



## Project design document form

(Version 11.0)

## BASIC INFORMATION

<b>Title of the project activity</b>	15 MW Solar Photovoltaic Power Project at Gujarat <sup>1</sup>
<b>Scale of the project activity</b>	<input type="checkbox"/> Large-scale <input checked="" type="checkbox"/> Small-scale
<b>Version number of the PDD</b>	04
<b>Completion date of the PDD</b>	15/06/2020
<b>Project participants</b>	ACME Solar Technologies (Gujarat) Private Limited EKI Energy Services Limited
<b>Host Party</b>	India
<b>Applied methodologies and standardized baselines</b>	<b>Methodology:</b> AMS I.D. Grid connected renewable electricity generation / Version 18 <sup>2</sup> <b>Standardized Baseline:</b> Not Applicable
<b>Sectoral scopes</b>	<b>Sectoral Scope:</b> 01 Energy industries (renewable/non-renewable sources)
<b>Estimated amount of annual average GHG emission reductions</b>	24,344 tCO <sub>2</sub> e

<sup>1</sup> <https://cdm.unfccc.int/Projects/DB/BVQ11355214849.13/view>

<sup>2</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

## SECTION A. Description of project activity

### A.1. Purpose and general description of project activity

ACME Solar Technologies (Gujarat) Private Limited (ASTGPL) has implemented a 15 MW solar photovoltaic technology based power plant in Village-Wadgam, Tehsil-Khambhat in Anand District in the state of Gujarat. The electricity generated from the project activity is exported to the regional electricity grid and sold to Gujarat Urja Vikas Nigam Limited (GUVNL) under a power purchase agreement.

ASTGPL has used thin film CdTe technology for its 15 MW project. The Solar power system is designed with number of sub main plants and solar PV arrays. Solar grid connected inverters of suitable capacity are used.

Since the project activity is a Greenfield project, the approved small scale methodology AMS.I.D already prescribes the baseline scenario as being “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”. The electricity exported by the project activity displaces an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the Indian Grid which relies predominantly on fossil fuels (particularly coal). Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

Project activity was commissioned on 13/03/2012.

The estimation of GHG emission reductions by the project activity is limited to carbon dioxide (CO<sub>2</sub>) only and its primary source is the fossil fuels consumed in the Indian grid. The project activity will lead to an estimated emission reduction of 24,344 tCO<sub>2</sub>e annually over the chosen crediting period.

### Sectoral Scope and Project Type:

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

**Methodology:** AMS-I.D “Grid connected renewable electricity generation” (Version 18.0<sup>3</sup>)

**Project Type:** I- Renewable energy projects

### View of the project participants on the contribution of the project activity to Sustainable Development:

Ministry of Environment, Forest and Climate Change, Govt. of India has stipulated the following indicators for sustainable development in the guidelines for CDM projects:

#### Social well-being:

- The project leads to generation of business opportunities and employment in the region thereby contributing towards social upliftment through direct and indirect benefits.
- The project activity in its execution lead to development of infrastructure in the region and at the same time promote business in the region through the improvement in electricity generation capacity of the grid.

#### Economic well-being:

<sup>3</sup> <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTFQQOFQQH4SBK>

- The project activity leads to an investment in the region accompanied with business and employment benefits along with improvement of grid supply which otherwise would not have happened in the absence of project activity.
- The clean electricity generated through solar power by the project activity is fed into the local grid thereby improving the availability of electricity in the region. This provides a better scenario for local industries and businesses to improve their production capacities thereby contributing towards the overall economic development of the region.

**Environmental well-being:**

- The project activity employs solar power for generation of electricity thereby displacing fossil fuels which are being rapidly consumed to meet the growing demand of electricity in the country thus contributing towards reduction in GHG emissions.
- Solar power projects generate no end products in the form of solid waste (ash etc.) compared to alternative modes of power generation (e.g. coal based on which the Indian grid is primarily dependent). Hence, the project activity is a cleaner source of power generation and is encouraging greener practice of power generation.
- The solar power project indirectly is contributing towards conservation of non-renewable resources which are under the constant threat of depletion due to excessive and rapid growth of energy demand. The growing threat of global warming which is a key concern is also addressed due to renewable energy use thereby mitigating climate change.

**Technological well-being:**

- The project activity uses thin film CdTe solar photovoltaic technology for grid connected power generation thereby demonstrating the viability of solar based renewable energy generation in the region, which is fed into the nearest sub-station (part of the Indian Grid), thus increasing energy availability under the service area of the substation. Hence, the project leads to technological well-being.

**A.2. Location of project activity**

**Host Party:** India

**Region/State/Province:** Gujarat

**City/Town/Community:** District: Anand, Tehsil: Khambhat, Village: Wadgam

**Physical/Geographical location:**

Latitude: 22° 19' 12" North

Longitude: 72° 25' 48" East

The site of the proposed PV power plant is on fairly flat land located in village wadgam approximately 20 km from the tehsil khambhat, 60 km from the town of Anand and 86 km from Ahmedabad in Gujarat. It lies at an altitude of approximately 6m, above mean sea level. The nearest airport is Ahmedabad. National Highways NH 8A and NH 8 pass from approximately 43 km and 53 km respectively from the selected site. State highway connecting Khambhat and Bhaunagar lies 14 km from site. Site is well connected by an internal road suitable for transport of heavy equipment.



**A.3. Technologies / measures**

**Technology to be employed by the project activity:**

As stated above, the project activity is 15 MW capacity thin film CdTe technology based solar photovoltaic plant. Since the project activity is a Greenfield installation there was no electricity generation at the project site prior to its implementation.

