Component project activity design document form
(Version 09.0)

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION	
Title of the CPA	**Solar Water Heater Program in India- "CPA-1"**
Scale of the CPA	☐ Large-scale ☒ Small-scale
Version number of the CPA-DD	11
Completion date of the CPA-DD	14/04/2020
Title and UNFCCC reference number of the registered CDM PoA	**PoA 8855: Solar Water Heater Program in India**
Title and reference number of the corresponding generic CPA	Solar Water Heater Program in India - "CPA-XX"
Coordinating/managing entity	Nuetech Solar Systems Pvt. Ltd
Host Party	India
Applied methodologies and standardized baselines	AMS.I.C./Version 21 "Thermal energy production with or without electricity"
Sectoral scopes	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)
Estimated amount of annual average GHG emission reductions	33,236 tCO_2

SECTION A. Description of component project activity (CPA)

A.1. Purpose and general description of CPA

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CPA-1 is a part of "Solar Water Heater Program in India". The purpose of the SSC-CPA is to install solar water heater (SWH) in residential and commercial buildings, throughout India. Project activity aims to save electricity generated from fossil fuel by using renewable energy to meet hot water demand and will result in reduction of CO_2 emissions.

CPA-1 includes SWH systems with a total surface area of 59,412 m^2, and a total capacity of 3,192 m^3/day of which 69% Flat Plate Collectors (FPC) and the remaining Evacuated Tube Collectors (ETC).[1] Table 1 shows the number of systems per system size. Table 2 shows the location of the systems per Indian state. The full database with unique identification of all systems is available as a separate excel file, called "CER calculations CPA-1 v07 14-04-2020 (Public)".

Table 1: Number of systems per system size.

System capacity (litres/day)	Number of systems
<101	2,576
101-201	7,769
201-401	664
401-601	664
601-801	77
801-1001	484
>1001	238
Total	12,472

The CDM program activity, CPA-1 is implemented by Nuetech Solar Systems Pvt Ltd (NSS) contracted as a CDM program activity Implementer (CPAI). NSS is in the business of manufacturing and marketing of SWH. CPA-1 has been implemented in the period from 02/07/2007 till 31/12/2009.

Table 2: Number of systems per state.

State	Number of systems
Andhra Pradesh	514
Assam	5
Daman and Diu	6
Delhi (National Capital Territory of)	171
Ghazibad	3
Goa	78
Gujarat	229
Harayana	9
Jammu & Kashmir	31
Karnataka	9,931
Kerala	1
Madhya Pradesh	3
Maharashtra	1,094

[1] For further information, see: http://www.nuetechsolar.com/products/basicmechanism.asp.

Punjab	46
Rajasthan	39
Tamil Nadu	107
Uttar Pradesh	204
Uttarakhand	1
Total	12,472

Under the CPA, two types of solar water heaters are provided, a Flat Plate Collector (FPC) and an Evacuated Tube Collector (ETC). In the FPC model, which is the simplest and the most common type of solar thermal device, the system works basically on a flat, blackened absorber plate inside the collector. When sunbeams are allowed to strike this plate, heat gets trapped inside the collector. This heats up the water in the copper tubes that run through the plate, causing the water to circulate through the system by natural conduction or convection. The heated water then gets transported to a storage tank placed above the collector, under well insulated conditions, for further channeling to the user point.[2] FPC models typically have a surface area of around 2.0 m^2/100 liters.

In the ETC model, the system works on two concentric tubes made of tough borosilicate glass. The outer tube is transparent and allows sunrays to pass through it with minimal reflection. The outer surface of the inner tube is selectively coated with an ultra-efficient absorber (A1-N/A1) for maximal solar spectrum absorption and minimal heat loss. The tops of the two tubes are fused tight and all gases in the space between the two glass layers are pumped out while exposing the tube to high temperature. The resulting vacuum acts as an excellent insulator just like in a glass-lined thermos flask. ETC models typically have a surface area of around 1.5 m^2/100 liters.

A.2. Location of CPA

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The CPA is located in India

Geographic reference:
Latitude – North 6.75 degree to North 37.10 degree
Longitude – East 68.03 degree to East 97.40 degree[3].

[3] Source: http://www.mapsofworld.com/lat_long/india-lat-long.html.

Figure 1: Geographical boundary for the SWH India PoA

A.3. Technologies/measures

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The SWH falling under this CPA consists of the following:

1. *Solar collector(s) that capture solar radiation*: A weatherproofed surface area in which fluid (generally water) is exposed to heat from the sun. Solar energy heats up the fluid causing it to circulate through the system by natural convection (thermosyphon) or the fluid is circulated with a pump. The fluid is usually passed to a storage tank located close to the collector.
2. *Storage tank*: a reservoir where the energy from the heated fluid is transferred to the cold water and where the heated water is stored until use.
3. *Fluid:* circulating fluid that absorbs the energy collected.

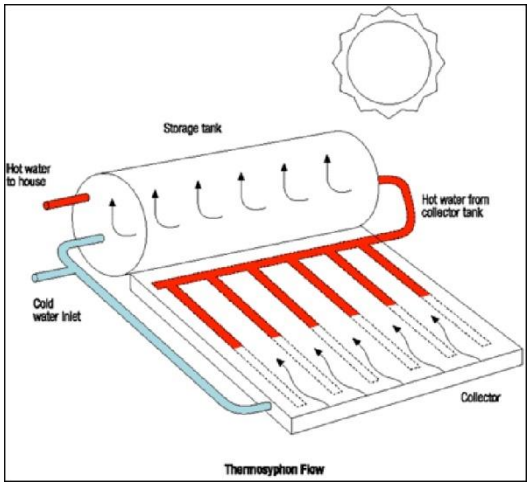

Figure 2: Solar water heating system (example with thermosyphon)

The technical specifications of the SWHs include the following:

Flat Plate Collectors (FPC) In the FPC model, which is the simplest and the most common type of

solar thermal device, the system works basically on a flat, blackened absorber plate inside the collector. When sunbeams are allowed to strike this plate, heat gets trapped inside the collector. This heats up the water in the copper tubes that run through the plate, causing the water to circulate through the system by natural conduction or convection. The heated water then gets transported to a storage tank placed above the collector, under well insulated conditions, for further channelling to the user point. FPC models typically have a surface area of around 2.0 m2/100 liters.

