micro scale project, CPA capacity is ≤ 5 MW:

Tools applied for the CPA XXX

Latest version of Tool to calculate the emission factor for an electricity system

**B.2. Applicability of methodology(ies) and standardized baseline(s)**

The project activity applies to approved SSC baseline and monitoring methodology; AMS-I.D. The project is eligible under this methodology since:

| Sr no. | Applicability conditions under AMS I.D  | Project activity is applicable to use the methodology since  |
|--------|---|--|
| 1      | <p>This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:</p> <p>(a) Supplying electricity to a national or a regional grid; or</p> <p>(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</p>                            | <p><b>Applicable and Fulfilled</b></p> <p>The project activity consist of renewable electricity generation through solar PV (photovoltaic) that will be supplied to the country's national / sub-national grid <u>or will be supplied electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</u></p>  |
| 2      | <p>Illustration of respective situations under which each of the methodology (i.e. AMS- I.D, AMS-I.F and AMS-I.A2) applies is included in Table 2.</p>  | <p><b>Applicable and Fulfilled</b></p> <p>The project activity consist of renewable electricity generation through solar PV (photovoltaic) that will be supplied to the country's national / sub-national grid <u>( 1<sup>st</sup> option of table 2) or will be supplied electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling ( 2<sup>nd</sup> option of table 2).</u> Hence is in compliance with Table 2 of AMS I.D version 17.</p> |
| 3      | <p>This methodology is applicable to project activities that:</p> <p>(a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition;<sup>3</sup> (c) In <del>4</del>existing plant(s); or (d) Involve a replacement<sup>5</sup> of (an) existing plant(s).</p> | <p><b>Applicable and Fulfilled</b></p> <p><del>The project activity consist of renewable electricity generation through solar PV (photovoltaic) that will be supplied to the country's national / sub-national grid.</del></p> <p>All project activities are expected to be greenfield projects. <u>Option a is applicable for CPA.</u></p>  |
| 4      | <p>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p>   | <p><b>Not Applicable</b></p> <p>The project activities are grid connected <del>solar-renewable</del> energy projects <u>( solar) and not hydro power plants</u></p>  |
| 5      | <p>If the new unit has both renewable and non- renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>  | <p><b>Not Applicable</b></p> <p>The project activities are grid connected <del>solar-renewable</del> energy projects <u>(solar)</u> and does not involve any non-renewable component.</p>  |
| 6      | <p>Combined heat and power (co-generation) systems are not eligible under this category.</p>  | <p><b>Applicable and Fulfilled</b></p> <p>The project activity consist of renewable electricity generation through solar PV</p>  |

|   |   |   |
|---|---|---|
|   |   | (photovoltaic) and is not a combined heat and power (co-generation) systems.  |
| 7 | In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units. | <b>Not Applicable</b><br>The project activity consists of renewable electricity generation through solar PV (photovoltaic) and all projects are expected to be greenfield projects.   |
| 8 | In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.   | <b>Not Applicable</b><br>The project activity consists of renewable electricity generation through solar PV (photovoltaic) and all projects are expected to be greenfield projects. No replacement or retrofit is expected. |

No leakage emission is envisaged as equipment expected to be used in each of the CPAs are required to be new. The eligibility criterion (point 8) has a provision wherein CPA owners are required to provide an affirmation that they shall use new equipment only. This will be cross verified by the CME Manager with the purchase order of equipment when available.

As the CPA involves no energy generating equipment being transferred from another project (para 22 of AMS I.D. ver 17) and no replacement of equipment (para 27 of AMS I.D. ver 17), the leakage emissions can be considered as zero for all CPAs.

As per the methodology AMS I.D. for individual CPAs to be considered for registration require that the electricity generated is evacuated to the national electricity grid, thereby replacing electricity that would have been otherwise generated through other carbon intensive sources. Hence, the emission factor of the electricity system as determined by the Central Electricity Authority (CEA) with UNFCCC approved 'Tool to calculate the emission factor for an electricity system' is applicable for this project activity.

~~Any potential project emissions from on-site fossil fuel consumption, if any, shall be determined using the "Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion" version 2.0 or later version thereof~~

### B.3. Sources and GHGs

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

Hence, the spatial extent of the project boundary includes the project activity and all power plants connected physically to the national/regional grid to which the proposed projects (CPAs) are also connected.

Currently four major power regions of the country namely, North-eastern, Eastern, Western and Northern, that operate as one synchronous grid with the Southern regional grid connected to this



grid through 'high voltage direct current' (HVDC) connection<sup>20</sup>. Currently both NEWNE and Southern Grids are synchronised and forms one Indian Grid.

~~Implementation of a solar PV project involves laying of small concrete foundations for the brackets that hold the solar panels and this activity involves negligible emission reduction. The remaining construction activities involves 'dry construction' wherein solar panels, cables, brackets etc are brought onto site in knocked down condition and bolted in place by trained technicians, hence does not result in any emissions. Therefore it can be concluded that implementing of a typical CPA will not result in any GHG emissions resulting in more than 1% of the overall emission reductions.~~

~~Similarly, there is no scope for onsite fossil fuel consumption as most construction activity in India involves manual labour (ex. mixing of concrete, pouring concrete into blocks etc). Hence project emissions for typical CPAs is considered as zero. However should there be any on-site fossil fuel consumption during the operation phase, the same shall be calculated using the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Ver 2.0.~~

The table below provides an overview of various states/territories of India with respect to the respective grids; namely the 'NEWNE Grid' and the 'Southern Grid':

| NEWNE Grid   |  |  |  | Southern Grid   |
|--|--|--|--|---|
| Northern   | Eastern  | Western  | North-Eastern  |   |
| <ul style="list-style-type: none"> <li>Chandigarh</li> <li>Delhi</li> <li>Haryana</li> <li>Himachal Pradesh</li> <li>Jammu and Kashmir</li> <li>Punjab</li> <li>Rajasthan</li> <li>Uttar Pradesh</li> <li>Uttarakhand</li> </ul> | <ul style="list-style-type: none"> <li>Bihar</li> <li>Jharkhand</li> <li>Orissa</li> <li>West Bengal</li> <li>Sikkim</li> <li>Andaman-Nicobar</li> </ul> | <ul style="list-style-type: none"> <li>Chhattisgarh</li> <li>Gujarat</li> <li>Daman &amp; Diu</li> <li>Dadar &amp; Nagar Haveli</li> <li>Madhya Pradesh</li> <li>Maharashtra</li> <li>Goa</li> </ul> | <ul style="list-style-type: none"> <li>Arunachal Pradesh</li> <li>Assam</li> <li>Manipur</li> <li>Meghalaya</li> <li>Mizoram</li> <li>Nagaland</li> <li>Tripura</li> </ul> | <ul style="list-style-type: none"> <li>Andhra Pradesh</li> <li>Karnataka</li> <li>Kerala</li> <li>Tamil Nadu</li> <li>Pondicherry</li> <li>Lakshadweep</li> </ul> |

Both the electric grids are predominantly coal based and the table below provides the list gases included in or excluded from the project boundary:

| Source   |                                       | Gas              | Included | Justification/Explanation   |
|----------|---------------------------------------|------------------|----------|---|
| Baseline | Grid connected electricity generation | CO <sub>2</sub>  | Yes      | Main emission sources.  |
|          |                                       | CH <sub>4</sub>  | No       | Minor emission source Excluded for simplification. This is conservative |
|          |                                       | N <sub>2</sub> O | No       | Minor emission source Excluded for simplification. This is conservative |

<sup>20</sup> Power Grid India official website: [www.powergridindia.com/pgcil\\_new/contentpage.aspx](http://www.powergridindia.com/pgcil_new/contentpage.aspx) (accessed 29/12/2011)

| Source           |   | Gas              | Included                 | Justification/Explanation  |
|------------------|---|------------------|--------------------------|--|
| Project activity | <del>Solar</del> <u>PV Renewable energy</u> based electricity generation  | CO <sub>2</sub>  | No                       | <del>Minor emission source.</del> As a zero emission grid connected <del>solar-renewable</del> power project, no emissions will result |
|                  |   | CH <sub>4</sub>  | No                       | As a zero emission grid connected <u>renewable solar</u> power project no emissions will result  |
|                  |   | N <sub>2</sub> O | No                       | As a zero emission grid connected <u>renewable solar</u> power project no emissions will result  |
|                  | Project emissions from on-site fossil fuel consumption<br><br>(Applicable only if the proposed technology for the CPA involves on-site fossil fuel consumption) | CO <sub>2</sub>  | <del>Yes</del> <u>No</u> | <del>Minor emission source.</del> As per methodology, no project emissions for renewable projects.                                     |
|                  |   | CH <sub>4</sub>  | No                       | As per methodology, no project emissions for renewable projects. <del>Minor emission source</del>                                      |
|                  |   | N <sub>2</sub> O | No                       | As per methodology, no project emissions for renewable projects. <del>Minor emission source</del>                                      |

#### B.4. Description of baseline scenario

As per the applicable small scale methodology AMS I.D “Grid connected renewable electricity generation” version 17, para 10<sup>21</sup> “The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”.

Hence the baseline scenario is the electricity generated by existing power plants supplying to the electricity grid. Currently NEWNE or Southern electricity grid are synchronised and there is single grid in India now. As noted in section E.3, the baseline scenario for a particular CPA will be dependent on the state in which the project is located, and hence the applicable baseline will consist of existing power plants supplying to the respective NEWNE or Southern electricity grid.

The CPA involved setting up of renewable energy technology to produce electricity and supply to the grid or to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling. In the absence of the project activity, the equivalent amount of electricity would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

#### B.5. Demonstration of eligibility for a generic CPA

➤➤

~~Project types that are explicitly listed in the positive list of grid-connected renewable electricity generation technologies in Attachment A of Appendix B of EB 63, Annex 24 are automatically defined as additional without further documentation of barriers. Solar technologies up to 15MW of installed capacity are included in the positive list and are therefore defined as additional. The project participants have chosen to demonstrate additionality at PoA level.~~

<sup>21</sup>

Source:

[http://cdm.unfccc.int/filestorage/V/9/L/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ/EB61\\_repan17\\_Revision\\_AMS-I.D\\_ver17.pdf?t=V1N8bHd5eThfDDdFVhGhkg2tz37OkAlxA](http://cdm.unfccc.int/filestorage/V/9/L/V9LRSXKP24Q7YT6HZDUBO3C0ING8AJ/EB61_repan17_Revision_AMS-I.D_ver17.pdf?t=V1N8bHd5eThfDDdFVhGhkg2tz37OkAlxA) (accessed 29/12/2011)

~~As defined in the eligibility criteria in section A 4.2.2 the project activities (CPAs) to be included in this PoA shall only constitute grid connected solar PV based power projects of installed capacity less than or equal to 15MW and hence fulfil the criteria for the positive list of projects that are automatically defined as additional without the need for any further documentation as defined in Attachment A of Appendix B of EB 63, Annex 24.~~

~~The start date of the CPA shall comply as per the definition in the CDM glossary (EB 66, Annex 63). The start date shall be later than 12<sup>th</sup> Jan 2012 which is the start date of the GSC for the PoA. A provision to check the start date is considered under the 'Eligibility Criteria'. For CPA inclusion and validation purpose, if actual start date is not available as no "real action" has taken place, then CPA-DD will include an indicative start date which will be updated once the evidence of actual start date is available~~

~~The project participants have chosen to demonstrate additionality at PoA level. Each CPA prior to inclusion will ensure compliance to the additionality conditions as part of the "Basic data prior to inclusion of CPA – Project additionality" as defined in the general eligibility criteria (section A 4.2.2):~~

- ~~• Does the project employ solar photovoltaic technology: Y/N~~
- ~~• Is the project connected to the national/sub-national grid: Y/N~~
- ~~• Is the final installed capacity of the project less than / equal to 15MW: Y/N~~

~~If the answers to all the above questions are Y (yes), the project activity shall be deemed as automatically additional in line with in Attachment A of Appendix B of EB 63, Annex 24. As defined in the eligibility criteria only projects that fulfil the additionality criteria shall be considered for inclusion in the PoA.~~

~~If any on the answers to the above questions is answered N (No), then project activity shall not be eligible to participate in this PoA unless a separate explanation has been provided otherwise.~~

The eligibility criteria for inclusion of a CPA under the PoA have been provided below in accordance with the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities" Version 4, Annex 03, EB87.

These criteria check the applicability of CPAs under the methodology AMS I.D version 17 and also check the additionality of the CPAs as per the methodology.

The categories applicable for this CPA should be as below:

1. General criteria (to be fulfilled by all CPAs for inclusion in the PoA)
2. Small -scale CPA criteria (to be fulfilled by only small-scale CPAs for inclusion in the PoA)
3. Micro-scale CPA criteria (to be fulfilled by only micro-scale CPAs for inclusion in the PoA)

These categories are discussed in detail as below

### General criteria (to be fulfilled by all CPAs for inclusion in the PoA)

| <u>Eligibility Criteria / Guideline as per<br/>EB 87, Annex 3 para 14)</u>   | <u>Yes /<br/>No</u> | <u>Information to be included in<br/>CPA-PDD and supporting<br/>evidence.</u>  |
|--|---------------------|--|
| <u>Geographical boundary of CPA: The CPA (also referred as 'project' in this table) should be located within the geographic boundaries of the Republic of India and the electricity should be supplied to India's national /regional electricity grid or</u> | <u>Yes</u>          | <u>- Include description of project location (state, district, nearest town/village) and a map of India denoting the location of site.</u><br><u>- Include a map of India indicating</u> |

|  |                   |   |
|--|-------------------|---|
| <p><u>Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</u></p>  |                   | <p><u>its location within the geographic boundaries of India.</u></p> <ul style="list-style-type: none"> <li>- <u>Include GPS coordinates of the site with an accuracy of 4 decimals or in degree / minute / second format.</u></li> <li>- <u>Include an appropriate supporting evidence in the form of permits or approvals or commercial agreements (ex. PPA) which provide an indication of the address or location of the proposed site</u></li> </ul>  |
| <p><u>Unique identification / Double Counting: Each CPA should be uniquely identified through identifying numbers (ex. Mabanaft- IN-PV-01), name of CPA, CPA Developer, Site Location and GPS coordinates.</u></p> <p><u>To avoid any potential errors through double counting, projects already registered as a CDM project or included as a CPA under a registered PoA, the same shall NOT be eligible for inclusion under this PoA.</u></p>   | <p><u>Yes</u></p> | <p><u>Provide the following details:</u></p> <p><u>Name of the CPA</u></p> <p><u>Contact Information of the CPA Developer</u></p> <p><u>The physical location of the project but not limited to the GPS coordinates.</u></p> <p><u>General information on the project (ex. proposed technology, capacity, etc)</u></p> <p><u>Present status of legal permits as required for the execution of the CPA.</u></p> <p><u>Expected start date as defined in the PoA- PDD</u></p> <p><u>For all CPAs excluding the ones being developed by MCI and its associate companies, the CPA Developer shall include an affirmation that the proposed CPA is not registered as another CDM project or included as a CPA in another registered PoA, and sign off acknowledging the terms and conditions of the PoA.</u></p> |
| <p><u><b>Specifications of technology / Demonstration of additionality: Each CPA shall generate electricity through renewable energy like solar. For Micro-scale projects – capacity will be less than 5 MW. For small scale projects capacity will be less than or equal to 15 MW and for large scale projects capacity will be greater than 15 MW. The CPA shall employ standard technology and specifications of the manufacturer and/or best practices of the market.</b></u></p> <p><u><b>The sample key specifications for solar</b></u></p> | <p><u>Yes</u></p> | <ul style="list-style-type: none"> <li>- <u>Capacity (in MW):</u></li> <li>- <u>Choice of Technology:</u></li> <li>- <u>Level of Implementation:</u></li> <li>- <u>Level and Type of Service:</u></li> <li>- <u>Performance Specifications:</u></li> </ul> <p><u>Supporting evidence can be in the form of approvals / permits / purchase orders / feasibility reports / technical brochures etc that provide an indication of the proposed technology and capacity.</u></p> <p><u>The connectivity to the grid can be verified using the Power Purchase Agreement / Wheeling Agreement or the Approval from the relevant local</u></p>   |