ACME Solar Technologies (Gujarat) Private Limited procured the CdTe modules from world's renowned module manufacturer. Technical specifications of the solar PV power plant are as follows:

Technical Specifications at the time of commissioning and during CDM registration of project activity

Type of solar photovoltaic modules	Thin Film			
Make of solar photovoltaic modules	First Solar			
Model of PV modules	FS-272	FS-275	FS-277	FS-280
Capacity of each photovoltaic modules	72.5 W	75 W	77.5 W	80 W
Number of units of each type	2,970	56,790	70,290	63,495
Number of solar PV modules installed	193,545			
Type of inverters	Central			
Make of inverters	ABB			
Capacity of each inverter	500 kW			
Total capacity of solar power project	15.00 MW			

It is to be noted that the above technical specifications were available at the time of commissioning and CDM Registration of project activity. However, it was observed that few modules had some problem of degradation. Therefore, supplier replaced few modules with 110 Watt modules which are higher wattage hence less in number. The change in modules is started from Sept 2015 onwards. Despite the change in module configuration, the capacity of project activity remains within 15 MW rated capacity. This change does not impact any change in capacity or scale of project activity.

Currently there are 2,970 modules of 72.5 watt, 22680 modules of 75 Watt, 54,070 modules of 77.5 Watt, 7,575 modules of 80 Watt and 75,330 modules of 110 Watt and total capacity of project activity remains as 15 MW. Thus total number of solar PV modules installed are 162,625.

Technical Specifications after change in module configuration:

Type of solar photovoltaic modules	Thin Film				
Make of solar photovoltaic modules	First Solar				
Model of PV modules	FS-272	FS-275	FS-277	FS-280	FS-4110-2
Capacity of each photovoltaic modules	72.5 W	75 W	77.5 W	80 W	110 W
Number of units of each type	2,970	22,680	54,070	7,575	75,330
Number of solar PV modules installed	162,625				
Type of inverters	Central				
Make of inverters	ABB				
Capacity of each inverter	500 kW				
Total capacity of solar power project	15.00 MW				

The supporting evidences for the change in modules are submitted to DOE. It was technically not possible to replace the non-functional modules with same rated capacity due to availability constraint. Thus, module configuration of nearby watt rated capacity (higher/lower) of replaced modules was installed, which is a usual market practice. It is to be noted that, in future whenever changes in module configuration is required, the new modules might be of different capacity, but overall capacity of project activity shall remain same.

The same module capacity PV Panels might not be available with the supplier at a given time, hence the modules of available capacity will be installed keeping the overall output capacity of project within 15 MW. This situation might occur in future too, leading to slight modification in module configurations (capacity and number of modules). The overall capacity shall be within threshold limit of 15 MW, thus the changes in project activity specifications information do not affect design of project activity, applicability of methodology, additionality of project activity and scale of project activity and no need to revise PDD in case of module configuration changes without crossing threshold limit of 15 MW. It is to be noted that in case of future replacement, PP will replace the PV modules by same make and the changes made in future will be transparently reflect in monitoring report.

Power evacuation infrastructure is set up as per the guidelines of Gujarat Electricity Regulatory Commissions (GERC), Central Electricity Regulatory Commission (CERC) and the respective Distribution Company (DISCOM). The project is connected to the nearby  $\geq 66$  kV grid substation. The grid connection unit is continuously synchronize the incoming solar power with the available grid for safe and efficient operation. The metering of net electricity generated is undertaken at the grid interconnection point.

The technology for the project is environmentally safe and sound. Further, there is no technology transfer associated with the project activity.

#### A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Party)	ACME Solar Technologies (Gujarat) Private Limited (Private entity)	No
Australia (Other party involved)	EKI Energy Services Limited (Private entity)	No

#### A.5. Public funding of project activity

No public funding is availed for the project activity from parties included in Annex I.

#### A.6. History of project activity

The project activity was commissioned on 13/03/2012. The registration date of the project activity under CDM mechanism is 27/12/2012. Currently, the project is applying for Renewal of 2<sup>nd</sup> Crediting Period.

The CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA). The CDM project activity is also not a project activity that has been deregistered. The CDM project activity was not a CPA that has been excluded from a registered CDM PoA.

No registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

#### A.7. Debundling

According to Appendix C of simplified modalities and procedures for small scale CDM project activities, "de-bundling" is defined as the fragmentation of the large scale project activity into smaller parts. The proposed small scale project activity is not a "de-bundled" component of large scale project activity. If, there is no registered small scale CDM project activity or a request for registration by another small-scale project activity:

- By the same project participants;
- In the same project category and technology/measure;
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The proposed small-scale project activity is not a de-bundled component of a large project activity. Since, there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity by the project promoter.

The tool referred is “Assessment of debundling for small-scale project activities”<sup>4</sup>, Version 4.0, EB 83, annex 13.

## SECTION B. Application of methodologies and standardized baselines

### B.1. Reference to methodologies and standardized baseline

**Title:** Grid connected renewable electricity generation

**Methodology:** AMS-I.D.: Grid connected renewable electricity generation -- (Version 18<sup>5</sup>).

The methodology refers to the following tools:

- TOOL07: Tool to calculate the emission factor for an electricity system<sup>6</sup>- version-07.0 (EB 100, Annex 04)

### B.2. Applicability of methodologies and standardized baselines

The methodology AMS.I.D Version 18 is being applied for the project activity. The reasons for the choice of project type and category for the project activity are as follows:

Criteria	Applicability to the project
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:  (a) supplying electricity to a national or a regional grid; or  (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project is renewable energy generation through installation of photovoltaic modules. The project is supplying electricity to the Indian grid. <b>Thus, the project activity complies with this criterion.</b>
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2.	As per Table 2 of the AMS.I.D Version 18, project activities that supply electricity to the National / regional grid are applicable under AMS.I.D Version 18. Since the proposed project activity under consideration is also supply electricity to the regional grid. <b>Thus, the project activity complies with this criterion.</b>
3. This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) involve a capacity addition in (an) existing plant(s); (c) involve a retrofit of (an) existing plant(s); d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) involve a replacement of (an) existing plant(s).	The project activity is Greenfield installation of new power plant at a site where there was no renewable energy power plant operating prior to implementation of project. <b>Thus, the project activity complies with this criterion.</b>