Evacuated Tube Collector (ETC). In the ETC model, the system works on two concentric tubes made of tough borosilicate glass. The outer tube is transparent and allows sunrays to pass through it with minimal reflection. The outer surface of the inner tube is selectively coated with an ultra-efficient absorber (A1-N/A1) for maximal solar spectrum absorption and minimal heat loss. The tops of the two tubes are fused tight and all gases in the space between the two glass layers are pumped out while exposing the tube to high temperature. The resulting vacuum acts as an excellent insulator just like in a glass-lined thermos flask. ETC models typically have a surface area of around 1.5 m2/100 liters.

Heat exchanger. The Programme also includes a type of SWH which uses a heat exchanger. In this type a fluid is heated in the collector after which the heat from the fluid is transferred to the water in a heat exchanger in the storage tank. The heat exchangers are used, for example, in cold regions, where a fluid can be used with a lower freezing point than water to prevent the water in the collector from freezing.

Size. The size of the systems can differ. The maximum system size is 640 m^2.

Regular/balcony models. The SWHs are regular systems, often used on rooftops, or balcony models.

A.4. Coordinating/managing entity

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Nuetech Solar Systems Pvt Ltd. is the entity responsible for the small-scale CPA.

A.5. Parties and CPA implementers

Parties involved	CPA implementers	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
India (host)	Nuetech Solar Systems Pvt. Ltd	No
Germany	Carbonbay GmbH & Co. KG	No

A.6. Public funding of CPA

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No public funding or ODA have or will be diverted for the implementation of the PoA.

A.7. History of CPA

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The proposed CPA is neither registered as a CDM project activity nor included in another registered CDM PoA. Next to this, the proposed CPA is not a project activity that has been deregistered.

The proposed CPA is not a CPA that has been excluded from a registered CDM PoA. Next to this, the proposed CPA is not part of a registered CDM project activity or a CPA under a registered

CDM PoA whose crediting period has or has not expired, or exists in the same geographical location as the proposed CPA.

A.8. Debundling

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CPAs are exempted from the debundling check if the individual elements of the CPA have a capacity below 1% of the small scale threshold.[4] The small scale threshold defined by AMS.I-C is "the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal". The table below shows the proposed SWH do not individually exceed 1% of the SSC threshold, and that therefore the program is exempted from the de-bundling check.

Table 3: AMS-I.C threshold

AMS I C Threshold	1% of SSC Threshold	Capacity of SWH distributed through program
45 MW_{th}	0.45 MW_{th}	maximum 640 m^2

The annual average solar radiation defined by the Small Scale Working Group is 700 W_{th}/m^2.[5] The maximum surface area of a single system in the PoA cannot exceed 640 m^2. The surface area of the largest system in CPA-1 is 104 m^2. The surface area has been calculated using the test reports for a 100l FPC (which has a surface area of 2.08m^2)[6] and an ETC (which has a surface area of 1.43m^2)[7]. With the prescribed amount of solar radiation of 700 W_{th}/m^2 such a system would have a capacity of 0.07 MW_{th}, which is below 1% of the 45 MW_{th} small-scale threshold.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

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AMS.I.C./Version 21 "Thermal energy production with or without electricity"

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

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Source		Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emission
		N_2O	No	Minor source of emission
Project activity	CO_2 emissions from power usage for pumps used in the SWH systems	CO_2	Yes	According to AMS-I.C. /Version 21, paragraph 45
		CH_4	No	
		N_2O	No	

[4] TOOL20. Methodological tool: Assessment of debundling for small-scale project activities Version 04.0, paragraph 17.

[5] Small Scale Working Group Meeting 07, annex 3, section 5.

[6] (FPC) Test Report, (RTC file no 730) Regional Test Centre (Solar Thermal) of the Madurai Kamaraj University, dated 18/07/2011.

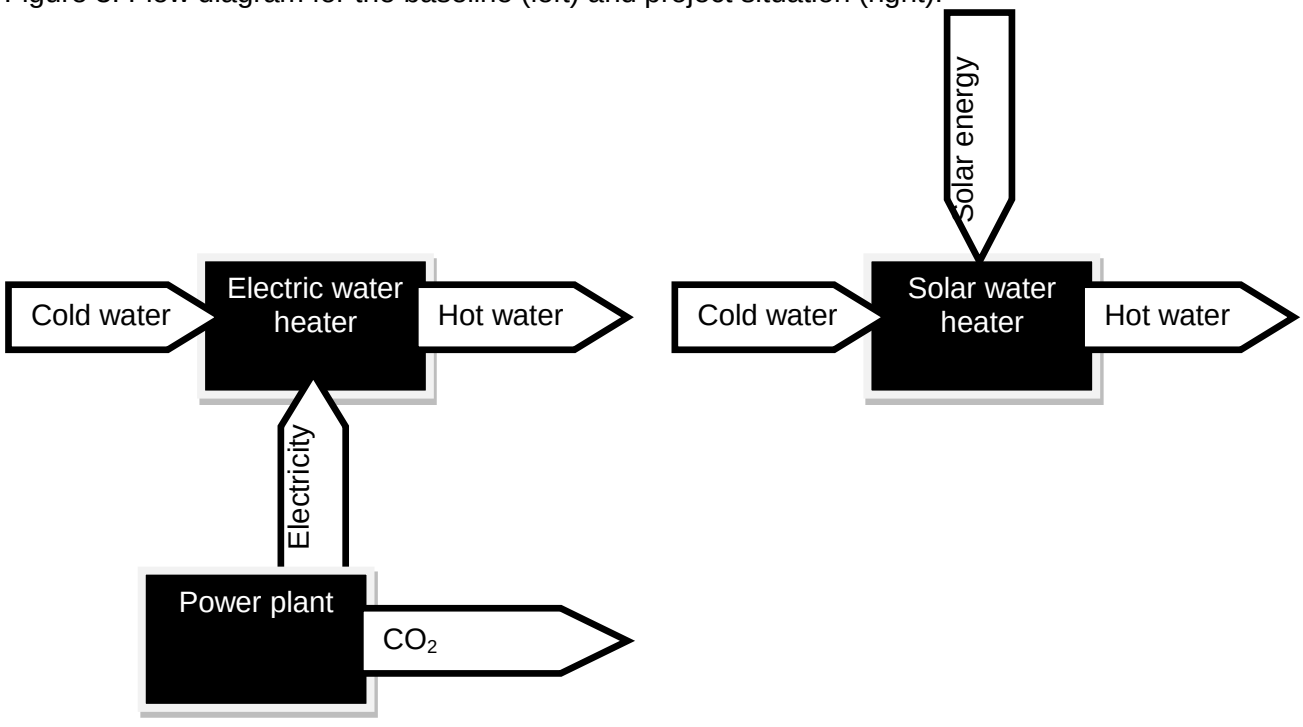
[7] (ETC) Test Report, (RTC file no 730) Regional Test Centre (Solar Thermal) of the Madurai Kamaraj University, dated 18/07/2011.