|  |     |   |
|--|-----|---|
| <p><u>technology will be module capacity, make, and number of module. Inverter capacity, make, number etc as applicable.</u></p> <p><u>Level of Implementation:</u> Greenfield Power<br/>Plant and new equipment</p> <p><u>Level and Type of Service:</u> The renewable energy project installed as part of the CPA should be connected to the <u>national grid. The project activity supplied electricity to grid or supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</u></p> <p><u>In absence of POA/CPA, the electricity would have been generated from grid connected power plants (fossil fuel dominated)</u></p> <p><u>Performance Specification:</u> The CPA should install renewable energy technology that have Approval / certification from the relevant designated authority. <u>All the equipment of each CPA will be complying with applicable national/ international standards.</u></p> |     | <p><u>authority or the Purchase Orders /Work Order / contract with party providing equipment / construction /operation services.</u></p> <p><u>The key specifications of relevant technology and their details or numerical values should be mentioned in real case specific CPA DD.</u></p> <p><u>The level and type of service will be checked from CPA.</u></p> <p><u>The approval of the technology will be verified from relevant designated authority. All the equipment of each CPA will be complying with applicable national/ international standards.</u></p> |
| <p><u>Start date: Indicate the project start date in line with the definition of the CDM glossary and verify that the project start date is not earlier than 12th January 2012, which is the start of validation (GSC start) for the PoA. If the project start date has not occurred at the time of CPA inclusion, include an indicative start date. The actual CPA start date can then be updated once necessary evidence is available.</u></p>   | Yes | <p><u>Start date of the project should be in line with the definition as provided by the CDM Glossary (EB 66, Annex 63)</u></p> <p><u>If no start date has been undertaken at the time of CPA inclusion, the CPA-PDD shall provide an indicative start date. The actual start date can then be later confirmed upon receipt of necessary evidence.</u></p>  |
| <p><u>Methodology compliance: Does the CPA comply with the applicability criteria of AMS I.D or ACM0002.</u></p> <p><u>The proposed CPA shall be a greenfield project.</u></p> <p><u>-Capacity Limitation: either small scale or large scale or micro-scale</u></p> <p><u>Technology Limitation:</u><br/><u>Solar PV.</u></p>  | Yes | <p><u>This condition will be considered fulfilled if the proposed CPA is a greenfield, grid connected renewable energy (solar) project and small/large/micro scale projects.</u></p>  |
| <p><u>LSC / EIA: Does the CPA comply with requirements stated in the generic CPA-PDD for the following:</u><br/><u>Local Stakeholder Consultation</u><br/><u>Environmental Impact Assessment</u></p>   | Yes | <p><u>As per host country regulations, EIA is not required to be undertaken for renewable projects (solar).</u><br/><u>IF an LSC has been undertaken at the time of inclusion, provide a copy of the</u></p>  |

|   |            |  |
|---|------------|--|
|   |            | <u>same. If not, a copy shall be made available by the CPA Developer upon undertaking the LSC.</u>   |
| <u>De-bundling check: Check if the CPA is NOT a de-bundled component of any other large scale project activity. This need to be check only for small scale or micro scale projects.</u>   | <u>Yes</u> | <u>Include a description in line with relevant 'Guidelines on assessment for de- bundling'(EB 54, Annex 13)</u><br><u>Provide a copy of an appropriate online database to support the description.</u>   |
| <u>CPA owner/developer to provide a written undertaking / affirmation acknowledging the following terms and conditions for the CPA inclusion:</u><br><u>Formal application for inclusion of CPA in the PoA under consideration</u><br><u>Affirm that the inclusion is a voluntary action</u><br><u>Affirm that all equipment used in the project shall be new.</u><br><u>Statement on diversion of ODA</u><br><u>Affirmation that CPA crediting period shall not exceed PoA end date.</u><br><u>Acceptance of terms and conditions for inclusion in the PoA</u> | <u>Yes</u> | <u>All CPAs excluding projects being developed by MCI shall provide a written affirmation confirming the following:</u><br><br><u>Formal application by the CPA owner/developer for inclusion of CPA in the PoA under consideration and an affirmation that this is a voluntary action by the CPA owner/developer.</u><br><u>Clarification on diversion of ODA</u><br><u>Acceptance of terms and conditions for inclusion in the PoA.</u><br><u>An affirmation that the CPA developer will not indulge in any activity that will lead to double counting of emission reduction generated by the project.</u><br><u>If a purchase order (P.O) for equipment has already been placed, then the affirmation is not required. In that case the CME Manager shall ensure that the equipment ordered is for new equipment only. In absence of a P.O, an affirmation is required from the CPA developer and the CME Manager shall ensure that the equipment ordered are new.</u><br><u>Approvals / permits which state the approved capacity of the CPA. An affirmation from the CPA developer to understand that CPA crediting period shall not exceed beyond 28 years from PoA start date. (This is specifically applicable for CPAs joining the PoA from year 7 onwards)</u> |

**Micro Scale CPA Criteria:**

In line with methodological tool of Demonstration of additionality of micro-scale project activities version 7.1 (Annex 14 of EB86)<sup>22</sup>

| <u>Sr. No</u> | <u>Criteria</u>                     | <u>Response required for eligibility for inclusion in PoA</u> | <u>Means of Verification / Documentary Evidence</u> |
|---------------|-------------------------------------|---|---|
| <u>1</u>      | <u>Will the aggregate installed</u> | <u>Yes</u>  | <u>• Detailed Project Report</u>                    |

<sup>22</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-19-v7.1.pdf>



|   |  |     |   |
|---|--|-----|---|
|   | capacity of the CPA remain less than the 5 MW threshold throughout the crediting period of the CPA in accordance with the Methodological tool “Demonstration of additionality of microscale project activities”?   |     | <ul style="list-style-type: none"> <li>• Prepared by third party / Submitted to banks for financing, Clearances,</li> <li>• Purchase Orders</li> </ul>  |
| 2 | Does the CPA comply with the applicability conditions of AMS I.D Version 17?   | Yes | <ul style="list-style-type: none"> <li>• Detailed Project Report</li> <li>• Prepared by third party / Submitted to banks for financing, Clearances,</li> <li>• Purchase Orders,</li> <li>• Power Purchase Agreement and</li> <li>• Grid Evacuation approval / agreement</li> </ul>  |
| 3 | <p>In order to determine the occurrence of debundling in accordance with Methodological tool “Assessment of debundling for small-scale project activities”<sup>23</sup> Version 04, does the CPA satisfy both of the following conditions?</p> <p>(a) Has the same activity implementer as the proposed micro scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;</p> <p>(b) The boundary is within 1 km of the boundary of the proposed micro-scale CPA, at the closest point.</p>                            | No  | <ul style="list-style-type: none"> <li>• Detailed Project Report prepared by third party / submitted to banks for financing,</li> <li>• Clearances,</li> <li>• Purchase Orders,</li> <li>• Contract with CME</li> </ul>   |
| 4 | <p>Does the CPA fulfill one of the following criteria:</p> <p>(a) The project activity employs specific renewable energy technologies/measures recommended by the host country designated national authority (DNA) and approved by the Board to be additional in the host country</p> <p>(b) form part of positive list of grid-connected renewable electricity generation technologies in the Methodological tool “Demonstration of additionality of small-scale project activities”; or</p> <p>(c) face investment barrier demonstrated as per the Methodological tool “Investment</p> | Yes | <p>(a) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders</p> <p>(b) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders</p> <p>(c) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders, calculations of project financial indicator and benchmark using Benchmark Analysis as per the Methodological tool “Investment analysis”</p> |

<sup>23</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-20-v1.pdf>



analysis".

**Small Scale CPA Criteria:**

| <b>Sr. No</b> | <b>Criteria</b>  | <b>Response required for eligibility for inclusion in PoA</b> | <b>Means of Verification / Documentary Evidence</b>   |
|---------------|--|---|---|
| <u>1</u>      | <u>Will the aggregate installed capacity of the CPA remain less than the 15 MW threshold throughout the crediting period of the CPA in accordance with the "General Guidelines to SSC CDM methodologies"?</u>  | <u>Yes</u>  | <ul style="list-style-type: none"> <li>• <u>Detailed Project Report Prepared by third party / Submitted to banks for financing, Clearances,</u></li> <li>• <u>Purchase Orders</u></li> <li>• <u>Commissioning reports</u></li> </ul>  |
| <u>2</u>      | <u>Does the CPA comply with the applicability conditions of AMS I.D Version 17?</u>  | <u>Yes</u>  | <ul style="list-style-type: none"> <li>• <u>Detailed Project Report Prepared by third party / Submitted to banks for financing, Clearances,</u></li> <li>• <u>Purchase Orders</u></li> <li>• <u>Power Purchase agreement</u></li> <li>• <u>Commissioning certificate</u></li> <li>• <u>Grid evacuation approval</u></li> </ul>  |
| <u>3</u>      | <u>In order to determine the occurrence of debundling in accordance with Methodological tool "Assessment of debundling for small-scale project activities" <sup>24</sup> Version 04, does the CPA satisfy both of the following conditions?</u><br><u>(a) Has the same activity implementer as the proposed small scale CPA or has a coordinating or managing entity, which also manages a large scale PoA of the same technology/measure, and;</u><br><u>(b) The boundary is within 1 km of the boundary of the proposed small-scale CPA, at the closest point.</u> | <u>No</u>   | <ul style="list-style-type: none"> <li>• <u>Detailed Project Report prepared by third party / submitted to banks for financing,</u></li> <li>• <u>Clearances,</u></li> <li>• <u>Purchase Orders,</u></li> <li>• <u>Contract with CME</u></li> </ul>   |
| <u>4</u>      | <u>Is the CPA additional as per the Methodological tool "Demonstration of additionality of small-scale project activities" <sup>25</sup> version 10 by fulfilling one of the following criteria:</u><br><u>(a) forms part of positive list of grid connected renewable electricity generation technologies; or</u><br><u>(b) faces investment barrier demonstrated as per the</u>  | <u>Yes</u>  | <u>(a) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders</u><br><u>(b) Detailed Project Report prepared by third party / submitted to banks for financing, Clearances, Purchase Orders, calculations of project financial indicator and benchmark using Benchmark Analysis as per the Methodological tool "Investment analysis"</u> |

<sup>24</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-20-v1.pdf>

<sup>25</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v1.pdf>

|  |  |  |  |
|--|--|--|--|
|  | Methodological tool "Investment analysis". |  |  |
|--|--|--|--|

If required by the eligibility criteria provided above for inclusion of a proposed CPA in PoA, the Benchmark Analysis would be conducted as follows:

A financial indicator (project IRR or equity IRR) would be chosen for the proposed CPA and justification for its selection would be provided. The IRR in nominal terms will be applied for CPA. Subsequently, a benchmark would be adopted which is appropriate to the type of financial indicator calculated and could be chosen as either of the following:

| Financial Indicator | Benchmark options  |
|---------------------|--|
| Equity IRR          | <p>Any one option from below</p> <p>a. Default value for the expected return on equity for India as per the Methodological tool "Investment analysis" (increased by applicable inflation as financial indicator is calculated in nominal terms )</p> <p>Or</p> <p>b. Government/official approved benchmark where such benchmarks are used for investment decisions</p>  |
| Project IRR         | <p>Any one option from below</p> <p>a. Local commercial lending rates applicable in the country (pre-tax rate used in case of pre-tax IRR). The Prime lending Rate (PLR) of Reserve Bank of India (RBI) will be considered for local commercial lending rates. RBI is the relevant national authority for its statistical database and same will consider for PLR value.</p> <p>Or</p> <p>b. Weighted Average Costs of Capital (WACC) calculated as:<br/> <math display="block">WACC = \{D/(D+E)\} * \{1-T/100\} * \text{Cost of Debt} + \{E/(D+E)\} * \text{Cost of Equity (tax-rate not applied in case of pre-tax IRR)}</math>           Where, Cost of Debt is determined as local commercial lending rate applicable in the country.<br/>           The Prime lending Rate (PLR) of Reserve Bank of India (RBI) will be considered for local commercial lending rates. RBI is the relevant national authority for its statistical database and same will consider for PLR value.<br/>           Cost of Equity is determined from any of the options listed above under Equity IRR.<br/>           'D' represents the debt component for the CPA and 'E' represents the equity component of the CPA. 'T' represents the tax rate applicable to the project activity.</p> <p>Or</p> <p>c. Government/official approved benchmark where such benchmarks are used for investment decisions</p> |

Financial indicator calculations will be done using a financial model based on a list of economic parameters provided by the CPA implementing agency and in accordance with Methodological tool "Investment analysis". This list of parameters as applicable would include the following:

| <u>Details Input parameters of the CPA</u>          |  | <u>Source</u>  |
|---|--|--|
| <u>Investment decision made date</u>                |  | <u>Board resolution or equivalent document</u>   |
| <u>State where the project is situated</u>          |  | <u>DPR, or offer, or Purchase Order or equivalent document</u>   |
| <u>Total Capacity of CPA(MW)</u>                    |  | <u>Calculated Value</u>  |
| <u>Expected Date of Commissioning</u>               |  | <u>Assumption</u>  |
| <u>Life of the plant (Yrs.)</u>                     |  | <u>As per manufacturer specifications or relevant equivalent document</u>  |
| <u>Generation of electricity</u>                    |  | -  |
| <u>PLF (%)</u>                                      |  | <u>Publically available data or third party PLF report or PLF as per CDM EB guidance "Guidelines for the reporting and validation of plant load factors".</u>  |
| <u>Annual generation (kWh)</u>                      |  | <u>Calculated Value</u>  |
| <u>Tariff rate at the decision making (INR/kWh)</u> |  | <u>Tariff order, or PPA or Electricity Bills or relevant equivalent document</u>   |
| <u>Escalation in Tariff (if applicable)</u>         |  | <u>Tariff order, or PPA or Electricity Bills or relevant equivalent document</u>   |
| <u>Revenues ( If applicable)</u>                    |  | <u>To be included in the calculation only if applicable to CPA and not covered under tariff. This could be Generation Based Incentive from Indian Renewable Energy Development Agency Ltd. (IREDA) or any other revenue as per state/national regulatory policies applicable on the date of investment decision.</u> |
| <u>Subsidy ( If applicable)</u>                     |  | <u>National or state-specific policy applicable for solar technologies</u>   |
| <u>Operation and maintenance cost and Insurance</u> |  | -  |
| <u>O &amp; M Expenses (INR Mn.)</u>                 |  | <u>DPR , or offer or relevant equivalent document</u>  |
| <u>Escalation in the operational expenses (%)</u>   |  | <u>DPR or offer or relevant equivalent document</u>  |
| <u>O &amp; M free for (Yr.)</u>                     |  | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Administrative expenses</u>                      |  | <u>Administration and Miscellaneous expenses were worked out by PP during investment decision</u>  |
| <u>Escalation in Administrative expenses</u>        |  | <u>Escalation for Admin Expenses</u>   |
| <u>Insurance (INR Mn.)</u>                          |  | <u>DPR , or offer or tariff order or relevant equivalent document</u>  |
| <u>Financial parameters</u>                         |  | -  |
| <u>TOTAL COST (INR Mn.)</u>                         |  | <u>DPR or offer or relevant equivalent document</u>  |

|  |   |   |
|--|---|---|
| <u>Loan Amount (INR Mn.)</u>                 |   | <u>DPR or offer or relevant equivalent document</u>           |
| <u>Equity Investment (INR Mn.)</u>           |   | <u>DPR or offer or relevant equivalent document</u>           |
| <u>Term loan</u>                             |   | -   |
| <u>Loan Amount (INR Mn.)</u>                 |   |   |
| <u>Interest rate (%)</u>                     |   | <u>DPR or offer or relevant equivalent document</u>           |
| <u>Loan Tenure (Qtr.)</u>                    |   | <u>DPR or offer or relevant equivalent document</u>           |
| <u>Moratorium Period (Qtr.)</u>              |   |   |
| <u>Repayment Period (Qtr.)</u>               |   | <u>Calculated Value</u>                                       |
| <u>Repayment instalments value (INR Mn.)</u> |   | <u>Calculated Value</u>                                       |
| <u>1st instalment from (Qtr. end)</u>        |   | <u>Considered from the next Quarter End</u>                   |
| <u>Book Depreciation (SLM Method)</u>        |   | -   |
| <u>Land</u>                                  | - | <u>DPR or offer or relevant equivalent document</u>           |
| <u>Gross Depreciable Value (INR Mn.)</u>     |   | <u>Calculated Value</u>                                       |
| <u>Salvage Value (%)</u>                     |   | <u>DPR or offer or tariff or relevant equivalent document</u> |
| <u>Salvage value (INR Mn.)</u>               |   | <u>Calculated Value</u>                                       |
| <u>Net Depreciable Value (INR Mn.)</u>       |   | <u>Calculated Value</u>                                       |
| <u>Residual Value (INR Mn.)</u>              |   | <u>Calculated Value</u>                                       |
| <u>IT Depreciation</u>                       |   | -   |
| <u>IT Depreciation (%)</u>                   |   | <u>As per publically available data</u>                       |
| <u>Income Tax</u>                            |   | -   |
| <u>Financial Year</u>                        |   | -   |
| <u>Income tax rate (%)</u>                   |   | <u>As Per Income Tax Rule,</u>                                |
| <u>MAT (%)</u>                               |   | <u>As Per IT rule</u>   |
| <u>Service Tax (%)</u>                       |   | <u>As Per Income Tax Rule</u>                                 |
| <u>Surcharge (%)</u>                         |   | <u>As Per Income Tax Rule,</u>                                |
| <u>Education cess (%)</u>                    |   | <u>As Per Income Tax Rule,</u>                                |
| <u>Final Tax rates</u>                       |   | -   |
| <u>Income tax rate (%)</u>                   |   | <u>Calculated Value</u>                                       |
| <u>MAT (%)</u>                               |   | <u>Calculated Value</u>                                       |
| <u>Service Tax (%)</u>                       |   | <u>Calculated Value</u>                                       |

Input values used in all investment analysis for the calculation of both the financial indicator and the Benchmark should be valid and applicable at the time of the investment decision taken by the CPA Implementer. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is chosen the fair value of the project activity assets at the end of the assessment period will

be included. The financial indicator should be lower than the benchmark to demonstrate additionality.

Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to variation of +/- 10% and the results of this variation should be presented in the CPA DD

The following parameters need to be subjected to the sensitivity analysis:

- Energy generation or Plant load factor
- Capital Cost
- Operation & Maintenance cost
- Tariff rate

In case the financial indicator remains lower than the benchmark in spite of favourable variations, it can be concluded that the CPA is unlikely to be financially attractive and would not have been implemented without CDM revenues.

## **B.6. Estimation of emission reductions of a generic CPA**

### **B.6.1. Explanation of methodological choices**

As applicable under approved small scale methodology AMS-1.D – Grid connected renewable electricity generation (version 17, EB 61), individual project activities can be either Greenfield, retrofit or capacity addition.

CPAs are typically expected to be included under this PoA are greenfield projects, i.e installation of a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity. Section 6.2 provides equations applicable for Greenfield projects, as per the latest applicable version of methodology AMS I.D or its replacement thereof.

According to the approved baseline methodology AMS I.D Version 17

#### **Baseline emissions:**

The baseline emission calculation for the CPA is attributable to the CO<sub>2</sub> Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the Indian grid will be multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.

$$BE_y = EG_{BL,y} \times EFCO_2,grid,y$$

Where,

|                                |          |   |
|--------------------------------|----------|---|
| <u>BE<sub>y</sub></u>          | <u>≡</u> | <u>Baseline Emissions in year y; tCO<sub>2</sub></u>  |
| <u>EG<sub>BL,y</sub></u>       | <u>≡</u> | <u>Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)</u> |
| <u>EFCO<sub>2,grid,y</sub></u> | <u>≡</u> | <u>CO<sub>2</sub> emission factor of the grid in year y; tCO<sub>2</sub>/MWh</u>  |

The methodology provides following approaches for emission factor calculations:

(a) Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology “Tool to calculate the emission factor for an electricity system”.

OR

(b) The weighted average emissions (in t CO<sub>2</sub>/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system' since data is available from an official source.

Since PoA involves the combined margin emission factor as ex-post parameter, the combined emission factor is determined as per latest version of CEA database. However this emission factor will be update during verification.

CO<sub>2</sub> Baseline Database for the Indian Power Sector, Version 11, April 2016<sup>26</sup>, published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

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

STEP 1: Identify the relevant electricity systems;

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

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

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

STEP 5: Calculate the build margin (BM) emission factor;

STEP 6: Calculate the combined margin (CM) emission factor.

#### **STEP 1: Identify the relevant electricity power systems**

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

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 CO<sub>2</sub> Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

**Table: Geographical Scope of Indian Electricity Grid**

| <u>Northern</u>         | <u>Eastern</u>     | <u>Western</u>                  | <u>North-Eastern</u>     | <u>Southern</u>       |
|-------------------------|--------------------|---------------------------------|--------------------------|-----------------------|
| <u>Chandigarh</u>       | <u>Bihar</u>       | <u>Chhattisgarh</u>             | <u>Arunachal Pradesh</u> | <u>Kerala</u>         |
| <u>Delhi</u>            | <u>Jharkhand</u>   | <u>Gujarat</u>                  | <u>Assam</u>             | <u>Karnataka</u>      |
| <u>Haryana</u>          | <u>Orissa</u>      | <u>Daman &amp; Diu</u>          | <u>Manipur</u>           | <u>Tamil Nadu</u>     |
| <u>Himachal Pradesh</u> | <u>West Bengal</u> | <u>Dadar &amp; Nagar Haveli</u> | <u>Meghalaya</u>         | <u>Andhra Pradesh</u> |
| <u>Jammu &amp;</u>      | <u>Sikkim</u>      | <u>Madhya Pradesh</u>           | <u>Mizoram</u>           | <u>Telengana</u>      |

<sup>26</sup> [http://cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

|                      |                              |                    |                 |                    |
|----------------------|------------------------------|--------------------|-----------------|--------------------|
| <u>Kashmir</u>       |                              |                    |                 |                    |
| <u>Punjab</u>        | <u>Andaman &amp; Nicobar</u> | <u>Maharashtra</u> | <u>Nagaland</u> | <u>Puducherry</u>  |
| <u>Rajasthan</u>     |                              | <u>Goa</u>         | <u>Tripura</u>  | <u>Lakshadweep</u> |
| <u>Uttar Pradesh</u> |                              |                    |                 |                    |
| <u>Uttarakhand</u>   |                              |                    |                 |                    |

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

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

**Option I:** Only grid power plants are included in the calculation.

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

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

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

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

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

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers. The choice of other two options for calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

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

|              | <u>2010-11</u> | <u>2011-12</u> | <u>2012-13</u> | <u>2013-14</u> | <u>2014-15</u> |
|--------------|----------------|----------------|----------------|----------------|----------------|
| <u>India</u> | <u>18.4%</u>   | <u>19.6%</u>   | <u>16.9%</u>   | <u>18.6%</u>   | <u>16.8%</u>   |

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

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

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

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



- **Ex-ante option:** If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. **Or**
- **Ex-post option:** If the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex-post option for the calculation of OM and it will be updated during monitoring period. 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. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting period.

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

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

| <b><u>Net Generation in Operating Margin (GWh) (excl. Imports)</u></b> |                 |                 |                 |
|--|-----------------|-----------------|-----------------|
|  | <u>2012-13</u>  | <u>2013-14</u>  | <u>2014-15</u>  |
| <u>INDIAN Grid</u>   | <u>6,97,187</u> | <u>7,21,632</u> | <u>8,08,417</u> |

| <b><u>Simple Operating Margin (tCO<sub>2</sub>/MWh) (incl. Imports)</u></b> |                |                |                |
|---|----------------|----------------|----------------|
|   | <u>2012-13</u> | <u>2013-14</u> | <u>2014-15</u> |
| -   |                |                |                |
| <u>INDIAN Grid</u>  | <u>0.99</u>    | <u>1.00</u>    | <u>0.99</u>    |

| <b><u>Weighted Generation Operating Margin</u></b> |               |
|--|---------------|
| <u>INDIAN Grid</u>                                 | <u>0.9941</u> |

#### **STEP 5: Calculate the build margin emission factor (EF<sub>BM,y</sub>)**

Option 2 as described in the tool has been chosen for this PoA to calculate the build margin emission factor for the project activity.

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

| <b><u>Build Margin (tCO<sub>2</sub>/MWh) (not adjusted for imports)</u></b> |                |
|---|----------------|
| -   | <u>2014-15</u> |
| <u>INDIAN Grid</u>  | <u>0.9285</u>  |

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

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

**Combined Margin** – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the latest version of –“Tool to calculate the emission factor for an electricity system” allows to weigh the operating margin and Build margin at 75% and 25%, respectively for wind and solar projects.

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

### **Calculation of Baseline Emission Factor $EF_{CO_2,grid,y}$**

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

$$EF_{CO_2,grid,y} = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$$

### **Where,**

|                                      |   |
|--------------------------------------|---|
| <b><u><math>w_{OM}</math></u></b>    | <u>75% weight for solar energy projects</u>                                 |
| <b><u><math>w_{BM}</math></u></b>    | <u>25% weight for solar energy projects</u>                                 |
| <b><u><math>EF_{OM,y}</math></u></b> | <u>calculated as described in Steps 3&amp;4 above (tCO<sub>2</sub>/MWh)</u> |
| <b><u><math>EF_{BM,y}</math></u></b> | <u>calculated as described in Steps 5 above (tCO<sub>2</sub>/MWh)</u>       |

### **For Solar Projects**

$$\begin{aligned} \text{Baseline Emission factor (INDIAN Grid)} &= 0.75 * 0.9941 + 0.25 * 0.9285 \\ &= 0.9777 \text{ tCO}_2/\text{MWh} \end{aligned}$$

The baseline emission factor is ex-post monitoring parameter and will update during monitoring period as per latest version of “Tool to calculate the emission factor for an electricity system”.

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

**Hence  $PE_y = 0$**

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

**Hence,  $LE_y = 0$**

**Emission reduction ( $ER_y$ ):** The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction  $ER_y$  by the project activity during a given year y is the difference between Baseline emission and Project emission & Leakage emission.

$$ER_y = BE_y - PE_y - LE_y$$

Where,

$ER_y$  = Emission Reduction in year y (tCO<sub>2</sub>/y)

$BE_y$  = Baseline emission in year y (tCO<sub>2</sub>/y)

$PE_y$  = Project emissions in year y (tCO<sub>2</sub>/y)

$LE_y$  = Leakage Emissions in year y (tCO<sub>2</sub>/y)

### B.6.2. Data and parameters fixed ex-ante

#### Parameters for CPA involving solar power projects

*The below parameter is just used for ex-ante estimation of emission reductions, however this combined margin emission factor is ex-post monitoring parameter and will be updated during verification.*

|   |   |
|---|---|
| Data / Parameter:                                     | $EF_{CO_2, grid, y}$ / <del><math>EF_{grid, CM, y}</math></del>   |
| Data unit:  | tCO <sub>2e</sub> /MWh  |
| Description:  | <del>CO<sub>2</sub> emission factor of the grid in year y</del> <del>Grid emission factor (combined margin)</del>   |
| Source of data:                                       | CO <sub>2</sub> Baseline Database for the Indian Power Sector (version 7.0) published Jan 2012  |
| Value(s) applied:                                     | NEWNE Grid: 0.9425<br>Southern Grid: 0.8875<br><u>As per CEA database Version 11, Indian Grid: 0.9777</u>   |
| Choice of data or Measurement methods and procedures: | The CO <sub>2</sub> Baseline Database for the Indian Power Sector is the official data published by the CEA and is calculated as per the UNFCCC approved Tool to calculate the emission factor for an electricity system.   |
| Purpose of data                                       | <u>for baseline emission calculations</u>   |
| Additional comment:                                   | This value will be used for the purpose of calculating the emission reduction in the respective CPA-DD. The actual GEF will be determined ex-post based on “y-1” database published by the CEA. <u>Currently Southern Grid and NEWNE grid are synchronised, thus there is single grid in India.</u> |

### B.6.3. Ex-ante calculations of emission reductions

As per paragraph 11 of AMS I.D, Version.17 the baseline emissions is the product of electrical energy baseline  $EG_{BL, y}$  expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor,  $EF_{CO_2, grid, y}$ .

$$BE_y = EG_{BL, y} * EF_{CO_2, grid, y}$$

Where:

$BE_y$  = Baseline Emissions in year y (t CO<sub>2e</sub>)

$EG_{BL, y}$  = Quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y (MWh)

$EF_{CO_2, grid, y}$  = CO<sub>2</sub> Emission factor of the grid in year y (t CO<sub>2e</sub> / MWh)

The quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y can be derived from periodic electricity / utility bills / invoices as made available by the electricity purchaser or utility company.

The emission factor of the grid needs to be derived in accordance with Methodological Tool – “Tool to calculate the emission factor for an electricity system”, version 02.2.1, Annex 19, EB 63. In India the Central Electricity Authority (CEA) of India annually publishes official data/study on grid emission factor (GEF) titled “CO<sub>2</sub> Baseline Database for the Indian Power Sector” (also referred to

as the “CEA Baseline Database” in this document) calculated as per the UNFCCC approved “Tool to calculate the emission factor for an electricity system”. At the time of drafting this PDD the latest version of the CEA Baseline Database is version 7.0, dated January 2012. The table below provides a summary of the Simple Operating Margin (OM) and Build Margin (BM) as derived from the CEA Baseline Database (all values in tCO<sub>2e</sub>/MWh):

Also included is a column CM indicating the Combined Margin as calculated using the weighted average of 0.75 (for OM) and 0.25 (for BM) as defined in the ‘Tool to calculate the emission factor for an electricity system’ (EB 63, Annex 19, page 18) for solar energy projects. The emission reduction values for the CPA shall be calculated based on the combined margin values as calculated in the column CM:

CM (Tool) / GEF for NEWNE Grid:  $(0.75 * 0.97) + (0.25 * 0.86) = 0.9425$

CM (Tool) / GEF for Southern Grid:  $(0.75 * 0.94) + (0.25 * 0.73) = 0.8875$

| Grid          | OM   | BM   | CM     |
|---------------|------|------|--------|
| NEWNE Grid    | 0.97 | 0.86 | 0.9425 |
| Southern Grid | 0.94 | 0.73 | 0.8875 |

For subsequent verification, the most recent applicable CEA baseline database shall be considered on ex- post basis.

Emission reduction for a given year (ER<sub>y</sub>) is calculated as follows:  $ER_y = BE_y - PE_y - LE_y$

Where, project emissions in year y (PE<sub>y</sub>) for a given year is defined as zero by AMS I.D version 17 (para for renewable energy projects. The paragraph 21 of the methodology states that CO<sub>2</sub> emissions from on-site consumption of fossil fuels, due to the project activity if any, are to be calculated as per necessary tool, “Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion” Ver 2.0 (EB 41, Annex 11) or latest version thereof.

The renewable projects (solar) does not involve any on site consumption of fossil fuels, hence this tool is not applicable.

As per currently latest version of CEA database version 11, the combined margin emission factor comes to be 0.9777 tCO<sub>2e</sub>/MWh.

For potential CPAs that employ standard photo-voltaic technology that involves no on-site fossil fuel consumption, PE<sub>y</sub> = 0.

With regards to leakage, para 22 of AMS I.D ver 17.0 states that if the energy generating equipment is transferred from another activity, leakage (LE<sub>y</sub>) then is to be considered. Similarly para 27 states that in case the project activity involves the replacement of equipment, then leakage is to be considered. The CPAs to be included are expected to purchase and install new equipment on site, hence no equipment is expected to be transferred, replaced or retrofitted. This is also considered in the eligibility criteria wherein the purchase will be made for new equipment only, therefore it can be concluded that emissions due to leakage, LE<sub>y</sub> = 0

~~Thus, for typical CPAs that have no on-site fossil fuel consumption,  $ER_y = BE_y$ . Any on-site fossil fuel consumption will be calculated using the formula:~~

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

Where:

- $PE_{FC,j,y}$  = Are the CO<sub>2</sub> emissions from fossil fuel combustion in process  $j$  during the year  $y$  (tCO<sub>2</sub>/yr);
- $FC_{i,j,y}$  = Is the quantity of fuel type  $i$  combusted in process  $j$  during the year  $y$  (mass or volume unit/yr);
- $COEF_{i,y}$  = Is the CO<sub>2</sub> emission coefficient of fuel type  $i$  in year  $y$  (tCO<sub>2</sub>/mass or volume unit)
- $i$  = Are the fuel types combusted in process  $j$  during the year  $y$

~~Thus, for typical CPAs that have on-site fossil fuel consumption,  $ER_y = BE_y - PE_{FC,i,j,y}$~~

## B.7. Application of the monitoring methodology and description of the monitoring plan

All data collected as part of monitoring should be archived electronically and be kept for at least two years after the completion of crediting period or after the last issuance whichever is later. 100% of the data should be monitored and monitored continuously during the crediting period. The key parameter that needs to be monitored is the net electricity generated by the CPA. Net electricity is defined as the consumption by the project site.