<sup>4</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-20-v1.pdf>

<sup>5</sup> <https://cdm.unfccc.int/Projects/DB/BVQ11355214849.13/view>

<sup>6</sup> <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

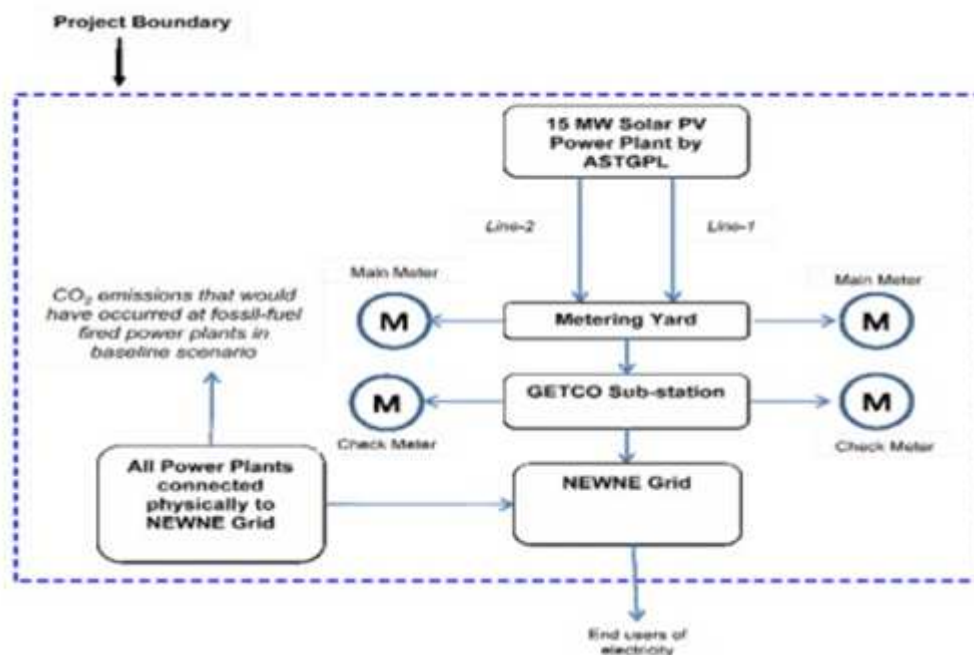
Criteria	Applicability to the project
<p>4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <p>(a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</p> <p>(b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m<sup>2</sup>;</p> <p>(c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m<sup>2</sup>.</p>	<p>The project activity is not a hydro power plant. <b>Thus, this criterion is not applicable to the project activity.</b></p>
<p>5. If new unit has both renewable and nonrenewable 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 new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p>The project activity has only renewable component i.e. solar PV generated power with 15 MW capacity, which meets the eligibility of 15 MW for a small scale CDM project activity. Further, the project does not involve any use of fossil fuel. <b>Thus, this criterion is not applicable to the project activity.</b></p>
<p>6. Combined heat and power (co-generation) systems are not eligible under this category.</p>	<p>The project activity generates only power and hence is not a cogeneration system. <b>Thus, this criterion is not applicable to the project activity.</b></p>
<p>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.</p>	<p>The project activity is Greenfield and there is no existing power generation facility at the site. The installed capacity of the project is 15 MW, which is not exceeding the limit for small scale projects. As per the Power Purchase Agreement signed with GUVNL, the project capacity is 15 MW and hence the capacity of the plant is not exceeding the limit of 15 MW over the crediting period of the project activity. <b>Thus, this criterion is not applicable to the project activity.</b></p>
<p>8. In the case of retrofit or replacement, to qualify as a small scale project, the total output of the modified or retrofitted or replacement unit shall not exceed the limit of 15 MW.</p>	<p>Project activity is neither retrofit nor modification of existing facility. The installed capacity of the project is 15 MW, which is not exceeding the limit for small scale projects. As per the Power Purchase Agreement signed with GUVNL, the project capacity is 15 MW and hence the capacity of the plant is not exceeding the limit of 15 MW over the crediting period of the project activity.</p>
<p>9. In the case of landfill gas, waste gas, waste water treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity</p>	<p>The project activity is a renewable solar Photovoltaic power project and is not a landfill gas, waste gas, wastewater treatment and agro-industries projects or recovered methane emissions project.</p>

Criteria	Applicability to the project
generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS I.C.: Thermal energy production with or without electricity” shall be explored.	<b>Hence, the criteria is not applicable to the project activity.</b>
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.	The Project activity is a renewable solar Photovoltaic power project and is not a biomass project. <b>Hence the criteria is not applicable to the project activity.</b>

As already been mentioned in the above table, as per the Power Purchase Agreement signed with GUVNL, the project capacity is 15 MW and hence the capacity of the plant is not exceeding the limit of 15 MW over the crediting period of the project activity. From the above it is observed that, the project activity is applicable under AMS.I.D.

### B.3. Project boundary, sources and greenhouse gases (GHGs)

As per Paragraph 18, AMS-I.D, Version 18 “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.” Accordingly the project boundary includes solar PV power generation system and all power plants connected physically to the local grid to which the proposed project supplies renewable electricity to avoid GHG emissions. The proposed project is located in the state of Gujarat and hence falls under the Indian grid. The following diagram explains the project boundary for the proposed project activity.



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

#### B.4. Establishment and description of baseline scenario

Updated baseline for the second crediting period in line with the “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period.” Version 03.0.1.

This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 283 to 286 of Project Standard version 02.0.

The tool stipulates the following steps to be carried out.