The CPA is located in the following states of India (the host country). The invoices of the SWHs provides the address and are the proof of location of the SWHs and that they are within geographic boundary of the registered PoA. The addresses are also listed in the sales record and SWH database which has been used for the emission reduction calculations.

State
Andhra Pradesh
Assam
Daman and Diu
Delhi (National Capital Territory of)
Ghazibad
Goa
Gujarat
Harayana
Jammu & Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Punjab
Rajasthan
Tamil Nadu
Uttar Pradesh
Uttarakhand

The geographical boundary of the registered PoA is the national boundary of India and thus included in this CPA. All activities, flows and installations listed in figure 3 are located in India.

Figure 3: Flow diagram for the baseline (left) and project situation (right).



Baseline situation

Project situation

B.3. Establishment and description of baseline scenario

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The baseline scenario is the continued use of the systems that were used before the implementation of the SWH system. An alternative available to the project proponents that delivers a comparable level of service is the use of electric water heaters.

Table 4: Estimated rural and urban energy consumption per household per year (GJ) (1999-2000)[8]

Region	Income group	Cooking	Water Heating	Lighting	Others	Total	% of total energy consumed in water heating
Rural	Low Income	19.88	6.62	0.4	1.3	28.2	23.47
	Middle Income	19.09	6.26	0.87	1.5	27.72	22.58
	High Income	14.88	4.39	1.2	1.9	22.37	19.62
	Average	18.8	6.13	0.75	1.57	26.1	23.48
Urban	Low Income	14.46	4.45	1.22	3.24	23.37	19.04
	Middle Income	9.46	2.85	1.52	4.1	17.93	15.89
	High Income	7.34	0.5	2.52	5.5	15.86	3.15
	Average	10.8	2.51	1.56	4.28	19.05	13.17

Baseline energy consumption

Water heating is an energy intensive activity due to significant loss of energy during heat transformation. For hot water to be available when needed, a large volume of water must be kept heated at all times. The energy consumption for hot water preparation accounts for 20-30% of the total electricity consumption by households[9], as demonstrated by Table 4.

Baseline Energy Source

Historical trends in household energy consumption for the period 1980-2000 indicate that many households continue to depend on traditional fuels for cooking and water heating.[10,11] Urban and rural India is largely dependent on non-renewable sources of energy for heating water. A UNEP-sponsored survey in India found that 90% of urban respondents relied solely on electricity to heat water[12,13].

[8] B. Sudhakara Reddy: *Technological Substitution and Changes in the Household Energy Consumption Pattern: A Case Study of India,* Indira Gandhi Institute of Development Research.

[9] UNEP Riso, Barriers to the Diffusion of Renewable Energy technologies – A case Study of the State of Maharashtra, India (Roskilde, 2001)

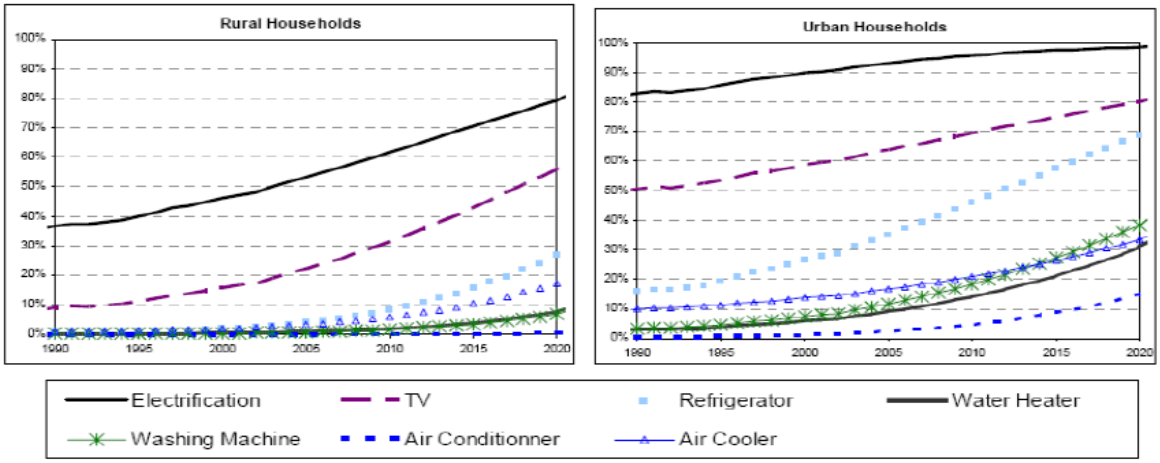
[10] B. Sudhakara Reddy*: Economic and social dimensions of household energy use: A case study of India*, Indira Gandhi Institute of Development Research.

[11] Stephane de la Rue du Can, Virginie Letschert, Michael McNeil, Nan Zhou, and Jayant Sathaye,(2009). *Residential and Transport Energy Use in India: Past Trend and Future Outlook* (Ernest orlando lawrence berkeley national laboratory).

[12] Samuel Milton & Steven Kaufman, (2005), *Solar Water Heating as a Climate Protection Strategy: The Role for Carbon Finance*.

Baseline Technology

The baseline energy source for heating water is electricity[14]. Electric Water Heater (EWH) is a common demonstrated and tested device for water heating. The Indian EWH market reported a sale of 1.6 million units in 2007 with a total valuation of Rs 6.5 billion. The market is growing with double-digit figures annually[15]. Further, India's water heater market is projected to surpass $ 600 million by 2023 and 61 million operational units by 2020.[16] Growth in the market is led by increasing number of new residential units and other construction activities coupled with rising per capita disposable income[17]. The current growth of the market makes it important that the heaters rely on a renewable energy source.