The measurement can be done based on electricity meters and/or bills/invoices as provided by the utility company. The actual monitoring procedure, including QA/QC procedures will be described in the CPA- PDD based on actual project conditions

### B.7.1. Data and parameters to be monitored by each generic CPA

Total electricity exported to the grid after deductions of auxiliary

| Data / Parameter:                   | EGBL <sub>y</sub>   |
|-------------------------------------|---|
| Data unit:                          | MWh   |
| Description:                        | <del>Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year <math>y</math> (MWh)</del><br><del>Net quantity of electricity exported to the grid during the year, <math>y</math></del>   |
| Source of data:                     | Data measured from electricity meters and/or official utility bills, invoices etc as supplied by the power purchaser. <del>(Credit Report /JMR as per Monthly Generation Report)</del>  |
| Value(s) applied                    | To be determined at CPA level   |
| Measurement methods and procedures: | <del>In this section the project participants shall provide description of equipment used for measurement, if applicable, and its accuracy class.</del><br><del>Data Type: Measured</del><br><del>Measurement Frequency: To be determined at CPA level</del><br><del>Recording Frequency: Periodic (based on the Utility company)</del><br><del>Responsibility: To be determined at CPA level</del><br><del>Archiving Policy: To be determined at CPA level</del><br><del>Calibration frequency: To be determined at CPA level</del><br><del>Accuracy: To be determined at CPA level</del><br><del>Data Type: Measured and calculated</del><br><del>Monitoring equipment: Electronic trivector and Bidirectional Energy Meters are used for monitoring</del><br><del>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</del><br><del>Archiving Policy: Paper &amp; Electronic</del><br><del>Calibration frequency: Once in five years</del><br><del>Electricity exported/imported to the grid is in kWh. However for the calculation</del> |

|                       |  |
|-----------------------|--|
|                       | <p>purpose electricity exported is converted in MWh.</p> <p>The Bi directional energy meter measures both export and import of project activity. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</p> <p><b><math>EG_{BL,y} = EG_{Export} - EG_{Import}</math></b></p> <p>The joint reading at metering point is carried out once in a month in presence of O&amp;M officials and state electricity board personnel. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the CME or CPA owner has no role on it. CME will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</p> <p>Cross Checking:<br/>Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.</p> |
| Monitoring frequency: | To be determined at CPA level Recording  |
| QA/QC procedures:     | <p>The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. The meter accuracy class and calibration interval is under purview of state electricity board and CME/CPA owner do not have any control on it. It is also noted that apportioning procedure (if applicable for CPA) is under control of state electricity board and PP do not have any control on it. The available parameter to CME/CPA owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.</p> <p><del>To be determined at CPA level</del></p>  |
| Purpose of data       | The Data/Parameter is required to calculate the baseline emission  |
| Additional comment:   | -  |

|  |   |
|--|---|
| <b>Data / Parameter:</b>                   | <b>EG Export</b>  |
| <b>Data unit:</b>                          | <b>MWh</b>  |
| <b>Description:</b>                        | Quantity of electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)  |
| <b>Source of data:</b>                     | Data measured from electricity meters and/or official utility bills, invoices etc as supplied by the power purchaser. (Credit Report /JMR as per Monthly Generation Report)   |
| <b>Value(s) applied</b>                    | To be determined at CPA level   |
| <b>Measurement methods and procedures:</b> | <p>Data Type: Measured/ calculated</p> <p>Monitoring equipment: Electronic trivector and Bidirectional Energy Meters are used for monitoring</p> <p>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</p> <p>Archiving Policy: Paper &amp; Electronic</p> <p>Calibration frequency: Once in five years</p> <p>Electricity exported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh.</p> <p>The Bi directional energy meter measures both export and import of project activity.</p> <p>The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</p> <p><b><math>EG_{BL,y} = EG_{Export} - EG_{Import}</math></b></p> |



|                              |  |
|------------------------------|--|
|                              | <p>The joint reading at metering point is carried out once in a month in presence of O&amp;M officials and state electricity board personnel. The calculations/measurement of electricity supplied to grid is under purview of state electricity board and the CME or CPA owner has no role on it. CME will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</p> <p><b>Cross Checking:</b><br/>Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.</p> |
| <b>Monitoring frequency:</b> | To be determined at CPA level Recording  |
| <b>QA/QC procedures:</b>     | The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. The meter accuracy class and calibration interval is under purview of state electricity board and CME/CPA owner do not have any control on it. It is also noted that apportioning procedure (if applicable for CPA) is under control of state electricity board and PP do not have any control on it. The available parameter to CME/CPA owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.         |
| <b>Purpose of data</b>       | The Data/Parameter is required to calculate the baseline emission  |
| <b>Additional comment:</b>   |  |

|  |   |
|--|---|
| <b>Data / Parameter:</b>                   | <b>EG Import</b>  |
| <b>Data unit:</b>                          | <b>MWh</b>  |
| <b>Description:</b>                        | Quantity of electricity import from grid as a result of the implementation of the CDM project activity in year y (MWh)  |
| <b>Source of data:</b>                     | Data measured from electricity meters and/or official utility bills, invoices etc as supplied by the power purchaser. (Credit Report /JMR as per Monthly Generation Report)   |
| <b>Value(s) applied</b>                    | To be determined at CPA level   |
| <b>Measurement methods and procedures:</b> | <p>Data Type: Measured/calculated</p> <p>Monitoring equipment: Electronic trivector and Bidirectional Energy Meters are used for monitoring</p> <p>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</p> <p>Archiving Policy: Paper &amp; Electronic</p> <p>Calibration frequency: Once in five years</p> <p>Electricity imported to the grid is in kWh. However for the calculation purpose electricity imported is converted in MWh.</p> <p>The Bi directional energy meter measures both export and import of project activity.</p> <p>The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</p> <p><b>EG BL,y = EGExport - EGImport</b></p> <p>The joint reading at metering point is carried out once in a month in presence of O&amp;M officials and state electricity board personnel. The calculations/measurement of electricity import from grid is under purview of state electricity board and the CME or CPA owner has no role on it. CME will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</p> |



|                              |  |
|------------------------------|--|
|                              | <b>Cross Checking:</b><br>Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.   |
| <b>Monitoring frequency:</b> | To be determined at CPA level Recording  |
| <b>QA/QC procedures:</b>     | The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. The meter accuracy class and calibration interval is under purview of state electricity board and CME/CPA owner do not have any control on it. It is also noted that apportioning procedure (if applicable for CPA) is under control of state electricity board and PP do not have any control on it. The available parameter to CME/CPA owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter. |
| <b>Purpose of data</b>       | The Data/Parameter is required to calculate the baseline emission  |
| <b>Additional comment:</b>   | -  |

|                                     |  |
|-------------------------------------|--|
| <b>Data / Parameter:</b>            | <b>EF CO<sub>2</sub>, grid, y / <del>EF-grid CM, y</del></b>   |
| Data unit:                          | tCO <sub>2</sub> e/MWh   |
| Description:                        | <del>CO<sub>2</sub> Emission factor of the grid in year y</del> Grid emission factor (combined margin)   |
| Source of data:                     | CO <sub>2</sub> Baseline Database for the Indian Power Sector published in the year 'y-1' for year, y  |
| Value(s) applied                    | To be determined at CPA level  |
| Measurement methods and procedures: | In this section the project participants shall provide description of equipment used for measurement, if applicable, and its accuracy class.<br><br>Data Type: Calculated<br><br>The grid emission factor calculations will be carried out on ex-post basis, once during the time of _verification, for the current year, y. The CO <sub>2</sub> Baseline Database for the Indian Power Sector published in the year 'y-1' for year, y shall be considered for the calculation of the CM. The value will be updated annually based on the most recent database available.  |
| Monitoring frequency:               | To be determined at CPA level Recording  |
| QA/QC procedures:                   | To be determined at CPA level  |
| Purpose of data                     | <del>This parameter is used to determine baseline emisisonsemissions</del>   |
| Additional comment:                 | <del>The CEA database considered for the calculation shall be for the year 'y-1' for the year, y for which the verification is being undertaken. 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. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting period</del> |

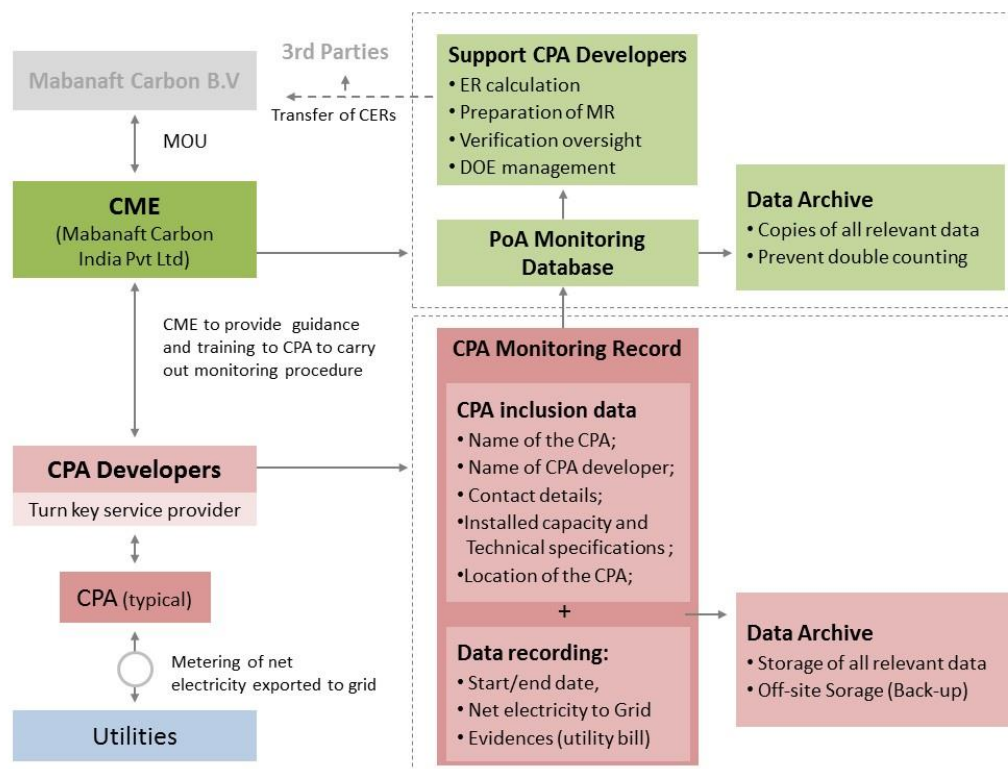
~~For CPAs that have on-site fossil fuel consumption, the following parameters will need to be monitored:~~

|  |  |
|--|--|
| <b>Data / Parameter:</b>                   | <b><del>FC</del><sub>i,j,y</sub></b>   |
| <b>Data unit:</b>                          | <b><del>Tons / Litres / m<sup>3</sup></del></b>  |
| <b>Description:</b>                        | <b><del>Net quantity of on-site fossil fuel, i, for process, j, consumed in year, y</del></b>  |
| <b>Source of data:</b>                     | <b><del>Invoices/bills from fossil fuel supplier</del></b>   |
| <b>Value(s) applied</b>                    | <b><del>To be determined at CPA level</del></b>  |
| <b>Measurement methods and procedures:</b> | <b><del>In this section the project participants shall provide description of equipment used for measurement, if applicable, and its accuracy class.<br/>Data Type: Measured<br/>Measurement Frequency: To be determined at CPA level<br/>Recording Frequency: Periodic (based on the invoices from supplier)<br/>Responsibility: To be determined at CPA level<br/>Archiving Policy: To be determined at CPA level<br/>Calibration frequency: To be determined at CPA level<br/>Accuracy: To be determined at CPA level</del></b> |
| <b>Monitoring frequency:</b>               | <b><del>To be determined at CPA level Recording</del></b>  |
| <b>QA/QC procedures:</b>                   | <b><del>To be determined at CPA level</del></b>  |
| <b>Purpose of data</b>                     |  |
| <b>Additional comment:</b>                 |  |

|  |  |
|--|--|
| <b>Data / Parameter:</b>                   | <b><del>COEF</del><sub>i,y</sub></b>   |
| <b>Data unit:</b>                          | <b><del>tCO<sub>2</sub>e/ unit of fuel</del></b>   |
| <b>Description:</b>                        | <b><del>CO<sub>2</sub> emission coefficient of on-site fossil fuel, i, consumed in year, y</del></b>   |
| <b>Source of data:</b>                     | <b><del>Invoices/bills from fossil fuel supplier. In absence of data, the IPCC default values for the fossil fuel shall be considered.</del></b>   |
| <b>Value(s) applied</b>                    | <b><del>To be determined at CPA level</del></b>  |
| <b>Measurement methods and procedures:</b> | <b><del>In this section the project participants shall provide description of equipment used for measurement, if applicable, and its accuracy class.<br/>Data Type: Measured<br/>Measurement Frequency: To be determined at CPA level<br/>Recording Frequency: Periodic (based on the Utility company)<br/>Responsibility: To be determined at CPA level Archiving Policy: To be determined at CPA level</del></b> |
| <b>Monitoring frequency:</b>               | <b><del>To be determined at CPA level Recording</del></b>  |
| <b>QA/QC procedures:</b>                   | <b><del>To be determined at CPA level</del></b>  |
| <b>Purpose of data</b>                     |  |
| <b>Additional comment:</b>                 |  |

### B.7.2. Description of the monitoring plan for a generic CPA

The purpose of the monitoring plan will be to measure and record the net electricity delivered to the respective electrical grid. Details of the CPA monitoring plan will be described within each CPA, considering the following elements.



## Management structure and responsibilities

The CME will implement a monitoring protocol consolidating all individual monitoring reports allowing the Designated Operational Entity (DOE) to verify all CPAs in the PoA. Monitoring will be carried out by each CPA. For each CPA, all parameters included in [B.7.1 of relevant Part II Generic CPA](#) will be monitored, if applicable by the CPA developer. The main measure for the PoA is the measurement of net electricity supplied to the grid and assuring the correct operation and maintenance of the measuring equipment.

## Data collection

The CME will establish and maintain a central PoA monitoring database covering information and data of each CPA. The following data will be recorded in the CPA PD prior to inclusion:

- Name of the CPA
- Contact Information of the CPA Developer
- The physical location of the project but not limited to the GPS coordinates.
- General information on the project (ex. proposed technology, capacity, etc)
- Status of legal permits as required for the execution of the CPA.
- Expected start date as defined in the PoA-PDD

In addition to the above information, copies of all preceding monitoring records, monitoring reports and verification status shall be retained through subsequent crediting periods.

Monitoring will be carried out by each CPA developer and recorded in a 'CPA monitoring record'. The CME will provide guidance to the CPA developer on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations. The start and end dates of each monitoring period, together with the CPA monitoring record will be recorded in the PoA monitoring database.

### Data recording

For each CPA, all parameters included in B.7.1 of relevant Part II Generic CPA provided by CPA developer in an electronic PoA monitoring record (PoA monitoring database), while primary data will be stored by each CPA developer.

### Data calibration

Data calibration will be done considering the calibration frequency as per responsible entities requirements and/or specifications. The CME will store all the data in an electronic database (PoA monitoring database). Primary data will be stored by the CPA developer. The calibration frequency will be once in five years as per CEA notification. The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and CME/Investor does not have any control on it.

### Data reporting

The CPA developer will be responsible for collating all data in the CPA monitoring record and preparation of monitoring report. The CME may provide guidance for the development of the monitoring report or under the nature of particular agreement with individual CPA developers, may have the option to prepare the monitoring report.

The CME is responsible communication with the DOE during verification activities. The monitoring report will compile all required monitoring information, in order to allow the DOE to verify the emission reductions for each monitoring period of each individual CPA. The monitoring report will unambiguously set out the data on emission reductions generation by each CPA during the monitoring period consistent with the requirements of this PoA-DD and the corresponding CPA-DD. Record keeping procedures for the PoA monitoring database undertaken by the CME will ensure that the data attributed to a monitoring period can be clearly attributed to an individual CPA and will furthermore prevent double counting of emission reduction data.