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

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

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

##### Step 1.2: Assess the impact of circumstances

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

Nevertheless, there is an impressive growth attained by the Indian Power Sector within the recent years, the installed capacity has grown from mere 1,713 MW in 1950 to 356,100.20 MW as on 31.03.2018, consisting of 226,279.34 MW Thermal, 77,641.63 MW Renew and 6,780 MW Nuclear. Sector-wise details of installed capacity are shown in Table 1. However, it is evident from Table 1<sup>7</sup> that the installed capacity is predominantly coal based and therefore, is a major source of carbon dioxide emissions in India. Hence, there exists scope for reducing the CO<sub>2</sub> emissions in the country by increased use of renewable energy sources.

<sup>7</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

Furthermore, project participant has considered the latest available CO<sub>2</sub> Baseline Database (CEA database, version 15) at the time of requesting renewal of the crediting period for establishing the baseline emission factor, which itself considered all the new circumstances. Hence, the new circumstances do not have an impact on the baseline emission. As per below table, the fossil fuel based thermal power generation is dominant over the renewable based power generation, thus baseline scenario remains same as original.

Table 1: Sector- wise installed capacity (MW) as on 31/03/2019 (CEA Database version 15)

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

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

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

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

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

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

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

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

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

In line with the project standard version 02.0, the impact of new relevant national and/or sectoral policies and circumstances on the baseline taking into account relevant EB guidance with regard to renewal of the crediting period at the time of requesting renewal of crediting period; and the correctness of the application of an approved baseline methodology for the determination of the continued validity of the baseline or its update, and the estimation of emission reductions for the applicable crediting period

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

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

Section 3 of the said act required the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy<sup>8</sup> on 12<sup>th</sup> February 2005 which was in force at the time of completion of the baseline study as stated in the registered PDD of the project activity. This policy has not been revised since then and is currently in force as well.

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

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

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

The approved small scale methodology for Grid connected renewable electricity generation, AMS-I.D (Version 18), has been used to determine the baseline and the estimation of emission reductions for the applicable crediting period. As referred in the methodology "*Tool to calculate the emission factor for an electricity system*" (version 07.0) has been used to determine continued validity of the baseline based on combined margin (CM) calculations.

As per CEA database version 15, the fossil fuel dominated electricity is more than renewable sector and is continuing with same pattern. In light of the above discussion it is to be concluded that in accordance with relevant guidelines stipulated in the Project Standard version 02.0, national and/or sectoral policies and circumstances had been considered towards formulating the OM & BM baseline scenario. Hence the baseline scenario as applied for the present project activity remains justified.

As per the approved small scale methodology for Grid connected renewable electricity generation, AMS-I.D (Version 18.0) para 19: "If the project activity is the installation of a Greenfield power plant, 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

<sup>8</sup> <http://www.cercind.gov.in/Act-with-amendment.pdf>

addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

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

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

The combined margin ( $EF_{grid,CM,y}$ ) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publically available. The CEA database version 15 is the latest available data at the time of PD submission to DOE for validation, hence same is considered for emission factor calculations.

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

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9419 tCO <sub>2</sub> /MWh	Combined margin CO <sub>2</sub> emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO <sub>2</sub> Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9622 tCO <sub>2</sub> /MWh	Operating margin CO <sub>2</sub> emission factor for the project electricity system in year y	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO <sub>2</sub> Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8811 tCO <sub>2</sub> /MWh	Build margin CO <sub>2</sub> emission factor for the project electricity system in year y	Baseline CO <sub>2</sub> Emission Database, Version 15.0, May 2019 published by Central Electricity Authority (CEA), Government of India

## B.5 Demonstration of additionality

The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.

<p>Specify the methodology, tool, standardized baseline or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by DNAs and approved by the Board, that establish automatic additionality for the proposed project activity (including the version number and the specific paragraph, if applicable).</p>	<p>Guidelines on the demonstration of additionality of small-scale project activities for demonstration of additionality</p>
<p>Describe how the proposed project activity meets the criteria for automatic additionality in the relevant methodology, tool, standardized baselines or specific renewable technologies/measures conferring automatic additional microscale CDM project activities proposed by a DNA and approved by the Board.</p>	<p><b>Additionality Assessment</b></p> <p>The project activity being small scale, meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (C) of decision 17/CP.7. As per the decision 17/CP.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. Further as per Attachment A to Appendix B of the Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, a proposed small scale CDM project activity is considered as additional if the project activity would not have occurred any way due to at least one of following barriers<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;</li> <li>b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;</li> <li>c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emission;</li> <li>d) Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.</li> </ul> <p>It goes on to provide a positive list of grid-connected renewable electricity generation</p>

	<p>technologies that are automatically defined as additional, without further documentation of barriers. The list consists of the following grid-connected renewable electricity generation technologies of installed capacity up to 15 MW:</p> <ul style="list-style-type: none"> <li>a) Solar technologies (photovoltaic and solar thermal electricity generation);</li> <li>b) Off-shore wind technologies;</li> <li>c) Marine technologies (wave, tidal).</li> </ul> <p>Since the project activity is a solar photovoltaic electricity generation project of capacity 15 MW, it can be concluded from the above list that the project activity is automatically additional and does not require demonstration of barriers.</p> <p>Hence, it can be concluded that the project is additional.</p>
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### Existing National and/or Sectoral Policies

Annexure 3 of the EB 22 states that national and/or sectoral policies and circumstances have to be accounted for when considering the baseline. Para 7(a) states that, only those national and/or sectoral policies or regulations under paragraph 6(a) i.e. type E+ policy that increase GHG emissions, that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997), shall be taken into account when developing a baseline scenario. The Electricity Act of 2003 promoted cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity (Refer Section 86(1) of Electricity Act 2003). Therefore, it could be seen that the provincial and sectoral policies are E- i.e., policies that decrease GHG emissions and are after November 2001. Hence the baseline scenario is the electricity generation by grid connected fossil fuel dominated power plants confirming to Annex 3 of EB 22.

Further, the baseline alternative mentioned above is in compliance with all the applicable regulatory policies and laws. Additionally, the project proponent is under no compulsion to opt for any particular technology or even a renewable mode of power generation. There is no governmental body or EB policy which requires a particular kind of fuel to be chosen and there is no legal requirement to which the above alternative does not conform.