Baseline renewal

This CPA-DD is applicable to the second crediting period. This section describes how the baseline has been renewed according to the requirements of sections 11.1 and 11.2 of the CDM project standard for Program of activities, Version 02.0 (CDM-EB93-A07-STAN). This includes an assessment of the validity of the modalities to calculate GHG emission reductions that would have resulted from the existing baseline scenario, and how to update it for each of the corresponding CPAs (para 288 and 287). Next to this, the continued validity of *data and parameters used for determining the original baseline, that were determined ex ante and not monitored during the PoA period*, should be assessed (para 291). The assessment of the assessment of the modalities to calculate GHG emission reductions should consider new and relevant mandatory national and/or sectoral policies and circumstances or conditions.

The baseline is the continued use of electric geysers to generate heat, and the baseline emission calculation relies on the grid emission factor of the Indian national grid.

This grid emission factor is an *ex-post* parameter and therefore updated with each inclusion and

[13] Stephane de la Rue du Can, Virginie Letschert, Michael McNeil, Nan Zhou, and Jayant Sathaye,(2009). *Residential and Transport Energy Use in India: Past Trend and Future Outlook* (Ernest Orlando Lawrence Berkeley National Laboratory).

[14] Solar Water heaters, UNDP, 2009, available at: https://www.undp.org/content/dam/india/docs/user%e2%80%99s_handbook_on_solar_water_heaters.pdf

[15] Financial Chronical (17 Sept 2008): https://www.business-standard.com/article/companies/a-o-smith-enters-india-aims-30-market-share-in-3-yrs-108091700026_1.html.

[16] International Energy Studies Group (2017), Assessing the Cost Effective Energy Saving Potential from Top 10 Appliance s in India

[17] https://www.techsciresearch.com/report/india-water-heater-market/3040.html

renewal of the baseline of a CPA. Any such update of the grid emission factor takes into account the impact of all relevant mandatory national and/or sectoral policies, including the Electricity Act 2003, National Electricity Policy and Tariff Policy and all the respective State Governments' and state regulatory commissions' policies on Renewable Energy Sector[18]. Likewise, the impact of any changes in circumstances or conditions, for example, changes in market characteristics, the availability of fuels for power generation or raw materials for developing new power generation capacity as well as the impact of electricity or fuel prices are taken into account.

All other parameters used in the calculation of the baseline emissions, are either monitoring parameters depending on survey results, values depending on CPA size, or fixed constants from applicable and valid MNRE standards, CDM documents, latest test results or even physical or mathematical constants. Also there, the baseline calculation incorporated the impact of relevant changes in polices or circumstances, or the parameters are by definition unaffected.

The *ex-post* Baseline Emission Factor Estimation based on Version 7 of Tool 07 (Tool to calculate the emission factor for an electricity system) is included in section I.6.3 of the PoA-DD.

Conclusion

Hot water is required for various purposes like bathing, shaving, kitchen, clothes washing, etc. This baseline is applicable in the present project activity as the SWH will be replacing EWH The electricity is generated by the national electricity grid, which is predominantly coal based.

B.4. Estimation of emission reductions

B.4.1. Explanation of methodological choices

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The approved baseline and monitoring methodology applied to this PoA and its CPAs is AMS-I.C. "Thermal energy production with or without electricity" (Version 21). The methodology has a number of options for the calculation of the baseline emissions, project emissions and the eventual emission reductions. These choices are:

1) The technology used for this PoA is solar water heaters. The baseline scenario is the use of electric water heaters that use electricity from the grid. To this technology paragraph 37 and 42 apply. Paragraph 2 explicitly refers to water heaters. For the grid baseline will be referred to available and national data[19] which will be checked for updates for each new monitoring report.
2) For the efficiency of the baseline systems, the conservative value of 100% is used (option (c) in paragraph 42).
3) The capacity limits (para 7) apply to new SWH systems. In some cases, the SWH may be a capacity addition to an existing SWH. These systems can be included according to paragraph 6 if the total capacity of the units added does not exceed the capacity limits in paragraph 7. The CPA databases include a check on total capacity installed in the CPA. Since capacity additions will be listed in the SWH database, which is the basis for each CPA, the capacity limits of the methodology will be respected.
4) The project emissions include emissions from on-site consumption of fossil fuels and electricity, only some of the larger systems will use forced flow pumps of which the power consumption will be monitored. The consequent emissions from power usage will be based on CO_2 Baseline Database for the Indian Power Sector, following paragraph 37.

[18] http://www.cbip.org/Policies2019/policies.aspx

[19] Based on latest CO_2 Baseline Database for the Indian Power Sector User Guide Version 15.0, December 2019 Government of India Ministry of Power Central Electricity Authority, http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

5) Leakage is relevant if the energy generating equipment is being transferred from outside the project boundaries. That is not the case as the SWH systems are newly manufactured. No second-hand installations will be used. Therefore, leakage does not occur.
6) The main monitoring parameters are different for small and large systems. For small systems the annual energy production will be determined through the number of days of operation. These systems will be referred to as Category I systems and are referred to in paragraph 82, Data / Parameter table 1 of the methodology AMS-I.C. version 21.
7) For larges systems with a capacity of over 45kW thermal, the energy consumption has to be determined with energy meters (see paragraph 82, Data / Parameter table 7, of the methodology AMS-I.C. version 21), which meter the water flow and the ingoing and outgoing temperature. These systems will be referred to as Category II systems. The General Guidelines to SSC CDM methodologies state that a thermal solar energy project shall define the capacity with a conversion factor of $700W_{th}/m^2$. For 45kW this gives 64 m^2 (Executive Board (EB) meeting 61 Annex 21, paragraph 4). Note in this respect that a system is defined as an individual system that is not physically interconnected with other SWHs.
8) For the monitoring of parameter 1, survey methods will be applied to determine annually the number of days that systems are operating (option (ii) for parameter 1 in paragraph 82) for systems with a collector area of up to 64 m^2. These are called Category I systems. For larger systems, so-called continuous monitoring equipment will be installed which meter the total heat production and, if forced flow pumps are used, the power consumption. The emission reductions will be determined ex post by multiplying the emission factor of the baseline technology with the energy production from the SWH systems (paragraph 16 of TOOL05). The baseline emission factor consists of the efficiency of the geyser and the carbon emission factor of the power grid. The energy production of the project will be determined based on the installed capacity and the average operating days for small SWH systems including statistics on those systems which are no longer operational. If the larger systems with a surface area above $64m^2$ are not monitored, they will be excluded from the emission reduction calculations.
9) For Category II systems the energy production will be metered through flow metering and metering the temperature of the water leaving the SWH system. The temperature of the ingoing water will be fixed at a conservative value of 293 K.[20] This division between small and large systems is in line with paragraph 82, parameter 1 which recommends using the annual hours of operation for systems where metering the thermal energy output is not plausible. BTU meters are expensive, with prices well exceeding the price of an average SWH system.[21] When BTU meters are not installed, the emission reductions from those systems will not be accounted for in the entire crediting period.