In case of common metering arrangement, apportioning procedure will be followed by the respective state electricity board and PP do not have any control on it. The state electricity board provides the value of net electricity supplied to grid and same will be used for emission reduction calculations.

The apportioning procedure will be followed based on daily generation data for all types of CPAs in case of individual verification period dates and billing cycle dates of the project activity do not coincide.

### Data archiving

The CME will be responsible for the management of all CPA monitoring records associated with each CPA and the consolidated PoA monitoring database comprising of CPA specific data. The CPA developer is responsible to keep a copy of the raw monitored data and the CPA monitoring record also for a period of 2 years after the completion of crediting period or after the last issuance whichever is later.

**Data quality control**

The data and reports provided by each CPA developer to the CME will be cross checked internally by the CME to ensure the accuracy and completeness of data. In case of mistakes, corrective action will be applied to avoid future similar mistakes.

Emergency Preparedness: The CPA Developer shall also ensure that the data recorded are suitably in the form of photocopies of log books or in electronic format in an off-site location, and should be made available for 3rd party verification as and when required. Hard copies of documentary evidence and log books if any should be scanned and stored in an electronic format in an off-site location and suitably backed up to prevent against potential loss, damage of the data. A copy of all the data collected will also be submitted to CME at least once a year.

A separate managing and operating plan (e.g. CME Manual) will be developed by the CME and shall provide additional information on the monitoring procedure and review of monitoring steps.

**Training and monitoring personnel**

The CME will provide all necessary information and training material that enables CPA developers to conduct the monitoring process as required by the PoA. The CPA developer ensures that all persons that participate in the actual monitoring process for the CPA will be suitably qualified and trained in the operation and maintenance of the CPA project activity. If required, these persons will also receive training on the application of the monitoring plan by the CME.

**Leakage:** No leakage emissions are considered.

**Case 2 - Large Scale CPA with ACM0002 methodology for Solar energy technology****PART II. Generic component project activity (CPA)****SECTION A. General description of a generic CPA****A.1. Purpose and general description of generic CPAs**

The proposed CPA is the installation of a new grid-connected “xx” MW “solar” power plant/unit at a site where no renewable power plant was operating prior to the implementation of the project activity (green-field plant). The project is being implemented in “location (village, tehsil, district, state)” by “CPA implementing agency”.

The electricity generated from CPA would be exported to the Indian grid in India or will be supplied to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling, there by displacing the consumption of electricity from the regional grid electricity distribution system

The electricity generated by the CPA xxx will thus replace the equivalent amount of electricity generated by the operation of existing/ grid connected power plants (mostly fossil fuel based power plants) and by addition of new generation sources into the grid. The CPA xxx thus reduces the anthropogenic emissions of greenhouse gases (GHGs) in to the atmosphere associated with the equivalent amount of electricity generation from the existing grid connected power plants (mostly fossil fuel) and by addition of new generation sources into the grid.

Mabanaft Carbon India Private Limited is the coordinating/managing entity (“CME”) for this PoA and [Name of the CPA implementer] will be implementing the CPA xxx. The crediting period chosen for the CPA xxx is Renewable Crediting Period. The annual estimated emission reductions from CPA xxx is [Annual estimated emission reductions in tCO<sub>2</sub>e/annum].

The CPA contributions to the sustainable development of the local area as well as the host country are as follows:

Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development in the interim approval guidelines<sup>27</sup> for CDM projects.

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

**Social well-being**

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

**Economic well-being**

<sup>27</sup> [http://www.cdmindia.gov.in/approval\\_process.php](http://www.cdmindia.gov.in/approval_process.php)

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

### **Environmental well-being**

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

### **Technological well-being:**

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

The Host County Approval issued by India DNA declaring acceptability of the Sustainable Indicators by the project activity shall be submitted to DOE.

For Large scale CPAs, the National CDM Authority has also mandated CMEs to commit a minimum of 2% earning (net realization value) from sale of CERs towards Sustainable Development activities including society and community development activities. This commitment would be realized based on the actual CER revenue received by the CMEs after meeting the statutory tax requirements and CER revenue sharing requirements with the utility as per the provisions of the PPA.

## **SECTION B. Application of a baseline and monitoring methodology and standardized baseline**

### **B.1. Reference of methodology(ies) and standardized baseline(s)**

In case of large scale projects, i.e. CPAs with total installed capacity > 15 MW:

The below methodology is used

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

Reference: ACM0002 Version 17

Tools applied for the CPA XXX

Latest version of "Tool to calculate the emission factor for an electricity system"

Tool for the demonstration and assessment of additionality, version 07

Combined tool to identify the baseline scenario and demonstrate additionality, version 06

### **B.2. Applicability of methodology(ies) and standardized baseline(s)**

Each Large Scale CPA under PoA will meet the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 17.0, Sectoral Scope 1, EB 81 as described below:

| <b><u>Applicability</u></b> | <b><u>Project activity vis-à-vis applicability</u></b> |
|-----------------------------|--|
|-----------------------------|--|



|  | <b>Conditions</b>   |
|--|---|
| <p><u>This methodology is applicable to grid-connected renewable power generation project activities that:</u></p> <ul style="list-style-type: none"> <li><u>• install a Greenfield power plant;</u></li> <li><u>• involve a capacity addition to (an) existing plant(s);</u></li> <li><u>• involve a retrofit of (an) existing operating plants/units;</u></li> <li><u>• involve a rehabilitation of (an) existing plant(s)/unit(s) or</u></li> <li><u>• involve a replacement of (an) existing plant(s)/unit(s).</u></li> </ul>  | <p><u>The CPA XXX under PoA is installation of a new grid connected renewable energy power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.</u></p> |
| <p><u>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;</u></p>   | <p><u>The proposed CPA XXX under PoA will be an installation of a new grid connected renewable energy power plant and hence this condition is met.</u></p>  |
| <p><u>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;</u></p>  | <p><u>The proposed CPA XXX under PoA does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable.</u></p>   |
| <p><u>In case of hydro power plants, one of the following conditions shall apply:</u></p> <ul style="list-style-type: none"> <li><u>• The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or</u></li> <li><u>• 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<sup>2</sup>; or</u></li> <li><u>• The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m<sup>2</sup>.</u></li> </ul> | <p><u>The proposed CPA XXX under PoA is a grid connected renewable energy project of solar type. No hydro power plants are involved under PoA. Thus this condition is not applicable for PoA.</u></p>   |
| <p><u>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<sup>2</sup>, all of the following conditions shall apply:</u></p> <ul style="list-style-type: none"> <li><u>• The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m<sup>2</sup>;</u></li> <li><u>• Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;</u></li> <li><u>• Installed capacity of the power plant(s) with</u></li> </ul>                   | <p><u>The proposed CPA XXX under PoA is a grid connected renewable energy project of solar technology. PoA does not involve hydro power plants, thus this condition is not applicable for PoA.</u></p>  |

|   |   |
|---|---|
| <p><u>power density lower than or equal to 4 W/m<sup>2</sup> shall be:</u></p> <ul style="list-style-type: none"> <li>✓ <u>Lower than or equal to 15 MW; and</u></li> <li>✓ <u>Less than 10 per cent of the total installed capacity of integrated hydro power project.</u></li> </ul>  |   |
| <p><u>In the case of integrated hydro power projects, project proponent shall:</u></p> <ul style="list-style-type: none"> <li>• <u>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</u></li> <li>• <u>Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.</u></li> </ul> | <p><u>The proposed CPA XXX under PoA is a grid connected renewable energy project of solar technology. PoA does not involve hydro power plants, thus this condition is not applicable for PoA.</u></p>  |
| <p><u>Methodology is not applicable to the following</u></p> <ul style="list-style-type: none"> <li>• <u>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;</u></li> <li>• <u>Biomass fired power plants/units</u></li> </ul>   | <p><u>The CPA XXX under PoA will be installation of a new grid connected renewable energy project and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the PoA.</u></p> <p><u>This PoA does not involve any biomass based power plants and hence this criterion is not applicable to the project activity.</u></p> |
| <p><u>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”.</u></p>   | <p><u>The CPA XXX under PoA will be a new grid connected renewable energy plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.</u></p>  |
| <p><b><u>Applicability conditions of “Tool to calculate the emission factor for an electricity system”</u></b></p>  |   |
| <p><u>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).</u></p>  | <p><u>This condition is applicable. OM, BM and CM are estimated using the tool for calculating baseline emissions.</u></p>  |
| <p><u>Under this tool, the emission factor for the project electricity system can be calculated either for grid</u></p>   | <p><u>Since CPA XXX under PoA activity is grid connected, this condition is applicable</u></p>  |

|  |   |
|--|---|
| <u>power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in “Appendix 2: Procedures related to off-grid power generation” should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.</u> | <u>and the emission factor has been calculated accordingly.</u>   |
| <u>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.</u>   | <u>CPA XXX under PoA will be located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.</u> |
| <u>Under this tool, the value applied to the CO2 emission factor of biofuels is zero.</u>  | <u>Each CPA under PoA will be grid connected renewable energy project and CO2 emission factor is not considered for biofuels.</u>               |

### **B.3. Sources and GHGs**

Project boundary has been ascertained using para 22 of ACM0002 (Version 17.0, EB 81) – “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to”.

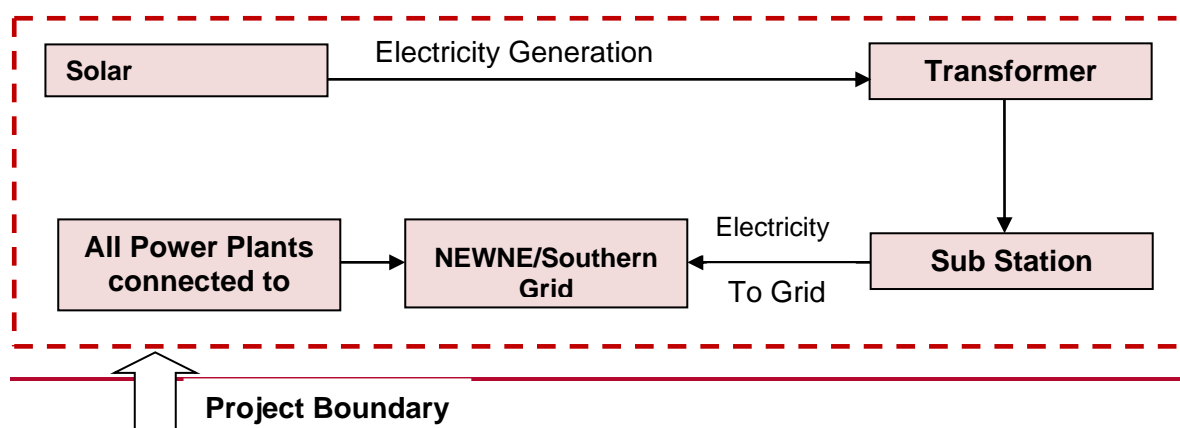
Hence the project boundary includes the renewable energy power turbine generator, sub-stations, grid and all power plants connected to grid. The proposed CPA will evacuate power to the grid.

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

For CPAs that do not have independent electricity meters installed for measurement of net electricity exported to grid i.e. the meters installed at the grid inter-connection point measure the combined electricity generation from the CPA as well as non-CPA project activities, apportioning procedures would be adopted for the calculating the net electricity generation attributable to the CPA. The project boundary in such a CPA consists common meters.

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

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



The sources and GHG gases involved for proposed CPA are as below

|                         | Source  | Gas              | Included | Justification/Explanation   |
|-------------------------|---|------------------|----------|---|
| <b>Baseline</b>         | CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.         | CO <sub>2</sub>  | Yes      | Major emission sources.   |
|                         |   | CH <sub>4</sub>  | No       | Excluded for simplification. This is conservative                                   |
|                         |   | N <sub>2</sub> O | No       | Excluded for simplification. This is conservative                                   |
| <b>Project activity</b> | For geothermal power plants, fugitive emissions of CH <sub>4</sub> and CO <sub>2</sub> from non-condensable gases contained in geothermal steam | CO <sub>2</sub>  | No       | CPA does not involve any Geothermal Power plant. Hence not applicable               |
|                         |   | CH <sub>4</sub>  | No       | CPA does not involve any Geothermal Power plant. Hence not applicable               |
|                         |   | N <sub>2</sub> O | No       | CPA does not involve any Geothermal Power plant. Hence not applicable               |
|                         | CO <sub>2</sub> emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants  | CO <sub>2</sub>  | No       | CPA does not involve solar thermal or geothermal power plants. Hence not applicable |
|                         |   | CH <sub>4</sub>  | No       | CPA does not involve solar thermal or geothermal power plants. Hence not applicable |
|                         |   | N <sub>2</sub> O | No       | CPA does not involve solar thermal or geothermal power plants. Hence not applicable |
|                         | For hydro power plants, emissions of CH <sub>4</sub> from the reservoir   | CO <sub>2</sub>  | No       | This is not applicable as PoA involves only solar technology.                       |
|                         |   | CH <sub>4</sub>  | No       | This is not applicable as PoA involves only solar technology.                       |
|                         |   | N <sub>2</sub> O | No       | This is not applicable as PoA involves only solar technology.                       |

#### B.4. Description of baseline scenario

As per the approved consolidated methodology ACM 0002, Version 17, para 24

If the project activity is the installation of a Greenfield power plant, the baseline scenario is the following:

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 CPA involved setting up of renewable energy technology to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of electricity 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 electricity would have been drawn from the state grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian Grid.

If the project activity is the installation of a Greenfield power plant, then:

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

Where:

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

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

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 latest data from an official source Baseline CO<sub>2</sub> Emission Database, published by Central Electricity Authority (CEA), Government of India<sup>28</sup>. The calculation of combined margin emission factor is represented in below section of PoA-DD. Currently Baseline CO<sub>2</sub> Emission Database Version 11.0 Dated April 2016 is latest available data, thus section B.6.1 calculates combined margin emission factor based on version 11 of CEA database. During verification, the combined margin emission factor will be updated

### **B.5. Demonstration of eligibility for a generic CPA**

The eligibility criteria for inclusion of a CPA under the PoA have been provided below in accordance with the "Standard for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities" Version 4, Annex 03, EB 87.

These criteria check the applicability of CPAs under the methodology ACM0002 version 17 and also check the additionality of the CPAs as per the methodology.

The categories applicable for this CPA should be as below:

1. General criteria (to be fulfilled by all CPAs for inclusion in the PoA)
2. Large-scale CPA criteria (to be fulfilled by only large-scale CPAs for inclusion in the PoA)

Each CPA should be treated as same type due to involvement of renewable energy power generation technology and Green field type of project activity. This is in line with para 62 of ACM0002 version 17.