### Prior Consideration of CDM

"Guidance on the demonstration and assessment of prior consideration of the CDM" (EB49, Annex 22), states that for project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status within six months of the project activity start date. In line with the above guidance, ACME Tele Power Limited (ATPL), the parent company of ASTGPL, intimated the UNFCCC and host party DNA i.e. National CDM Authority (NCDMA) of its intention to seek CDM for the proposed project activity on 22<sup>nd</sup> June, 2010, which was much before the start date of the project activity (as mentioned in section C.1.1). Later, it was decided to change the location of the project activity and hence another notification was sent to UNFCCC and NCDMA on 8<sup>th</sup> April, 2011, with the changed location and project proponent as ASTGPL. Although the revised prior consideration of CDM form included changed location and name of project proponent as ACME Solar Technologies (Gujarat) Private Limited at Section 1 of the form, the name of the entity at Section 2 was not correctly mentioned. An amendment in this regard was sent to UNFCCC on 23<sup>rd</sup> August, 2011. Hence, from the above

discussions, it can be clearly established that, CDM was seriously considered in the decision to proceed with the proposed project activity.

## B.6. Estimation of emission reductions

### B.6.1. Explanation of methodological choices

As per the approved consolidated Methodology AMS - I.D, version 18:

Baseline emissions include only CO<sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

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

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

$EF_{grid,CM,y}$  = Combined margin 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 grid emission factor as per the** “Tool to calculate the emission factor for an electricity system” version 07 is calculated as below.

CO<sub>2</sub> Baseline Database for the Indian Power Sector, Version 15, December 2019<sup>9</sup> published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

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

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

#### Step 1: Identify the relevant electricity systems

As described in tool “For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity systems”. It also states that “If the

<sup>9</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

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**

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

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

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

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

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

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

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

The data required to calculate Simple adjusted OM and Dispatch data analysis OM is not possible due to lack of availability of data to project developers. The choice of other two options for

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

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

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

*Data Source: Central Electricity Authority (CEA) database Version 15, Dec 2019<sup>10</sup>*

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

The simple OM emission factor is calculated as the generation-weighted average CO<sub>2</sub> emissions per unit net electricity generation (tCO<sub>2</sub>/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

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

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

OR

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

PP has chosen ex-ante option for calculation of Simple OM emission factor using a 3-year generation-weighted average, based on the most recent data available at the time of submission of the PD to the DOE for validation.

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

#### Step 4: Calculate the operating margin emission factor (EF<sub>grid,OMSimple,y</sub>) according to the selected method

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

Net Generation in Operating Margin (GWh) (incl. Imports)			
	2016-17	2017-18	2018-19
INDIAN Grid	916,278	960,639	995,957

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

<sup>10</sup>[http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

Weighted Generation Operating Margin	
INDIAN Grid	0.9622

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

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

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

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

(b) **Option 2** - For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

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

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

Build Margin (tCO <sub>2</sub> /MWh) (not adjusted for imports)	
	2018-19
INDIAN Grid	0.8811

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

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

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

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

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

The combined margin emissions factor is calculated as follows:

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

Where:

$EF_{grid,BM,y}$	= Build margin CO <sub>2</sub> emission factor in year y (t CO <sub>2</sub> /MWh)
$EF_{grid,OM,y}$	= Operating margin CO <sub>2</sub> emission factor in year y (t CO <sub>2</sub> /MWh)
$W_{OM}$	= Weighting of operating margin emissions factor (per cent)
$W_{BM}$	= Weighting of build margin emissions factor (per cent)

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

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

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

### Baseline emission factor ( $EF_y$ ):

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

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

$$BE_y = 25,846 \times 0.9419 = 24,344 \text{ tCO}_2 \text{ during a given year } y.$$

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

Data/Parameter	$EF_{grid,OM,y}$
Data unit	tCO <sub>2</sub> /MWh
Description	Operating Margin CO <sub>2</sub> emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019 <sup>11</sup>
Value(s) applied	0.9622
Choice of data or measurement methods and procedures	Calculated as the last 3 year (2016-17, 2017-18, 2018-19) generation-weighted average, sourced from Baseline CO <sub>2</sub> Emission Database, Version 15.0, Dec 2019 published by Central Electricity Authority (CEA), Government of India.
Purpose of data	For the calculation of the Baseline Emission
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

<sup>11</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

Data/Parameter	EF <sub>grid, BM, y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Build Margin CO <sub>2</sub> emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019 <sup>12</sup>
Value(s) applied	0.8811
Choice of data or measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system, version 07" as per the latest data available for the most recent year 2017-18. The data is obtained from "CO <sub>2</sub> Baseline Database for Indian Power Sector" version 15, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	To determine Baseline Emissions
Additional comment	The value has been fixed ex-ante.

Data/Parameter	EF <sub>grid, CM, y</sub> or EF <sub>CO<sub>2</sub>, grid, y</sub>
Data unit	tCO <sub>2</sub> /MWh
Description	Combined Margin CO <sub>2</sub> emission factor in year y
Source of data	Calculated from CEA database, Version 15, Dec 2019 <sup>13</sup>
Value(s) applied	0.9419
Choice of data or measurement methods and procedures	<p>The combined margin emissions factor is calculated as follows:</p> $EF_{grid, CM, y} = EF_{grid, OM, y} * W_{OM} + EF_{grid, BM, y} * W_{BM}$ <p>Where:</p> <p>EF<sub>grid, BM, y</sub>= Build margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)</p> <p>EF<sub>grid, OM, y</sub>= Operating margin CO<sub>2</sub> emission factor in year y (tCO<sub>2</sub>/MWh)</p> <p>W<sub>OM</sub> = Weighting of operating margin emissions factor (%) = 75%</p> <p>W<sub>BM</sub>= Weighting of build margin emissions factor (%) = 25%</p>
Purpose of data	To determine Baseline Emissions
Additional comment	The value has been fixed ex-ante.