Baseline emissions

This section is in line with what is elaborated on PoA level for baseline emissions calculations.

The baseline scenario for a CPA is that electricity is imported from the grid for water heating by consumers:

$$BE_{thermal,CO2,y} = \sum_{n=1}^{n=N} \frac{EG_{thermal,n,y}}{\eta_{BL,thermal}} \times EF_{FF,CO2,y} \quad (1)$$

[20] This value is conservative. For example, according to table 8 of the "User's Handbook on Solar Water Heaters, from UNDP, 2010, this value can be as low as 6 ºC and hardly ever exceeds 20 ºC.

[21] See for example: https://dir.indiamart.com/impcat/btu-meter.html,

In which:

$BE_{thermal,\ CO2,y}$	The baseline emissions from steam/heat displaced by the project activity during the year y	(tCO_2e/year)
$EG_{thermal,y}$	The net quantity of steam/heat supplied by the project activity during the year y	(GJ/year)
$EF_{FF,CO2,y}$	The CO2 emission factor of the fossil fuel that would have been used in the baseline plant obtained from reliable local or national data, if available, alternatively, IPCC default emission factors can be used.	(tCO_2e /GJ)
$\eta_{BL,thermal}$	The efficiency of the plant using fossil fuel that would have been used in the absence of the project activity	-

For the ex ante calculation of the baseline emissions, the same approach has been used for both Category I and Category II systems. The ex ante baseline emissions are calculated using Method 2 from section B.6.3. Part II of the PoA-DD. Formula 3 of the PoA-DD is therefore applied to both Category I and Category II systems

$$EG_{thermal,n,y,catI} = \frac{V_{catI,n} \times Q_{n\times} S_{op} \times D}{100} \quad (2)$$

$$EG_{thermal,n,y,catII} = \frac{V_{catII,n} \times Q_n \times S_{op} \times D}{100} \quad (3)$$

Where:

Symbol	Description	Unit
$V_{catI,n}$	Amount of water heated daily in the CPA by Category I system n	m^3/day
$V_{catII,n}$	Amount of water heated daily in the CPA by Category II system n	m^3/day
Q_n	Average amount of energy collected by the SWH during a Thermal Performance Test at day-time under standard conditions for 100l water	kWh/day/100l
S_{op}	Share of systems confirmed to be operational	-
D	Number of operational days in year y	days/year

Which gives (formula 2 from the PoA-DD):

$$BE_{thermal,CO2,y} = \sum_{n=1}^{n=N} \frac{EG_{thermal,n,y,catI}}{\eta_{EWH}} \times EF_{grid,y} + \sum_{n=1}^{n=N} \frac{EG_{thermal,n,y,catII}}{\eta_{EWH}} \times EF_{grid,y} \quad (4)$$

Gives:

Symbol	Description	Unit
$EF_{grid,y}$	The CO_2 emission factor of the grid to which system n is connected	tCO_2e /MWh
$EG_{thermal,\ CAT\ I,y}$	The net quantity of steam/heat supplied by the project activity from Category I systems during the year y	MWh/year
$EG_{thermal,\ CAT\ II,y}$	The net quantity of steam/heat supplied by the project activity from Category I systems during the year y	MWh/year
η_{EWH}	The efficiency of an electric water heater	
$BE_{thermal,\ CO2,y}$	The baseline emissions from steam/heat displaced by the project activity during the year y	tCO_2e/year

Project emissions

The project emissions will be monitored. Emissions from the use of electricity by the pumps will be accounted for as project emissions following paragraph 45 of the methodology. This paragraph

refers to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". The latest version of this tool is version 03. Referring to page 1 of this tool, Scenario A applies "electricity consumption from the grid" to which the following equation applies for project emissions. For the *ex-ante* calculation, the total amount of pump capacity has been used to estimate the power consumption in the project scenario.

The project emissions of CPA-1 will be calculated as follows:

$$PE_{EC,y,n,II} = \sum_{n=1}^{N} EC_{PJ,n,y} \times EF_{grid,y} \times (1 + TDL_y) \quad (5)$$

Where

Symbol	Description	Unit
$PE_{EC,y,n,II}$	Project emissions from electricity consumption by category II system n from the grid during the year *y*	tCO_2e/year
$EC_{PJ,n,y}$	Quantity of electricity consumed by the Category II system n in year *y*	MWh/year
TDL_y	Average technical transmission and distribution losses for providing electricity to the category II system	%
$EF_{grid,y}$	The CO_2 emission factor of the grid to which system n is connected	tCO_2e /MWh

Leakage

There is no leakage from a CPA as there is no transfer of energy generating equipment from another activity.

Emission Reductions

Emission reductions are calculated as the difference between the baseline emission from displaced electricity and the sum of the project emissions (PE_y) and leakage (LE_y).

$$ER_y = BE_y - (PE_y + LE_y) \quad [22] \quad (6)$$

In which:

Symbol	Description	Unit
ER_y	Emission reductions by the project activity during a given year *y*	tCO_2e/year
BE_y	Baseline emissions of the project activity during the year *y*	tCO_2e/year
PE_y	Project emissions of the project activity during the year y	tCO_2e/year
LE_y	Leakage emissions in the year *y*	tCO_2e/year

B.4.2. Data and parameters fixed ex ante

The emission reductions ex ante for this CPA will be based on Method 2 for category I and II systems. This is the approach based on the thermal performance of each collector type.