These categories are discussed in detail as below

#### **1. General criteria (to be fulfilled by all CPAs for inclusion in the PoA)**

| <b><u>Eligibility Criteria / Guideline as per<br/>EB 87, Annex 3 para 14)</u></b> | <b><u>Yes /<br/>No</u></b> | <b><u>Information to be included in<br/>CPA-PDD and supporting<br/>evidence.</u></b> |
|---|----------------------------|--|
| <u>Geographical boundary of CPA: The CPA</u>                                      | <u>Yes</u>                 | <u>- Include description of project</u>  |

<sup>28</sup> [http://cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

|  |     |   |
|--|-----|---|
| <p><u>(also referred as 'project' in this table) should be located within the geographic boundaries of the Republic of India and the electricity should be supplied to India's national /regional electricity grid or Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</u></p>  |     | <p><u>location (state, district, nearest town/village) and a map of India denoting the location of site.</u></p> <ul style="list-style-type: none"> <li>- <u>Include a map of India indicating its location within the geographic boundaries of India.</u></li> <li>- <u>Include GPS coordinates of the site with an accuracy of 4 decimals or in degree / minute / second format.</u></li> <li>- <u>Include an appropriate supporting evidence in the form of permits or approvals or commercial agreements (ex. PPA) which provide an indication of the address or location of the proposed site</u></li> </ul>   |
| <p><u>Unique identification / Double Counting: Each CPA should be uniquely identified through identifying numbers (ex. Mabanaft- IN-PV-01), name of CPA, CPA Developer, Site Location and GPS coordinates.</u></p> <p><u>To avoid any potential errors through double counting, projects already registered as a CDM project or included as a CPA under a registered PoA, the same shall NOT be eligible for inclusion under this PoA.</u></p> | Yes | <p><u>Provide the following details:</u></p> <p><u>Name of the CPA</u><br/> <u>Contact Information of the CPA Developer</u><br/> <u>The physical location of the project but not limited to the GPS coordinates.</u><br/> <u>General information on the project (ex. proposed technology, capacity, etc)</u><br/> <u>Present status of legal permits as required for the execution of the CPA.</u><br/> <u>Expected start date as defined in the PoA- PDD</u><br/> <u>For all CPAs excluding the ones being developed by MCI and its associate companies, the CPA Developer shall include an affirmation that the proposed CPA is not registered as another CDM project or included as a CPA in another registered PoA, and sign off acknowledging the terms and conditions of the PoA.</u></p> |
| <p><u><b>Specifications of technology / Demonstration of additionality:</b> Each CPA shall generate electricity through renewable energy like solar. For Micro-scale projects – capacity will be less than 5 MW, For small scale projects capacity will be less than or equal to 15 MW and for large scale projects capacity will be greater than 15 MW. The CPA shall employ standard technology and specifications of the</u></p>            | Yes | <ul style="list-style-type: none"> <li>- <u>Capacity (in MW):</u></li> <li>- <u>Choice of Technology:</u></li> <li>- <u>Level of Implementation:</u></li> <li>- <u>Level and Type of Service:</u></li> <li>- <u>Performance Specifications:</u></li> </ul> <p><u>Supporting evidence can be in the form of approvals / permits / purchase orders / feasibility reports / technical brochures etc that provide an indication of the proposed technology and capacity.</u></p>  |



|   |     |  |
|---|-----|--|
| <p>manufacturer and/or best practices of the market.–</p> <p><u>The sample key specifications for solar technology will be module capacity, make, and number of module, inverter capacity, make, number etc as applicable.</u></p> <p><b>Level of Implementation:</b> Greenfield Power Plant and new equipment</p> <p><b>Level and Type of Service:</b> The renewable energy project installed as part of the CPA should be connected to the grid. <u>The project activity supplied electricity to grid or –supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</u></p> <p><u>In absence of POA/CPA, the electricity would have been generated from grid connected power plants (fossil fuel dominated)</u></p> <p><b>Performance Specification:</b> The CPA should install renewable energy technology that have Approval / certification from the relevant designated authority.</p> <p><u>All the equipment of each CPA will be complying with applicable national/ international standards.</u></p> |     | <p><u>The connectivity to the grid can be verified using the Power Purchase Agreement / Wheeling Agreement or the Approval from the relevant local authority or the Purchase Orders /Work Order / contract with party providing equipment / construction /operation services.</u></p> <p><u>The key specifications of relevant technology and their details or numerical values should be mentioned in real case specific CPA DD.</u></p> <p><u>The level and type of service will be checked from CPA.</u></p> <p><u>The approval of the technology will be verified from relevant designated authority. All the equipment of each CPA will be complying with applicable national/ international standards.</u></p> |
| <p><u>Start date: Indicate the project start date in line with the definition of the CDM glossary and verify that the project start date is not earlier than 12th January 2012, which is the start of validation (GSC start) for the PoA. If the project start date has not occurred at the time of CPA inclusion, include an indicative start date. The actual CPA start date can then be updated once necessary evidence is available.</u></p>  | Yes | <p><u>Start date of the project should be in line with the definition as provided by the CDM Glossary (EB 66, Annex 63)</u></p> <p><u>If no start date has been undertaken at the time of CPA inclusion, the CPA-PDD shall provide an indicative start date. The actual start date can then be later confirmed upon receipt of necessary evidence.</u></p>   |
| <p><u>Methodology compliance: Does the CPA comply with the applicability criteria of AMS I.D or ACM0002</u></p> <p><u>The proposed CPA shall be a greenfield project.</u></p> <p><u>Capacity Limitation: either small scale or large scale or micro-scale</u></p> <p><u>Technology Limitation: Solar PV.</u></p>  | Yes | <p><u>This condition will be considered fulfilled if the proposed CPA is a greenfield, grid connected renewable energy (solar) project. and small/large/micro scale projects.</u></p>  |
| <p><u>LSC / EIA: Does the CPA comply with requirements stated in the generic CPA-</u></p>   | Yes | <p><u>As per host country regulations, EIA is not required to be undertaken for</u></p>  |

|  |            |  |
|--|------------|--|
| <u>PDD for the following:</u><br><u>Local Stakeholder Consultation</u><br><u>Environmental Impact Assessment</u>   |            | <u>renewable projects (solar).</u><br><u>IF an LSC has been undertaken at the</u><br><u>time of inclusion, provide a copy of the</u><br><u>same. If not, a copy shall be made</u><br><u>available by the CPA Developer upon</u><br><u>undertaking the LSC.</u>   |
| <u>De-bundling check: Check if the CPA is</u><br><u>NOT a de-bundled component of any</u><br><u>other large scale project activity. This</u><br><u>need to be check only for small scale or</u><br><u>micro scale projects.</u>  | <u>Yes</u> | <u>Include a description in line with</u><br><u>relevant 'Guidelines on assessment for</u><br><u>de- bundling'(EB 54, Annex 13)</u><br><u>Provide a copy of an appropriate online</u><br><u>database to support the description.</u>   |
| <u>CPA owner/developer to provide a written</u><br><u>undertaking / affirmation acknowledging</u><br><u>the following terms and conditions for the</u><br><u>CPA inclusion:</u><br><ul style="list-style-type: none"> <li><u>• Formal application for inclusion of</u><br/><u>CPA in the PoA under</u><br/><u>consideration</u></li> <li><u>• Affirm that the inclusion is a</u><br/><u>voluntary action</u></li> <li><u>• Affirm that all equipment used in</u><br/><u>the project shall be new.</u></li> <li><u>• Statement on diversion of ODA</u></li> <li><u>• Affirmation that CPA crediting</u><br/><u>period shall not exceed PoA end</u><br/><u>date.</u></li> <li><u>• Acceptance of terms and</u><br/><u>conditions for inclusion in the PoA</u></li> </ul> | <u>Yes</u> | <u>All CPAs excluding projects being</u><br><u>developed by MCI shall provide a</u><br><u>written affirmation confirming the</u><br><u>following:</u><br><br><u>Formal application by the CPA</u><br><u>owner/developer for inclusion of CPA in</u><br><u>the PoA under consideration and an</u><br><u>affirmation that this is a voluntary action</u><br><u>by the CPA owner/developer.</u><br><u>Clarification on diversion of ODA</u><br><u>Acceptance of terms and conditions for</u><br><u>inclusion in the PoA.</u><br><u>An affirmation that the CPA developer</u><br><u>will not indulge in any activity that will</u><br><u>lead to double counting of emission</u><br><u>reduction generated by the project.</u><br><u>If a purchase order (P.O) for equipment</u><br><u>has already been placed, then the</u><br><u>affirmation is not required. In that case</u><br><u>the CME Manager shall ensure that the</u><br><u>equipment ordered is for new</u><br><u>equipment only. In absence of a P.O,</u><br><u>an affirmation is required from the CPA</u><br><u>developer and the CME Manager shall</u><br><u>ensure that the equipment ordered are</u><br><u>new.</u><br><u>Approvals / permits which state the</u><br><u>approved capacity of the CPA. An</u><br><u>affirmation from the CPA developer to</u><br><u>understand that CPA crediting period</u><br><u>shall not exceed beyond 28 years from</u><br><u>PoA start date. (This is specifically</u><br><u>applicable for CPAs joining the PoA</u><br><u>from year 7 onwards)</u> |

**Large Scale CPA specific criteria**

| <u>Sr.</u><br><u>No</u> | <u>Criteria</u>  | <u>Response</u><br><u>required</u><br><u>for eligibility for</u><br><u>inclusion in PoA</u> | <u>Means of Verification /</u><br><u>Documentary Evidence</u>  |
|-------------------------|--|---|--|
| <u>1</u>                | <u>Does the CPA comply with the</u><br><u>applicability conditions of</u><br><u>ACM0002 Version 17</u> | <u>Yes</u>  | <u>Detailed Project Report prepared by</u><br><u>third party / submitted to banks for</u><br><u>financing.</u> |

|          |  |  |  |
|----------|--|--|--|
|          |  |  | <u>Clearances,</u><br><u>Purchase Orders,</u><br><u>Power Purchase Agreement and</u><br><u>Grid Evacuation approval /</u><br><u>agreement</u>  |
| <u>2</u> | <u>Does the CPA follows simplified procedure to demonstrate additionality as per positive list and relevant conditions of auto additional as mentioned in methodology ACM0002 Version 17</u> | <u>Yes /No</u>   | <u>Detailed Project Report ,</u><br><u>Clearances,</u><br><u>Purchase Orders,</u><br><u>National statistics or other official data</u><br><u>Publically available documents</u>  |
| <u>3</u> | <u>Does the CPA additional in accordance with the “Tool for the demonstration and assessment of additionality” Version 07</u>  | <u>Yes if project is not auto additional.</u><br><u>This criteria is not applicable if project is auto additional.</u> | <u>Applied methodology ACM0002,</u><br><u>Detailed Project Report prepared by third party / submitted to banks for financing,</u><br><u>Clearances,</u><br><u>Purchase Orders,</u><br><u>calculations of project financial indicator and benchmark using Benchmark Analysis as per the “Tool for the demonstration and assessment of additionality” and Methodological tool “Investment analysis” or other documents required to demonstrate barriers as per the tool,</u><br><u>capacity of plants of various technologies installed in the country</u> |

If required by the eligibility criteria provided above for inclusion of a proposed CPA in PoA, the Benchmark Analysis would be conducted as follows:

A financial indicator (project IRR or equity IRR) would be chosen for the proposed CPA and justification for its selection would be provided. The IRR in nominal terms will be applied for CPA. Subsequently, a benchmark would be adopted which is appropriate to the type of financial indicator calculated and could be chosen as either of the following:

| <u>Financial Indicator</u> | <u>Benchmark options</u>  |
|----------------------------|---|
| <u>Equity IRR</u>          | <u>Any one option from below</u><br><br>a. <u>Default value for the expected return on equity for India as per the Methodological tool “Investment analysis” (increased by applicable inflation as financial indicator is calculated in nominal terms )</u><br><br><u>Or</u><br><br>b. <u>Government/official approved benchmark where such benchmarks are used for investment decisions</u>  |
| <u>Project IRR</u>         | <u>Any one option from below</u><br><br>a. <u>Local commercial lending rates applicable in the country (pre-tax rate used in case of pre-tax IRR).</u><br><u>The Prime lending Rate (PLR) of Reserve Bank of India (RBI) will be considered for local commercial lending rates. RBI is the relevant national authority for its statistical database and same will consider for PLR value.</u> |

|  |   |
|--|---|
|  | <p><b>Or</b></p> <p>b. <u>Weighted Average Costs of Capital (WACC) calculated as:</u><br/> <math display="block">WACC = \{D/(D+E)\} * \{1-T/100\} * \text{Cost of Debt} + \{E/(D+E)\} * \text{Cost of Equity (tax-rate not applied in case of pre-tax IRR)}.</math> Where, Cost of Debt is determined as local commercial lending rate applicable in the country. <b>The Prime lending Rate (PLR) of Reserve Bank of India (RBI) will be considered for local commercial lending rates. RBI is the relevant national authority for its statistical database and same will consider for PLR value.</b><br/> Cost of Equity is determined from any of the options listed above under Equity IRR.<br/> <b>'D' represents the debt component for the CPA and 'E' represents the equity component of the CPA. 'T' represents the tax rate applicable to the project activity.</b></p> <p><b>Or</b></p> <p>c. <u>Government/official approved benchmark where such benchmarks are used for investment decisions</u></p> |
|--|---|

Financial indicator calculations will be done using a financial model based on a list of economic parameters provided by the CPA implementing agency and in accordance with Methodological tool "Investment analysis". This list of parameters as applicable would include the following:

| <b>Details Input parameters of the CPA</b>          |  | <b>Source</b>  |
|---|--|--|
| <u>Investment decision made date</u>                |  | <u>Board resolution or equivalent document</u>   |
| <u>State where the project is situated</u>          |  | <u>DPR, or offer, or Purchase Order or equivalent document</u>   |
| <u>Total Capacity of CPA(MW)</u>                    |  | <u>Calculated Value</u>  |
| <u>Expected Date of Commissioning</u>               |  | <u>Assumption</u>  |
| <u>Life of the plant (Yrs.)</u>                     |  | <u>As per manufacturer specifications or relevant equivalent document</u>  |
| <u>Generation of electricity</u>                    |  | -  |
| <u>PLF (%)</u>                                      |  | <u>Publicly available data or third party PLF report or PLF as per CDM EB guidance "Guidelines for the reporting and validation of plant load factors".</u>            |
| <u>Annual generation (kWh)</u>                      |  | <u>Calculated Value</u>  |
| <u>Tariff rate at the decision making (INR/kWh)</u> |  | <u>Tariff order, or PPA or Electricity Bills or relevant equivalent document</u>   |
| <u>Escalation in Tariff (if applicable)</u>         |  | <u>Tariff order, or PPA or Electricity Bills or relevant equivalent document</u>   |
| <u>Revenues ( If applicable)</u>                    |  | <u>To be included in the calculation only if applicable to CPA and not covered under tariff. This could be Generation Based Incentive from Indian Renewable Energy</u> |

|   |   |  |
|---|---|--|
|   |   | <u>Development Agency Ltd. (IREDA) or any other revenue as per state/national regulatory policies applicable on the date of investment decision.</u> |
| <u>Subsidy ( If applicable)</u>                     |   | <u>National or state-specific policy applicable for solar technologies</u>   |
| <u>Operation and maintenance cost and Insurance</u> |   | -  |
| <u>O &amp; M Expenses (INR Mn.)</u>                 |   | <u>DPR , or offer or relevant equivalent document</u>  |
| <u>Escalation in the operational expenses (%)</u>   |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>O &amp; M free for (Yr.)</u>                     |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Administrative expenses</u>                      |   | <u>Administration and Miscellaneous expenses were worked out by PP during investment decision</u>  |
| <u>Escalation in Administrative expenses</u>        |   | <u>Escalation for Admin Expenses</u>   |
| <u>Insurance (INR Mn.)</u>                          |   | <u>DPR , or offer or tariff order or relevant equivalent document</u>  |
| <u>Financial parameters</u>                         |   | -  |
| <u>TOTAL COST (INR Mn.)</u>                         |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Loan Amount (INR Mn.)</u>                        |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Equity Investment (INR Mn.)</u>                  |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Term loan</u>                                    |   | -  |
| <u>Loan Amount (INR Mn.)</u>                        |   | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Interest rate (%)</u>                            |   |  |
| <u>Loan Tenure (Qtr.)</u>                           |   |  |
| <u>Moratorium Period (Qtr.)</u>                     |   |  |
| <u>Repayment Period (Qtr.)</u>                      |   | <u>Calculated Value</u>  |
| <u>Repayment instalments value (INR Mn.)</u>        |   | <u>Calculated Value</u>  |
| <u>1st instalment from (Qtr. end)</u>               |   | <u>Considered from the next Quarter End</u>  |
| <u>Book Depreciation (SLM Method)</u>               |   | -  |
| <u>Land</u>   | - | <u>DPR or offer or relevant equivalent document</u>  |
| <u>Gross Depreciable Value (INR Mn.)</u>            |   | <u>Calculated Value</u>  |
| <u>Salvage Value (%)</u>                            |   | <u>DPR or offer or tariff or relevant equivalent document</u>  |
| <u>Salvage value (INR Mn.)</u>                      |   | <u>Calculated Value</u>  |
| <u>Net Depreciable Value (INR Mn.)</u>              |   | <u>Calculated Value</u>  |
| <u>Residual Value (INR Mn.)</u>                     |   | <u>Calculated Value</u>  |
| <u>IT Depreciation</u>                              |   | -  |
| <u>IT Depreciation (%)</u>                          |   | <u>As per publically available data</u>  |
| <u>Income Tax</u>                                   |   | -  |

|                            |  |                                |
|----------------------------|--|--------------------------------|
| <u>Financial Year</u>      |  | -                              |
| <u>Income tax rate (%)</u> |  | <u>As Per Income Tax Rule,</u> |
| <u>MAT (%)</u>             |  | <u>As Per IT rule</u>          |
| <u>Service Tax (%)</u>     |  | <u>As Per Income Tax Rule</u>  |
| <u>Surcharge (%)</u>       |  | <u>As Per Income Tax Rule,</u> |
| <u>Education cess (%)</u>  |  | <u>As Per Income Tax Rule,</u> |
| <u>Final Tax rates</u>     |  | -                              |
| <u>Income tax rate (%)</u> |  | <u>Calculated Value</u>        |
| <u>MAT (%)</u>             |  | <u>Calculated Value</u>        |
| <u>Service Tax (%)</u>     |  | <u>Calculated Value</u>        |

Input values used in all investment analysis for the calculation of both the financial indicator and the Benchmark should be valid and applicable at the time of the investment decision taken by the CPA Implementer. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or if a shorter period is chosen the fair value of the project activity assets at the end of the assessment period will be included. The financial indicator should be lower than the benchmark to demonstrate additionality.

Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to variation of +/- 10% and the results of this variation should be presented in the CPA DD

The following parameters need to be subjected to the sensitivity analysis:

- Energy generation or Plant load factor
- Capital Cost
- Operation & Maintenance cost
- Tariff rate

In case the financial indicator remains lower than the benchmark in spite of favourable variations, it can be concluded that the CPA is unlikely to be financially attractive and would not have been implemented without CDM revenues.

For large scale CPA, the common practice analysis will be carried out as per Methodological tool "Common practise" Version 3.1.

## **B.6. Estimation of emission reductions of a generic CPA**

### **B.6.1. Explanation of methodological choices**

According to the approved baseline methodology ACM0002 Version 17.0.0, EB 81, Annex 9

#### **Baseline emissions:**

The baseline emission calculation for the CPA is attributable to the CO<sub>2</sub> Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the Indian grid will be multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.



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

Where,

|                          |   |   |
|--------------------------|---|---|
| $BE_y$                   | = | Baseline Emissions in year y; tCO <sub>2</sub>  |
| $EG_{\text{facility},y}$ | = | Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)  |
| $EF_{\text{grid},CM,y}$  | = | Combined margin CO <sub>2</sub> emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO <sub>2</sub> /MWh) |

As per methodology, combined margin CO<sub>2</sub> emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO<sub>2</sub>/MWh)"version 5.

CO<sub>2</sub> Baseline Database for the Indian Power Sector, Version 11, April 2016<sup>29</sup>, published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

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

STEP 1: Identify the relevant electricity systems;

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

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

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

STEP 5: Calculate the build margin (BM) emission factor;

STEP 6: Calculate the combined margin (CM) emission factor.

#### **STEP 1: Identify the relevant electricity power systems**

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

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 CO<sub>2</sub> Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

**Table: Geographical Scope of Indian Electricity Grid**

<sup>29</sup> [http://cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver11.pdf](http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf)

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

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

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

**Option I:** Only grid power plants are included in the calculation.

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

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

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

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

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

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers. The choice of other two options for calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

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

|              | <u>2010-11</u> | <u>2011-12</u> | <u>2012-13</u> | <u>2013-14</u> | <u>2014-15</u> |
|--------------|----------------|----------------|----------------|----------------|----------------|
| <u>India</u> | <u>18.4%</u>   | <u>19.6%</u>   | <u>16.9%</u>   | <u>18.6%</u>   | <u>16.8%</u>   |

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

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the Indian grid is less than 50 % of

the total generation. Thus the average emission rate method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The “Simple operating margin” has been calculated as per the weighted average emissions (in tCO<sub>2</sub>/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation;

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

- **Ex-ante option:** If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. Or
- **Ex-post option:** If the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex-post option for the calculation of OM and it will be updated during monitoring period. 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. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting period.

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

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

| <b><u>Net Generation in Operating Margin (GWh) (excl. Imports)</u></b> |                 |                 |                 |
|--|-----------------|-----------------|-----------------|
|  | <u>2012-13</u>  | <u>2013-14</u>  | <u>2014-15</u>  |
| <u>INDIAN Grid</u>   | <u>6,97,187</u> | <u>7,21,632</u> | <u>8,08,417</u> |

| <b><u>Simple Operating Margin (tCO<sub>2</sub>/MWh) (incl. Imports)</u></b> |                |                |                |
|---|----------------|----------------|----------------|
|   | <u>2012-13</u> | <u>2013-14</u> | <u>2014-15</u> |
| <u>INDIAN Grid</u>  | <u>0.99</u>    | <u>1.00</u>    | <u>0.99</u>    |

| <b><u>Weighted Generation Operating Margin</u></b> |               |
|--|---------------|
| <u>INDIAN Grid</u>                                 | <u>0.9941</u> |

#### **STEP 5: Calculate the build margin emission factor (EF<sub>BM,y</sub>)**

Option 2 as described in the tool has been chosen for this PoA to calculate the build margin emission factor for the project activity.

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

| <b><u>Build Margin (tCO<sub>2</sub>/MWh) (not adjusted for imports)</u></b> |                |
|---|----------------|
| -   | <u>2014-15</u> |
| <u>INDIAN Grid</u>  | <u>0.9285</u>  |

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

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

**Combined Margin** – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the latest version of “Tool to calculate the emission factor for an electricity system” allows to weigh the operating margin and Build margin at 75% and 25%, respectively for wind and solar projects.

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

#### **Calculation of Baseline Emission Factor EF<sub>y</sub>**

The baseline emission factor **EF<sub>y</sub>** is calculated as the weighted average of the Operating Margin emission factor (**EF<sub>OM,y</sub>**) and the Build Margin emission factor (**EF<sub>BM,y</sub>**):

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

#### **Where,**

|                                 |   |
|---------------------------------|---|
| <b><u>W<sub>OM</sub></u></b>    | <u>75% weight for solar energy projects</u>                                 |
| <b><u>W<sub>BM</sub></u></b>    | <u>25% weight for solar energy projects</u>                                 |
| <b><u>EF<sub>OM,y</sub></u></b> | <u>calculated as described in Steps 3&amp;4 above (tCO<sub>2</sub>/MWh)</u> |
| <b><u>EF<sub>BM,y</sub></u></b> | <u>calculated as described in Steps 5 above (tCO<sub>2</sub>/MWh)</u>       |

#### **For Solar Projects**

$$\begin{aligned} \text{Baseline Emission factor (INDIAN Grid)} &= 0.75 * 0.9941 + 0.25 * 0.9285 \\ &= 0.9777 \text{ tCO}_2/\text{MWh} \end{aligned}$$

The baseline emission factor is ex-post monitoring parameter and will update during monitoring period as per latest version of “Tool to calculate the emission factor for an electricity system” and latest version of CEA database.

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

**Hence  $PE_y = 0$**

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

**Hence,  $LE_y = 0$**

**Emission reduction ( $ER_y$ ):** The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plant by renewable electricity. The emission reduction  $ER_y$  by the project activity during a given year  $y$  is the difference between Baseline emission and Project emission.

Thus as per equation 17 of ACM0002 Version 17,

$$ER_y = BE_y - PE_y$$

Where,

$ER_y$  = Emission Reduction in year (tCO<sub>2</sub>e/year)

$BE_y$  = Baseline emissions in year (tCO<sub>2</sub>e/year)

$PE_y$  = Project emissions in year (tCO<sub>2</sub>e/year)

### **B.6.2. Data and parameters fixed ex-ante**

#### **Parameters for CPA involving solar power projects**

The PoA does not involve any parameter as ex-ante, thus there is no any parameter mentioned in below table.

The combined margin emission factor is ex-post parameter and included as monitoring parameter.

|  |   |
|--|---|
| <b><u>Data / Parameter:</u></b>                              | : |
| <u>Data unit:</u>  | : |
| <u>Description:</u>  | : |
| <u>Source of data:</u>                                       | : |
| <u>Value(s) applied:</u>                                     | : |
| <u>Choice of data or Measurement methods and procedures:</u> | : |
| <u>Purpose of data</u>                                       | : |
| <u>Additional comment:</u>                                   | : |

### **B.6.3. Ex-ante calculations of emission reductions**

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

$$ER_y = BE_y - PE_y - LE_y$$

Where,

$ER_y$  = Emission Reduction in tCO<sub>2</sub>/year

$BE_y$  = Baseline emission in tCO<sub>2</sub>/year

$PE_y$  = Project emissions in tCO<sub>2</sub>/year

$LE_y$  = Leakage Emissions in tCO<sub>2</sub>/year

**Baseline Emission (BE<sub>y</sub>)**

The baseline emissions are the product of electrical energy baseline  $EG_{\text{facility},y}$  expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

$$BE_y = EG_{\text{facility},y} * EF_{\text{grid},CM,y}$$

Where,

$EG_{\text{facility},y}$  = Total quantity of net electricity delivered to the Indian grid

| <u>CPA Investors' Name</u> | <u>Capacity</u> | <u>PLF (%)</u> | <u>Generated Power (MWh) p.a</u> | <u>Baseline Emission Factor (tCO<sub>2</sub>/MWh)</u> | <u>Baseline emissions (tCO<sub>2</sub>/ year)</u> |
|----------------------------|-----------------|----------------|----------------------------------|---|---|
|                            |                 |                |                                  |   |   |

$EF_{\text{grid},CM,y}$  = Baseline emission factor for Indian Grid  
= 0.9777 tCO<sub>2</sub>/MWh for solar projects

$$BE_y = \text{xxxx} * \text{xxxx}$$

$$= \text{xxxx}$$

As per Section B.6.1:

$$PE_y = 0$$

$$LE_y = 0$$

Thus,

$$ER_y = BE_y - PE_y - LE_y$$

$$ER_y = BE_y - 0 - 0$$

$$ER_y = BE_y$$

Therefore,

$$ER_y = \text{xxxx}$$

**B.7. Application of the monitoring methodology and description of the monitoring plan****B.7.1. Data and parameters to be monitored by each generic CPA****Parameters for CPA involving solar power projects**

|  |  |
|--|--|
| <u>Data / Parameter:</u>                   | <u>EG<sub>facility,y</sub></u>   |
| <u>Data unit:</u>                          | <u>MWh</u>   |
| <u>Description:</u>                        | <u>Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the CPA in year y</u>   |
| <u>Source of data:</u>                     | <u>Credit Report /JMR as per Monthly Generation Report</u>   |
| <u>Value(s) applied</u>                    | <u>XXX (Estimated Value, specific to CPA and this value will be in accordance with project parameters)</u>   |
| <u>Measurement methods and procedures:</u> | <u>Data Type: Measured and calculated</u><br><u>Monitoring equipment: Electronic Trivector and Bidirectional Energy Meters are used for monitoring</u><br><u>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</u><br><u>Archiving Policy: Paper &amp; Electronic</u> |



|                              |   |
|------------------------------|---|
|                              | <p><u>Calibration frequency: Once in five years</u></p> <p><u>Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh.</u></p> <p><u>The Bi directional energy meter measures both export and import of project activity. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</u></p> <p><u><math>EG_{facility,y} = EG_{Export} - EG_{Import}</math></u></p> <p><u>The joint reading at metering point is carried out once in a month in presence of O&amp;M officials and state electricity board personnel. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the CME or CPA owner has no role on it. CME will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</u></p> <p><u>Cross Checking:</u><br/> <u>Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.</u></p> |
| <u>Monitoring frequency:</u> | <u>Monthly</u>  |
| <u>QA/QC procedures:</u>     | <u>The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. The meter accuracy class and calibration interval is under purview of state electricity board and CME/CPA owner do not have any control on it. It is also noted that apportioning procedure (if applicable for CPA) is under control of state electricity board and PP do not have any control on it. The available parameter to CME/CPA owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.</u>   |
| <u>Purpose of data</u>       | <u>The Data/Parameter is required to calculate the baseline emission</u>  |
| <u>Additional comment:</u>   | <u>Data will be archived electronically for a period of 2 years beyond the end of crediting period.</u>   |

|  |   |
|--|---|
| <u>Data / Parameter:</u>                   | <u>EG<sub>Export</sub></u>  |
| <u>Data unit:</u>                          | <u>MWh</u>  |
| <u>Description:</u>                        | <u>Quantity of electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)</u>   |
| <u>Source of data:</u>                     | <u>Data measured from electricity meters and/or official utility bills, invoices etc as supplied by the power purchaser. (Credit Report /JMR as per Monthly Generation Report)</u>  |
| <u>Value(s) applied</u>                    | <u>To be determined at CPA level</u>  |
| <u>Measurement methods and procedures:</u> | <p><u>Data Type: Measured and calculated</u></p> <p><u>Monitoring equipment: Electronic trivector and Bidirectional Energy Meters are used for monitoring</u></p> <p><u>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</u></p> <p><u>Archiving Policy: Paper &amp; Electronic</u></p> <p><u>Calibration frequency: Once in five years</u></p> <p><u>Electricity exported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh.</u></p> <p><u>The Bi directional energy meter measures both export and import of project activity.</u></p> <p><u>The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the</u></p> |

|                       |  |
|-----------------------|--|
|                       | <p>grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</p> <p><b><math>EG_{BL,y} = EG_{Export} - EG_{Import}</math></b></p> <p>The joint reading at metering point is carried out once in a month in presence of O&amp;M officials and state electricity board personnel. The calculations/measurement of electricity supplied to grid is under purview of state electricity board and the CME or CPA owner has no role on it. CME will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</p> <p><b>Cross Checking:</b><br/>Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.</p> |
| Monitoring frequency: | To be determined at CPA level Recording  |
| QA/QC procedures:     | The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. The meter accuracy class and calibration interval is under purview of state electricity board and CME/CPA owner do not have any control on it. It is also noted that apportioning procedure (if applicable for CPA) is under control of state electricity board and PP do not have any control on it. The available parameter to CME/CPA owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.   |
| Purpose of data       | The Data/Parameter is required to calculate the baseline emission  |
| Additional comment:   |  |

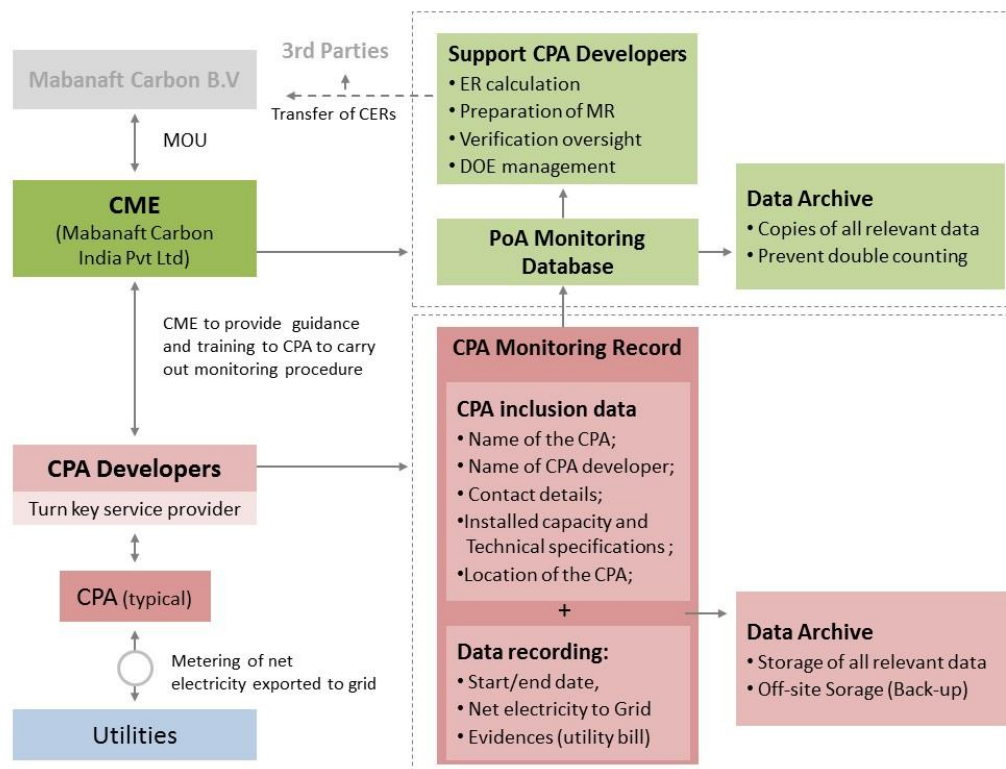
|                                     |   |
|-------------------------------------|---|
| <b>Data / Parameter:</b>            | <b>EG Import</b>  |
| Data unit:                          | MWh   |
| Description:                        | Quantity of electricity import from grid as a result of the implementation of the CDM project activity in year y (MWh)  |
| Source of data:                     | Data measured from electricity meters and/or official utility bills, invoices etc as supplied by the power purchaser. (Credit Report /JMR as per Monthly Generation Report)   |
| Value(s) applied                    | To be determined at CPA level   |
| Measurement methods and procedures: | <p>Data Type: Measured and calculated</p> <p>Monitoring equipment: Electronic trivector and Bidirectional Energy Meters are used for monitoring</p> <p>Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually</p> <p>Archiving Policy: Paper &amp; Electronic</p> <p>Calibration frequency: Once in five years</p> <p>Electricity imported to the grid is in kWh. However for the calculation purpose electricity imported is converted in MWh.</p> <p>The Bi directional energy meter measures both export and import of project activity.</p> <p>The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per below equation:</p> <p><b><math>EG_{BL,y} = EG_{Export} - EG_{Import}</math></b></p> <p>The joint reading at metering point is carried out once in a month in presence of O&amp;M officials and state electricity board personnel. The calculations/measurement of electricity import from grid is under purview of</p> |