### B.6.3 Ex ante calculation of emission reductions

Installed Capacity	15 MW
No. of Days of operation	365 Days
No of Hours	24 Hours
Capacity Utilization Factor	19.67 %
Net Generation	25,846 MWh

Particulars	Unit	2016-17	2017-18	2018-19
Simple Operating Margin (incl. Imports)	tCO <sub>2</sub> e/MWh	0.9636	0.9543	0.9685
Net Generation in Operating Margin	GWh	916,278	960,693	995,957
Weighted Generation Operating Margin	tCO <sub>2</sub> e/MWh	0.9622		

Particulars	Unit	Value	Weight
Weighted Generation Operating Margin	tCO <sub>2</sub> e/MWh	0.9622	0.75
Build Margin (not adjusted for imports)	tCO <sub>2</sub> e/MWh	0.8811	0.25

<sup>12</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

<sup>13</sup> [http://www.cea.nic.in/reports/others/thermal/tpece/cdm\\_co2/user\\_guide\\_ver15.pdf](http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf)

Combined Margin Emission Factor	tCO <sub>2</sub> e/MWh	0.9419
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### Baseline Emissions

BE<sub>y</sub> (As per Equation (1) of AMS.I.D, Version 18),

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

Where,

$$EG_{BL,y} = 25,846 \text{ MWh}$$

$$EF_{CO_2,grid,y} = EF_{grid,CM,y} = 0.9419 \text{ tCO}_2\text{e/MWh}$$

Hence,

$$\begin{aligned} BE_y &= 25,846 \text{ MWh} \times 0.9419 \text{ tCO}_2\text{e/MWh} \\ &= 24,344 \text{ tCO}_2\text{e} \end{aligned}$$

Project Emissions, PE<sub>y</sub> = 0 (As explained in section B6.1)

Leakage Emissions, LE<sub>y</sub> = 0 (As explained in section B6.1)

Therefore the emission reductions, ER<sub>y</sub> (As per Equation (10) of AMS.I.D, Version 18)

$$\begin{aligned} ER_y &= BE_y - PE_y - LE_y \\ &= 24,344 - 0 - 0 \\ &= 24,344 \text{ tCO}_2\text{e} \end{aligned}$$

### B.6.4 Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO <sub>2</sub> e)	Project emissions (t CO <sub>2</sub> e)	Leakage (t CO <sub>2</sub> e)	Emission reductions (t CO <sub>2</sub> e)
Year 1	24,344	0	0	24,344
Year 2	24,344	0	0	24,344
Year 3	24,344	0	0	24,344
Year 4	24,344	0	0	24,344
Year 5	24,344	0	0	24,344
Year 6	24,344	0	0	24,344
Year 7	24,344	0	0	24,344
<b>Total</b>	170,408	0	0	170,408
<b>Total number of crediting years</b>	7 years			
<b>Annual average over the crediting period</b>	24,344	0	0	24,344

### B.7. Monitoring plan

#### B.7.1 Data and parameters to be monitored

<b>Data/Parameter</b>	<b>EG<sub>BL,y</sub></b>
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Monthly State Energy Account Report
Value(s) applied	25,846 (estimated)

Measurement methods and procedures	<p>and procedures</p> <p>ABT Main meters, two in number (one for each bay or line), will be installed at the plant to continuously measure the grid electricity export and import. These measurements will be recorded at least once in a month by representatives of the State utility and ASTGPL. The monthly electricity generation data will be uploaded on the SLDC website.</p> <p>The net electricity exported/supplied to the grid will be calculated as the difference between the measured quantities of the grid electricity export and the import.</p> <p>In the event that the main meters are not in service as a result of maintenance, repairs or testing, then dedicated meters for the plant at the GETCO substation will be used.</p> <p>All the meters will have an accuracy class of 0.2s.</p>
Monitoring frequency	Monthly
QA/QC procedures	Calibration of all the meters will be undertaken at least once in three years <sup>14</sup> and faulty meters will be duly replaced immediately. Calibration will be done by an authorized agency or reputed laboratory. All the meters will be sealed by the State utility and will be in control of the State utility. The main meter reading will be cross checked with records for sold electricity (invoices).
Purpose of data	To Determine baseline emissions
Additional comment	The data will be archived electronically as well as in log books at the power plant and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later