Data / Parameter	Build Margin Emission Factor

[22] AMS-I.C.. versión 21, para 81.

Unit	tCO_2/MWh
Description	Build Margin for Second Crediting Period
Source of data	Based on latest CO_2 Baseline Database for the Indian Power Sector User Guide Version 15.0, December 2019 Government of India Ministry of Power Central Electricity Authority, at the time of submission of CPA-DD for renewal of crediting period. http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf
Value(s) applied	0.8811
Choice of data or Measurement methods and procedures	This is the second crediting period of CPA-01. As the ex-post option is chosen, according to option 2, for the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 of the Tool. Accordingly, 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.
Purpose of data	Calculation of Baseline Emissions
Additional comment	The BM is the latest available for Unified India and is for the year 2018-19. This is fixed for the entire second crediting period for CPA-01.

Data / Parameter	$\mathbf{V_{catl,n}}$
Unit	m^3/day
Description	Aggregated amount of water heated daily in each CPA by Category I system n
Source of data	CPAI – (expected) aggregated water capacity of the systems installed in the CPA
Value(s) applied	The value for FPC is 2,113 The value for ETC is 1,074
Choice of data or Measurement methods and procedures	The water capacity of the system installed will be tailored to the needs of the user. The relation with the different SWH types is typically as follows: • FPC uses $2.08m^2$ for a 100 litre/day system, • ETC uses 1.43 m^2 for a 100 litre/day system.
Purpose of data	Calculation of Baseline Emissions
Additional comment	This is the sum of the total capacity of all Category I SWH systems (to be) installed in the SSC-CPA.

Data / Parameter	$\mathbf{\eta_{EWH}}$
Unit	%
Description	Efficiency of an electric water heater system
Source of data	Methodology AMS-I.C., version 21, paragraph 42(c).
Value(s) applied	100%
Choice of data or Measurement methods and procedures	This value is conservative. A 100% efficiency assumes no losses. Electric geysers always have a lower efficiency than a 100%.
Purpose of data	Calculation of Baseline Emissions
Additional comment	This value will only be used for category I SWH.

Data / Parameter	$\mathbf{TDL_y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to the category II system

Source of data	"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01), EB 39, Annex 7, page 12.
Value(s) applied	20%
Choice of data or Measurement methods and procedures	This is the default factor for scenario A for project or leakage electricity consumption sources.
Purpose of data	Calculation of Project Emissions
Additional comment	This value will be annually updated based on new publications from the Ministry of Power Central Electricity Authority.

Method 1 (Not Applied in this CPA)

Data / Parameter	T_{in}
Unit	K
Description	Average input temperature
Source of data	Standards from the government of India or a specific test report of the SWH model(s) used in this CPA.
Value(s) applied	-
Choice of data or Measurement methods and procedures	-
Purpose of data	
Additional comment	This value will only be used for category I SWH.

Data / Parameter	T_{out}
Unit	K
Description	Average output temperature
Source of data	Standards from the government of India or a specific test report of the SWH model(s) used in this CPA.
Value(s) applied	-
Choice of data or Measurement methods and procedures	-
Purpose of data	
Additional comment	This value will only be used for category I SWH.

Data / Parameter	C_w
Unit	J/g/K
Description	Specific Heating Capacity of water
Source of data	Georgia State University, Department of Physics: http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/spht.html
Value(s) applied	4.1855
Choice of data or Measurement methods and procedures	Physical constant.
Purpose of data	
Additional comment	-

Data / Parameter	**F**
Unit	MJ/KWh
Description	Conversion factor from MJ to KWh
Source of data	-
Value(s) applied	3.6
Choice of data or Measurement methods and procedures	Conversion factor
Purpose of data	
Additional comment	

Method 2 (Applied)

Data / Parameter	**$Q_{,n}$**
Unit	kWh/day/100l
Description	Average amount of energy collected by the SWH during a Thermal Performance Test at day-time under standard conditions for 100l water
Source of data	(FPC) Test Report, (RTC file no 730) Regional Test Centre (Solar Thermal) of the Madurai Kamaraj University, dated 18/07/2011. (ETC) Test Report, (RTC file no 730) Regional Test Centre (Solar Thermal) of the Madurai Kamaraj University, dated 18/07/2011. (see footnote 9 and 10)
Value(s) applied	FPC: 4.6 ETC: 3.17
Choice of data or Measurement methods and procedures	The Thermal Performance Test provides a conservative estimate of the amount of heat a SWH delivers. The total energy collected is measured as the change in the energy content of the water in the storage tank during a period of 3.5 hours before and after noon. [23]
Purpose of data	Calculation of Baseline Emissions
Additional comment	The test procedure is conservative since it measures only 7.0 hours of sunlight, equally spread around noon. In India, the average sunshine hours per year are 2,856, or 7.8 hours per day.[24] In addition, during the daytime hours in which there is no sunshine solar heaters can still deliver hot water.

B.4.3. Ex ante calculation of emission reductions

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Baseline emissions

This section is in line with what is elaborated on PoA level for baseline emissions calculations.

The baseline scenario for a CPA is that electricity is imported from the grid for water heating by consumers:

$$BE_{thermal,CO2,y} = \sum_{n=1}^{n=N} \frac{EG_{thermal,n,y}}{\eta_{EWH}} \times EF_{grid,y} \quad (1)$$

[23] Ministry of New and Renewable Energy, Test Procedure for Thermosyphon –Type Domestic Solar Hot water Systems

[24] See: http://www.climatetemp.info/india, site visited at 1 February 2012.