|                              |  |
|------------------------------|--|
|                              | <p>state electricity board and the CME or CPA owner has no role on it. CME will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan.</p> <p><b>Cross Checking:</b><br/>Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.</p>   |
| <b>Monitoring frequency:</b> | To be determined at CPA level Recording  |
| <b>QA/QC procedures:</b>     | The calibration of all the meters will be undertaken at required intervals and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s or 0.5s. The meter accuracy class and calibration interval is under purview of state electricity board and CME/CPA owner do not have any control on it. It is also noted that apportioning procedure (if applicable for CPA) is under control of state electricity board and PP do not have any control on it. The available parameter to CME/CPA owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter. |
| <b>Purpose of data</b>       | The Data/Parameter is required to calculate the baseline emission  |
| <b>Additional comment:</b>   | -  |

|  |   |
|--|---|
| <b>Data / Parameter:</b>                   | $EF_{grid,CM,y}$  |
| <b>Data unit:</b>                          | tCO <sub>2</sub> /MWh   |
| <b>Description:</b>                        | Combined Margin CO <sub>2</sub> emission factor in year y   |
| <b>Source of data:</b>                     | Calculated from CEA database.   |
| <b>Value(s) applied</b>                    | <b>For solar projects</b><br>0.9777   |
| <b>Measurement methods and procedures:</b> | Calculated as per latest version of "Tool to calculate the emission factor for an electricity system". The data is obtained from latest version of "CO <sub>2</sub> Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India   |
| <b>Monitoring frequency:</b>               | Yearly  |
| <b>QA/QC procedures:</b>                   | No QA/QC procedure required as value is determined from CEA database.   |
| <b>Purpose of data</b>                     | The Data/Parameter is required to calculate the baseline emission.  |
| <b>Additional comment:</b>                 | <p>Data will be archived electronically for a period of 2 years beyond the end of crediting period.</p> <p>The above value is determined based on version 11 of "CO<sub>2</sub> Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India and version 5 of "Tool to calculate the emission factor for an electricity system", however during verification latest version of tool and latest version of CEA database will be referred.</p> <p>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. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting period.</p> |

### **B.7.2. Description of the monitoring plan for a generic CPA**

The purpose of the monitoring plan will be to measure and record the net electricity delivered to the respective electrical grid. Details of the CPA monitoring plan will be described within each CPA, considering the following elements.



### Management structure and responsibilities

The CME will implement a monitoring protocol consolidating all individual monitoring reports allowing the Designated Operational Entity (DOE) to verify all CPAs in the PoA. Monitoring will be carried out by each CPA. For each CPA, all parameters included in B.7.1 will be monitored, if applicable by the CPA developer. The main measure for the PoA is the measurement of net electricity supplied to the grid and assuring the correct operation and maintenance of the measuring equipment.

### Data collection

The CME will establish and maintain a central PoA monitoring database covering information and data of each CPA. The following data will be recorded in the CPA DD prior to inclusion:

- a. Name of the CPA
- b. Contact Information of the CPA Developer
- c. The physical location of the project but not limited to the GPS coordinates.
- d. General information on the project (ex. proposed technology, capacity, etc)
- e. Status of legal permits as required for the execution of the CPA.
- f. Expected start date as defined in the PoA-DD

In addition to the above information, copies of all preceding monitoring records, monitoring reports and verification status shall be retained through subsequent crediting periods.

Monitoring will be carried out by each CPA developer and recorded in a 'CPA monitoring record'. The CME will provide guidance to the CPA developer on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations. The start and end dates of each monitoring period, together with the CPA monitoring record will be recorded in the PoA monitoring database.

### **Data recording**

For each CPA, all parameters included in B.7.1, if applicable, will be monitored by the CPA developer and recorded electronically in a CPA monitoring record. The CPA developer will provide the CPA monitoring records to the CME. The CME will document and store all data related to parameters included in section B.7.1 provided by CPA developer in an electronic PoA monitoring record (PoA monitoring database), while primary data will be stored by each CPA developer.

### **Data calibration**

Data calibration will be done considering the calibration frequency as per responsible entities requirements and/or specifications. The CME will store all the data in an electronic database (PoA monitoring database). Primary data will be stored by the CPA developer. The calibration frequency will be once in five years as per CEA notification. The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and CME/Investor does not have any control on it.

### **Data reporting**

The CPA developer will be responsible for collating all data in the CPA monitoring record and preparation of monitoring report. The CME may provide guidance for the development of the monitoring report or under the nature of particular agreement with individual CPA developers, may have the option to prepare the monitoring report.

The CME is responsible communication with the DOE during verification activities. The monitoring report will compile all required monitoring information, in order to allow the DOE to verify the emission reductions for each monitoring period of each individual CPA. The monitoring report will unambiguously set out the data on emission reductions generation by each CPA during the monitoring period consistent with the requirements of this PoA-DD and the corresponding CPA-DD. Record keeping procedures for the PoA monitoring database undertaken by the CME will ensure that the data attributed to a monitoring period can be clearly attributed to an individual CPA and will furthermore prevent double counting of emission reduction data.

In case of common metering arrangement, apportioning procedure will be followed by the respective state electricity board and PP do not have any control on it. The state electricity board provides the value of net electricity supplied to grid and same will be used for emission reduction calculations.

The apportioning procedure will be followed based on daily generation data for all types of CPAs in case of individual verification period dates and billing cycle dates of the project activity do not coincide.

### **Data archiving**

The CME will be responsible for the management of all CPA monitoring records associated with each CPA and the consolidated PoA monitoring database comprising of CPA specific data. The CPA developer is responsible to keep a copy of the raw monitored data and the CPA monitoring

record also for a period of 2 years after the completion of crediting period or after the last issuance whichever is later.

### **Data quality control**

The data and reports provided by each CPA developer to the CME will be cross checked internally by the CME to ensure the accuracy and completeness of data. In case of mistakes, corrective action will be applied to avoid future similar mistakes.

Emergency Preparedness: The CPA Developer shall also ensure that the data recorded are suitably in the form of photocopies of log books or in electronic format in an off-site location, and should be made available for 3rd party verification as and when required. Hard copies of documentary evidence and log books if any should be scanned and stored in an electronic format in an off-site location and suitably backed up to prevent against potential loss, damage of the data. A copy of all the data collected will also be submitted to CME at least once a year. A separate managing and operating plan (e.g. CME Manual) will be developed by the CME and shall provide additional information on the monitoring procedure and review of monitoring steps.

### **Training and monitoring personnel**

The CME will provide all necessary information and training material that enables CPA developers to conduct the monitoring process as required by the PoA. The CPA developer ensures that all persons that participate in the actual monitoring process for the CPA will be suitably qualified and trained in the operation and maintenance of the CPA project activity. If required, these persons will also receive training on the application of the monitoring plan by the CME.

**Leakage:** No leakage emissions are considered.



## Appendix 1. Contact information of coordinating/managing entity and responsible person(s)/ entity(ies)

|  |   |
|--|---|
| <b>CME and/or responsible person/ entity</b> | <input checked="" type="checkbox"/> CME<br><input type="checkbox"/> Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA |
| <b>Organization</b>                          | Mabanaft Carbon India Private Limited   |
| <b>Street/P.O. Box</b>                       | Hiranandani Business Park, Powai  |
| <b>Building</b>                              | 103, Spectra  |
| <b>City</b>                                  | Mumbai  |
| <b>State/Region</b>                          | Maharastra  |
| <b>Postcode</b>                              | 400076  |
| <b>Country</b>                               | India   |
| <b>Telephone</b>                             | +31 10 290 6942   |
| <b>Fax</b>                                   | +31 10 4110 753   |
| <b>E-mail</b>                                | <a href="mailto:ruben.benders@mabanaft.nl">ruben.benders@mabanaft.nl</a>  |
| <b>Website</b>                               |   |
| <b>Contact person</b>                        |   |
| <b>Title</b>                                 | Director, Mabanaft Carbon India Private Limited   |
| <b>Salutation</b>                            | Mr.   |
| <b>Last name</b>                             | Benders   |
| <b>Middle name</b>                           | Ruben   |

|  |   |
|--|---|
| <b>CME and/or responsible person/ entity</b> | <input checked="" type="checkbox"/> <del>CME</del><br><input type="checkbox"/> <del>Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA</del> |
| <b>Organization</b>                          | <del>Mabanaft Carbon B.V.</del>   |
| <b>Street/P.O. Box</b>                       | <del>Wilhelminakade</del>   |
| <b>Building</b>                              | <del>101 (43rd floor)</del>   |
| <b>City</b>                                  | <del>Rotterdam</del>  |
| <b>State/Region</b>                          | <del>AP</del>   |
| <b>Postcode</b>                              | <del>3072</del>   |
| <b>Country</b>                               | <del>Netherlands</del>  |
| <b>Telephone</b>                             | <del>+31 10 290 6942</del>  |
| <b>Fax</b>                                   | <del>+31 10 4110 753</del>  |
| <b>E-mail</b>                                | <del><a href="mailto:ruben.benders@mabanaft.nl">ruben.benders@mabanaft.nl</a></del>   |
| <b>Website</b>                               |   |
| <b>Contact person</b>                        |   |
| <b>Title</b>                                 | <del>Director, Mabanaft Carbon India Private Limited</del>  |

|  |   |
|--|---|
| <b>CME and/or responsible person/ entity</b> | <input checked="" type="checkbox"/> <del>CME</del><br><input type="checkbox"/> <del>Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA</del> |
| <b>Salutation</b>                            | Mr.   |
| <b>Last name</b>                             | Benders   |
| <b>Middle name</b>                           | Ruben   |

|  |   |
|--|---|
| <b>CME and/or responsible person/ entity</b> | <input type="checkbox"/> <del>CME</del><br><input checked="" type="checkbox"/> <del>Responsible person/ entity for application of the selected methodology(ies) and, where applicable, the selected standardized baseline(s) to the PoA</del> |
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| <b>Middle name</b>                           | =   |

## Appendix 2. Affirmation regarding public funding

No public funding is provided for the proposed program.

## Appendix 3. Applicability of methodology(ies) and standardized baseline(s)

Baseline carbon dioxide emissions from power sector has been source from Government of India, Ministry of Power, Central Electricity Authority (CEA).

CO2 Baseline Database for the Indian Power Sector User Guide Version 7.0 January 2012 can be downloaded at: [http://www.cea.nic.in/reports/planning/cdm\\_co2/user\\_guide\\_ver7.pdf](http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver7.pdf)

Being ex post monitoring parameter, CO2 Baseline Database for the Indian Power Sector User Guide Version 11.0 April 16 is used for latest baseline emission factors.-

Please refer section B.2 and B.4 for applicability and baseline scenario respectively for respective case of generic component of CPA.

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

Please refer section B.6 of respective case of generic component of CPA.

## **Appendix 5. Further background information on the monitoring plan**

Please refer section B.7 of respective case of generic component of CPA.

## **Appendix 6. Summary of post registration changes**

1. Along with existing AMS I.D methodology, one methodology ACM0002 is added in PoA by keeping the same technology. Due to addition of one Methodology of ACM0002 version 17, separate generic CPA Part is added in PoA DD. The purpose and general description of PoA DD (section A.2) is revised in line with multiple methodologies.
- ~~1.2.~~ Due to withdrawal of authorised party Mabanaf Carbon B.V from Netherland, this entity name is removed from PoA DD. Also Carbonbay GmbH & Co., KG from Germany is added in PoA DD.
- ~~—~~ Due to multiple methodologies, the additionality demonstration at PoA level is removed and additionality will be demonstrated at CPA level. Accordingly eligibility criteria has been revised.
- ~~—~~ The eligibility criteria for AMS I.D Methodology version 17 is elaborated transparently without any material change in earlier eligibility criteria and in line with multiple methodologies.
3. Additional small scale CPA criteria, micro scale CPA criteria, and Large scale CPA criteria are mentioned in PoA DD along with general CPA criteria. Also information in line with investment analysis is mentioned in PoA DD.
4. EIA section is revised in line with solar technology.
5. In Part II Generic CPA for AMS I.D – the applicability criteria is elaborated considering the solar technology. Also sources of gases, project boundary sections are revised. The eligibility criteria also revised
- ~~2.6.~~ In Part II Generic CPA for AMS I.D - Also baseline emission factor is determined as per latest version of CEA database being as ex- post monitoring parameter. Section B.6.2 is revised with latest emission factor along with existing emission factor.
7. In Part II Generic CPA for AMS I.D - The description related to emissions due to fossil fuel consumption are removed from CPA Part of AMS I.D version 17 as methodology AMS I.D version 17 does not require it. Also monitoring parameters related to fossil fuel consumption are removed from PoA DD.

3-8. In Part II Generic CPA for AMS I.D - In CPA Part of AMS I.D version 17 – The parameter **EG<sub>BL,y</sub>** is elaborated transparently. The separate monitoring of export and import is mentioned.

9. The below transparent description regarding common metering and apportioning is mentioned in monitoring section. In case of common metering arrangement, apportioning procedure will be followed by the respective state electricity board and PP do not have any control on it. The state electricity board provides the value of net electricity supplied to grid and same will be used for emission reduction calculations. The apportioning procedure will be followed based on daily generation data for all types of CPAs in case of individual verification period dates and billing cycle dates of the project activity do not coincide.

The above changes are mentioned in revised PoA DD in line with para 292 of PS version 09. The Post registration Changes are inclusion of multiple methodologies. The impact of changes on proposed changes to the registered PoA on the following points are as below

- a) The above post registration changes covers multiple methodologies, thus applicability of respective methodology has been mentioned in revised PoA DD. There is no any impact on applicability of methodology.
- b) The monitoring plan of respective generic CPAs are in line with respective methodology. In revised PDD, the monitoring plan is in compliance with respective methodology requirement. Wherever required, the transparent information is mentioned in monitoring section. The parameters are removed from PoA DD which are not required as per methodology.
- c) The level of accuracy and completeness in the monitoring of project activity is as per methodology requirement for each generic CPAs mentioned in revised PoA DD.
- d) The additionality criteria are elaborated as per respective methodology requirement.
- e) Being involvement of ACM0002 Version 17, the large scale CPA is also part of this PoA. The registered small scale PoA is changed to large scale PoA due to addition of methodology ACM0002 in the PoA.
- f) The eligibility criteria is revised as per multiple methodology requirement.

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### Document information

| Version | Date          | Description  |
|---------|---------------|--|
| 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  | Revisions to: <ul style="list-style-type: none"> <li>• Include provisions related to choice of start date of PoA;</li> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to local stakeholder consultation;</li> <li>• Add exception for generic CPA where technology is under positive lists;</li> <li>• Editorial improvement.</li> </ul> |
| 04.1    | 5 August 2014 | Editorial revision to correct the document information table.  |

| Version   | Date            | Description   |
|---|-----------------|---|
| 04.0  | 25 June 2014    | <p>Revisions to:</p> <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the <i>Guideline: Completing the programme design document form for CDM programme of activities</i> (Version 04.0));</li> <li>• Include provisions related to standardized baselines;</li> <li>• 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;</li> <li>• Add general instructions on post-registration changes in paragraph 2 and 3 of general instructions and Appendix 6;</li> <li>• Change the reference number from <i>F-CDM-PoA-DD</i> to <i>CDM-PoA-DD-FORM</i>;</li> <li>• Editorial improvement.</li> </ul> |
| 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>   |
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