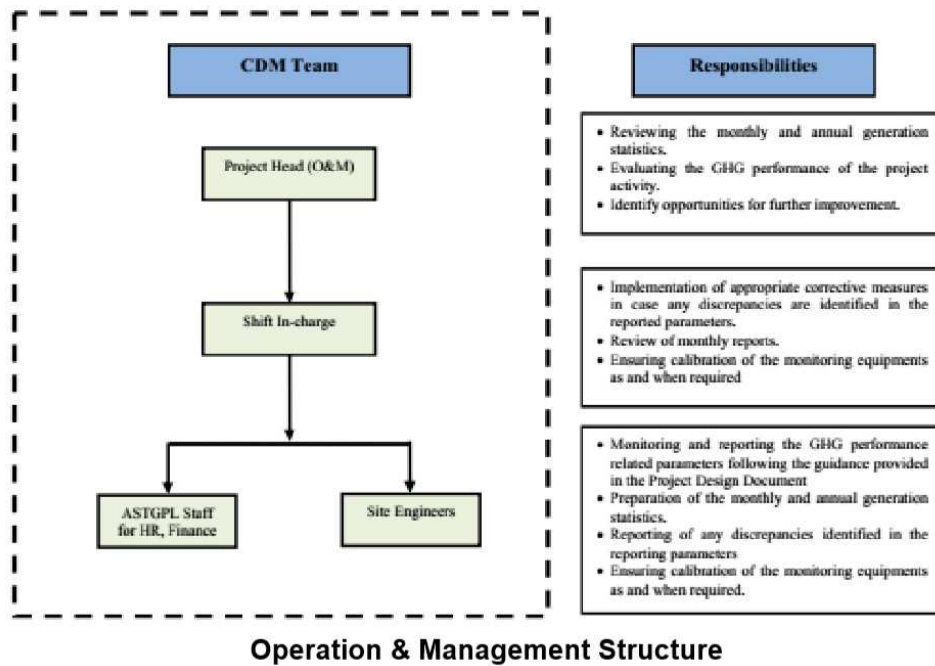
### B.7.2 Sampling plan

Not applicable

### B.7.3 Other elements of monitoring plan

The organizational structure for the proposed power plant envisages site engineers responsible for O&M of the plant. The site engineers will report to the shift in-charge, who will then report to the Project Head (O&M). The day-to-day operation like planning the routine maintenance, safety and environmental control will be placed under the care of the shift in charges. All administrative functions like personnel, industrial relations, labour welfare and financial functions will be looked after by ACME Solar Technologies (Gujarat) Private Limited. The organizational structure and responsibilities on project operation, monitoring and data recording has been mentioned below:

<sup>14</sup> In accordance with the small scale CDM guidelines  
[http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC\\_guid06.pdf](http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid06.pdf)



### Reading and Correction of Meters:

For the purpose of energy accounting, ASTGPL will provide ABT compliant meters at the interface points. Interface metering will confirm to the Central Electricity Authority (Installation and Operation Meters) Regulation, 2006. ABT Main meters, two in number (one for each bay or line), will be installed at the plant to continuously measure the grid electricity export and import. These measurements will be recorded at least once in a month by representatives of the State utility and ASTGPL. The monthly electricity generation data will be uploaded on the SLDC website. The net electricity exported/supplied to the grid will be calculated as the difference between the measured quantities of the grid electricity export and the import. In the event that the main meters are not in service as a result of maintenance, repairs or testing, then dedicated meters for the plant at the GETCO substation will be used.

### Calibration of Meters:

Calibration of all the meters will be undertaken once in three years and faulty meters will be duly replaced immediately. Calibration will be done by an authorized agency or reputed laboratory. All the meters will be sealed by the State utility and will be in control of the State utility.

### Emergency Preparedness and Uncertainty Procedure:

In case Main meters are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meters are not in service as a result of maintenance, repairs or testing, dedicated meters for the plant at the GETCO substation will be used. The main meter reading will be cross checked with records for sold electricity (invoices).

### Data Recording and Archiving:

ASTGPL will keep complete and accurate records of operating log at the Power Plant. The data will be archived electronically as well as in log books at the power plant and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

**SECTION C. Start date, crediting period type and duration****C.1. Start date of project activity**

19/10/2010 (Date of signing of the EPC Contract)

**C.2 Expected operational lifetime of project activity**

25 years and 0 months

**C.3 Crediting period of project activity****C.3.1 Type of crediting period**

The project activity uses the renewable crediting period instead of fixed crediting period. The maximum length of the first crediting period will be 7 years and 0 months, and it will be renewed two times.

Currently the project is requesting the renewal of 2<sup>nd</sup> Crediting Period.

**C.3.2 Start date of crediting period**

The project is applying for Renewal of 2<sup>nd</sup> Crediting Period. The start date of the new Crediting Period will be from 27/12/2019

**C.3.3 Duration of crediting period**

7 years and 0 months

**SECTION D. Environmental impacts****D.1. Analysis of environmental impacts**

The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India notification<sup>15</sup> S.O. 1533 (E) dated September 14, 2006 regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of Environment, Forest and Climate Change) states that 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. Solar PV power projects are not included in this list and thus an EIA is not required. The project activity has no significant impact on the environment.

**D.2. Environmental impact assessment**

As discussed above, the project activity would not have any adverse environmental impacts. The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment, Forest and Climate Change, Government of India. Hence, EIA is not required to be undertaken by the host party for the proposed project activity.

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<sup>15</sup> Reference: <http://envfor.nic.in/legis/eia/so1533.pdf>

## SECTION E. Local stakeholder consultation

### E.1. Modalities for local stakeholder consultation

ACME Solar Technologies (Gujarat) Private Limited invited stakeholders to a meeting to explain the UNFCCC CDM process and proposed project activity. Personal invitations were sent to stakeholders in August, 2011. Stakeholders' meeting for the CDM project on the 15 MW Solar Photovoltaic Power Plant of ASTGPL took place on 10th September, 2011 in Anand district of Gujarat. Residents of following villages attended the meeting:

1. Wadgam
2. Tali Talao
3. Vannaj

A record of the people attending the meeting was maintained and all comments from the stakeholders received during the meeting were recorded and compiled in the minutes of meeting.

The meeting was presided over by Mr. Anil Modh (General Manager, Solar Projects, ASTGPL) who welcomed the gathering and introduced the company and its initiative to those present. He gave a brief description about the company and ACME group informing them about the commitment of ACME group towards innovation, energy saving, renewable energy and products & services that can help the community as a whole. He informed the stakeholders present at the meeting about the capacity of the solar PV power project and the technology proposed to be employed for the power generation. He informed them about the fact that it would lead to generation of clean power as it would be fired by solar power which is a renewable source of energy.

Mr. Modh then invited the CDM consultant to explain the CDM aspects of the proposed project. CDM consultant briefed the stakeholders on the possible threat of climate change caused due to increased concentration of Greenhouse gases in the atmosphere. He further briefed the gathering about Kyoto Protocol, Clean Development Mechanism and its associated benefits. He described the project activity in relation to CDM and discussed the benefits of implementing the project. He described that the project, if implemented, would result in reduction of Greenhouse gases in the atmosphere by feeding power to the fossil fuel fired grid system. Thus, he explained that the project activity would be beneficial to the environment and the society as a whole.

Mr. Modh then requested the stakeholders to share their queries, suggestions and concerns with respect to the proposed CDM project activity and replied to the same.