For the ex ante calculation of the baseline emissions, the same approach has been used for both Category I and Category II systems. The ex ante baseline emissions are calculated using Method 2 from section B.6.3. Part II . of the PoA-DD. Formula 3 of the PoA-DD is therefore applied to both Category I and Category II systems

$$EG_{thermal,n,y,catI} = \frac{V_{catI,n} \times Q_n \times D}{100} \quad (2)$$

$$EG_{thermal,n,y,catII} = \frac{V_{catII,n} \times Q_n \times D}{100} \quad (3)$$

Where:

Symbol	Description	Value FPC	Value ETC	Unit
$V_{catI,n}$	Amount of water heated daily in the CPA by Category I system n	2,113	1,074	m^3/day
$V_{catII,n}$	Amount of water heated daily in the CPA by Category II system n	5	0	m^3/day
Q_n	Average amount of energy collected by the SWH during a Thermal Performance Test at day-time under standard conditions for 100l water	4.6	3.17	kWh/day/100l
D	Number of operational days in year y		280	days/year

Which gives (formula 2 from the PoA-DD):

$$BE_{thermal,CO2,y} = \sum_{n=1}^{n=N} \frac{EG_{thermal,n,y,catI}}{\eta_{EWH}} \times EF_{CO2,grid,n,y} + \sum_{n=1}^{n=N} \frac{EG_{thermal,n,y,catII}}{\eta_{EWH}} \times EF_{CO2,grid,n,y} \quad (4)$$

Gives:

Symbol	Description	Value	Unit
$EF_{CO2,grid,n,y}$	The CO_2 emission factor of the grid to which system n is connected	0.8865[25]	tCO_2e /MWh
$EG_{thermal, CAT\ I,y}$	The net quantity of steam/heat supplied by the project activity from Category I systems during the year y	36,748	MWh/year
$EG_{thermal, CAT\ II,y}$	The net quantity of steam/heat supplied by the project activity from Category II systems d The CO_2 emission factor of the Indian grid uring the year y	64	MWh/year
η_{EWH}	The efficiency of an electric water heater	100%	
$BE_{thermal, CO2,y}$	The baseline emissions from steam/heat displaced by the project activity during the year y	32,645	tCO_2e/year

The resulting reduction for a 100 litre SWH system based on the calculation above is 1.08 MWh/year. That estimate is conservative when comparing this figure with estimates from MNRE which put the energy saving at 1.5 MWh/year.[26]

[25] This value is the average over de SWH systems in CPA-1. For the ex ante calculations latest CO_2 emission factor of the Indian grid has been used. Since this is the 2nd crediting period, wOM=0.25 and wBM= 0.75 has been applied, following *TOOL07 Methodological tool: Tool to calculate the emission factor for an electricity system* Version 07.0, paragraph 86.

[26] Delhi Energy Efficiency & Renewable Energy Management Centre, Solar water heater: a device operating on renewable energy, available at: http://www.mnre.gov.in/Solar-water-heaters/booklet-swhs-delhi-govt.pdf.

Determination of Baseline Emission Factor Estimation ($EF_{CO2,grid,y}$)

The Baseline Emission Factor Estimation will be based on the latest report of the Central Electricity Authority (CEA). At the time of Validation of this CPA, Version 7 of Tool 07 is applied.

The baseline emission factor estimation is based on Methodological Tool ("Tool to calculate emission factor for electricity systems" (Version 07). The latest emission grid factor is used to calculate the emission reductions. The emission factor is derived from the latest version as given by the CEA[27] The steps as provided in the PoA-DD are followed:

Step 1: Identify the relevant electricity systems.

To select the relevant grid system, official publication of the Government of India for the purpose of CDM baselines has been used, this is based on the most recent data available with the Central Electricity Authority (CEA). This database is based on "Tool to Calculate the Emission Factor for an Electricity System". Therefore, the latest CO_2 Baseline Database for the Indian Power Sector User Guide Version 15.0 December 2019, Government of India Ministry of Power Central Electricity Authority, has been used. The grid emission factor is calculated for a unified India, which is used for estimation emission reductions for the project activity.

For the purpose of determining the operating margin emission factor, option a), for imports from connected electricity systems located in another host country(ies), the emission factor is 0 tons CO_2 per MWh.

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

Option 1 has been followed for the project activity i.e. only gird power plants are included in the calculations.

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 the following method:

(a)Simple OM;

CO_2 Baseline Database for Indian Power Sector, Version 15.0, published by Central Electricity Authority has been referred for the values of Operating Margin.

For simple OM, the emissions factor needs to be calculated based on ex-post option as the emission factor is determined ex-post at the time of Monitoring Report. Based on the Tool, 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. 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

Mercados EMI, Development of an area based Energy Service Company (ESCO) model for solar water heating in India, (New Delhi 2010), available at: http://mnre.gov.in/pdf/Report-ESCO-Model%20%28RFP%29.pdf. (a report for: Project Management Unit, UNDP/GEF Assisted Global Solar Water Heating Project, Ministry of New and Renewable Energy, Government of India).

[27]Based on latest CO_2 Baseline Database for the Indian Power Sector User Guide Version 15.0, December 2019 Government of India Ministry of Power Central Electricity Authority,

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 periods.

The chosen year to calculate grid emission factor is y-1, which will be followed for throughout the crediting period. If the data of y-1 is not available on CEA website, the second option would be y-2 that will be applied. If that option is also not available, other sources will be relied upon to estimate the grid emission factor in line with the relevant tool.

Step 4: Calculate the operating margin emission factor according to the selected method.

The Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

To calculate the operating margin, the annual operating margins, the year 2018-19 is considered. The simple operating margin CO_2 emission factor in year y-1 (tCO2/MWh) $EF_{grid,OMsimple,y}$ is 0.9685 for Unified India Grid. Depending on the year of availability of data on CEA website, year y-1 will be chosen. If data of y-1 is not available, y-2 will be chosen alternatively.

Step 5: Calculate the build margin (BM) emission factor.

Based on the Tool,
This is the second crediting period of CPA-01. As the ex-post option is chosen, according to option 2, for the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 of the Tool. Accordingly, 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.

Hence the Build Margin that will be considered for CPA-01 is that available at the CEA website at the time of submission of this CPA for inclusion.

Based on CEA user guide, the build margin reflects the average CO_2 intensity of newly built power stations that will be (partially) replaced by a CDM project. In accordance with the Grid Tool, the build margin is calculated in the database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The build margin generally covers units commissioned in the last five years.

Build Margin Emission Factor in tCO_2/MWh

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2018-19
India	0.8811

Table reference- CEA Baseline Database, Version 15[28]

The BM as calculated by CEA for the latest year is 0.8811.

[28] Based on latest CO_2 Baseline Database for the Indian Power Sector User Guide Version 15.0, December 2019 Government of India Ministry of Power Central Electricity Authority, http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf

Hence a BM Emission Factor that will considered for the entire second crediting period for CPA-01 is 0.8811 tCO_2/MWh.