Finally, Mr. Modh thanked Shri Jeenabhai Sonabhai Goyal (Sarpanch, Wadgam Village), Shri Suresh Bhai (Sarpanch, Tali Talao Village) and all other stakeholders for attending this meeting on invitation from ACME Solar Technologies (Gujarat) Private Limited. He also expressed that ACME Group is committed to its social and environmental obligations and invites various participants to keep on giving their feedback on a continuous basis so that if any improvements are called for, those could be implemented in various operations of the project.

### E.2. Summary of comments received

Sl. No	Question	Stakeholder	Answer
1	Will this electricity be costlier than normal electricity for the consumers?	Chandu Bhai (Resident of Wadgam Village)	The electricity from the solar PV power plant will be connected to the sub-station and fed into the local electricity grid. The electricity generated will be transmitted to different parts of the region through the grid. The electricity

			thus provided to the consumers will be at no additional cost above the normal electricity cost.
2	When will the plant start supplying electricity?	Ranjit Singhji (Resident of Wadgam Village)	The proposed project is under construction and is 90% complete. The plant will be commissioned in few months and once the transmission line is ready, the electricity will be supplied to the grid.
3	To which substation will the electricity be supplied?	Mangal Bhai (Resident of Tali Talao Village)	The electricity will be supplied to the Undel substation.
4	For how many years the plant will operate?	Bhailal Narayan Bhai (Resident of Wadgam Village)	The lifetime of the project is 25 years.

### E.3. Consideration of comments received

All the stakeholders were appreciative that the CDM project activity in their locality is contributing to a global cause and they commended the ASTGPL management for their initiatives in the area of solar power development. All the questions asked by the stakeholders were satisfactorily explained to the participants by the project promoter. The project promoter explained about the technical details, feasibility of the project activity and its impacts on environment. The stakeholders appreciated the project promoter for the environmental friendly measures. Considering the comments made by the stakeholders, no significant negative impacts due to the project activity had been identified.

### SECTION F. Approval and authorization

The host Country Approval having ref number 4/6/2012-CCC dated 10/10/2012 is submitted to DOE,

## Appendix 1. Contact information of project participants

<b>Organization name</b>	ACME Solar Technologies (Gujarat) Private Limited
<b>Country</b>	India
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<b>E-mail</b>	<a href="mailto:sandeep.gupta@acme.in">sandeep.gupta@acme.in</a>
<b>Website</b>	-
<b>Contact person</b>	Mr. Sandeep Gupta

<b>Organization name</b>	EKI Energy Services Limited
<b>Country</b>	India
<b>Address</b>	Office No 201, Plot No. 48, Scheme 78, Part-2, Vijay Nagar, Indore- 452010, Madhya Pradesh, India
<b>Telephone</b>	+91 (0) 73142 89086
<b>Fax</b>	-
<b>E-mail</b>	<a href="mailto:naveen@enkingint.org">naveen@enkingint.org</a>
<b>Website</b>	-
<b>Contact person</b>	Mr. Naveen Sharma

## Appendix 2. Affirmation regarding public funding

There is no recourse to any public funding by the project proponents to implement the proposed project activity.

## Appendix 3. Applicability of methodologies and standardized baselines

Information with respect to the baseline has already been explained under section B.6.

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

Information with respect to the ex-ante calculation of emission reduction has already been explained under section B.6.3.

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

The monitoring information is detailed under section B.7.

## **Appendix 6. Summary report of comments received from local stakeholders**

Please refer section E of the PDD.

## **Appendix 7. Summary of post registration changes**

The below changes to the project design has been made in revised PDD as Post registration Changes during the 1<sup>st</sup> Crediting Period from 27/12/2012 to 26/12/2019.

1. The revised Module configuration details like module capacity and number of modules are mentioned in revised PDD along with existing information. Also it is clarified in PDD that the module configuration may change in future, but the overall AC output capacity of project will remain same (not exceeding 15 MW). Whenever there is problem in any modules, the supplier may not make available same module capacity PV Panels, hence the modules of available capacity will be installed keeping the overall output capacity of project same. This is practical situation and hence in future, slight modification in module configurations (capacity and number of modules) may occur, which will be duly reported in the concerned monitoring period in the MR. The overall capacity of project is within 15 MW threshold limit, thus the changes in project activity specifications information do not affect the applicability of methodology, additionality and scale of project activity. Some minor editorial changes made in PDD which are not material. There is no any prior approval required for these post registration changes. As per para 6 of Appendix 1 of project standard version 09.

The above post registration changes were approved and the updated CDM PDD of the project activity was published on 05/10/2017.

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### **Document information**

<i>Version</i>	<i>Date</i>	<i>Description</i>
11.0	31 May 2019	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN);</li> <li>• Make editorial improvements.</li> </ul>

<i>Version</i>	<i>Date</i>	<i>Description</i>
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: <ul style="list-style-type: none"> <li>• Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms;</li> <li>• Make editorial improvement.</li> </ul>
09.0	24 May 2017	Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0);</li> <li>• Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM);</li> <li>• Make editorial improvement.</li> </ul>
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: <ul style="list-style-type: none"> <li>• Include provisions related to statement on erroneous inclusion of a CPA;</li> <li>• Include provisions related to delayed submission of a monitoring plan;</li> <li>• Provisions related to local stakeholder consultation;</li> <li>• Provisions related to the Host Party;</li> <li>• Make editorial improvement.</li> </ul>
05.0	25 June 2014	Revision to: <ul style="list-style-type: none"> <li>• Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0));</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 project activity in B.7.4 and Appendix 1;</li> <li>• Change the reference number from F-CDM-PDD to CDM-PDD-FORM;</li> <li>• Make editorial improvement.</li> </ul>
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

<i>Version</i>	<i>Date</i>	<i>Description</i>
Decision Class: Regulatory Document Type: Form Business Function: Registration Keywords: project activities, project design document		