Step 6: Calculate the combined margin (CM) emissions factor.

The weighted average CM method (option a) is the preferred option in the Tool and has been chosen to calculate $EF_{grid,CM,y}$

Based on the Tool, as this is the second crediting period, the CO_2 Emission Factor (baseline emission factor) is calculated as the combination of the OM and BM emission factors with the weightage value of W_{OM} = 0.25 and W_{BM} = 0.75.

$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} w_{BM}$

Where,

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)
w_{OM}= 0.25 w_{BM}= 0.75

Hence, the Baseline Emission Factor is calculated as below:

Combined Margin CO_2 Emission Factor (tCO_2/MWh)	
India	**0.9685 x 0.25 + 0.8811 x 0.75 = 0.9029**

Project emissions

The project emissions will be monitored. For the ex ante calculation the total amount of pump capacity has been used to estimate the power consumption in the project scenario.

In CPA-1 there is one system with pumps installed. The aggregated capacity of the systems with a pump is 5,000 litre/day. The aggregated total capacity of the pumps installed is 0.7 kW. Forced flow pumps operate 4.5 hours during a day in which the solar water heater is operational. The average days of operation of the system (***D***) is 280 days/year. As a result, the ex ante estimated energy consumption of the pumps in CPA-1 is 0.88 MWh/year.

The project emissions of CPA-1 have been calculated as follows:

$$PE_{EC,y,n,II} = \sum_{n=1}^{N} EC_{PJ,n,y} \times EF_{CO2,grid,n,y} \times (1 + TDL_y) \quad (5)$$

Gives:

Symbol	**Description**	**Value**	**Unit**
$\boldsymbol{EC_{PJ,n,y}}$	Quantity of electricity consumed by the Category II system n in year *y*	0.88	MWh/year
$\boldsymbol{TDL_y}$	Average technical transmission and distribution losses for providing electricity to the category II system	20%	%
$\boldsymbol{PE_{EC,y,n,II}}$	Project emissions from electricity consumption by category II system n from the grid during the year *y*	0.9556	tCO_2e/year

Leakage
There is no leakage from a CPA as there is no transfer of energy generating equipment from another activity.

Emission Reductions
Emission reductions are calculated as the difference between the baseline emission from displaced electricity and the sum of the project emissions (PE_y) and leakage (LE_y).

$ER_y = BE_y - (PE_y + LE_y)$ [29] (6)

In which:

Symbol	Description	Value	Unit
ER_y	Emission reductions by the project activity during a given year *y*	33,236	tCO_2e/year
BE_y	Baseline emissions of the project activity during the year *y*	33,237	tCO_2e/year
PE_y	Project emissions of the project activity during the year y	1	tCO_2e/year
LE_y	Leakage emissions in the year *y*	0	tCO_2e/year

See the attached spreadsheet in Annex 3 for the details of ex-ante emission reductions calculations.

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	33,237	1	0	33,236
Year 2	33,237	1	0	33,236
Year 3	33,237	1	0	33,236
Year 4	33,237	1	0	33,236
Year 5	33,237	1	0	33,236
Year 6	33,237	1	0	33,236
Year 7	33,237	1	0	33,236
Total	232,659	**7**	**0**	232,652
Total number of crediting years				7
Annual average over the crediting period	33,237	1	0	33,236

B.5. Monitoring plan

B.5.1. Data and parameters to be monitored

Data / Parameter	**D**
Unit	days/year
Description	Number of operational days in year y
Source of data	Surveys among users in a CPA.

[29] AMS-I.C.. version 21, para 81.

Value(s) applied	280
Measurement methods and procedures	The amount will be determined according to the monitoring plan and applicable sampling methods.
Monitoring frequency	Annually
QA/QC procedures	This value will only be determined for category I SWH. The value used for the ex ante calculation stems from the User's Handbook on Solar Water Heaters.[30] This parameter constitutes parameter 1 in AMS-I.C,, version 21. paragraph 82.
Purpose of data	Calculation of Baseline Emissions
Additional comment	

Data / Parameter:	S_{op}
Data unit:	
Description:	Share of systems confirmed to be operational
Source of data:	Surveys among users in a CPA.
Value(s) applied	100%
Measurement methods and procedures:	The amount will be determined according to the monitoring plan and applicable sampling methods.
Monitoring frequency:	Annually
QA/QC procedures:	This value will only be determined for category I SWH. This parameter constitutes parameter 1 in AMS-I.C,, version 21. paragraph 82.
Purpose of data	Calculation of baseline emissions
Additional comment:	

Data / Parameter	$EG_{thermal,\ CAT\ II,y}$
Unit	MWh/year
Description	The aggregated amount of thermal energy generated by SWH category II unit *n* in year *y* (MWh)
Source of data	BTU meter installed per unit
Value(s) applied	For the calculations in section D.6.3 a value of 64 MWh/year has been used. This value is based on test results on the heat collection by category II systems.

[30] UNDP/GEF, User's Handbook on Solar Water Heaters (New Delhi, 2010), page 3, available at: http://mnre.gov.in/booklets/swh160910.pdf.

Measurement methods and procedures	The amount of heat generated per unit will be measured continuously and aggregately recorded annually. The BTU meter should be installed to measure the fluid flow on the system outlet (to avoid that water losses in the system are included). The temperature should be metered in both the inlet and the outlet of the system, to include any storage capacity that is part of the system. In case the BTU meters are not installed for the CAT II systems, these systems will not be accounted for emission reduction calculations for the entire crediting period. Also, in case SWH systems with pumps do not have electric meters installed to determine the project emissions, the respective SWH systems will not be included for emission reduction calculations too. This is a conservative approach, as the emission reductions from the systems are much higher than the project emissions from the use of flow pumps.
Monitoring frequency	BTU readings will be recorded continuously, aggregated annually. Where large differences occur with previous readings, an explanation will be sought from the user and archived.
QA/QC procedures	Maintenance of BTU meters according to the requirements of the manufacturer. BTU readings will be recorded annually. Where large differences occur with previous readings, an explanation will be sought from the user and archived.
Purpose of data	Calculation of Baseline Emissions
Additional comment	This value will only be determined for category II SWH. This parameter constitutes parameter 7 of AMS-I.C. version 21, paragraph 82.

Data / Parameter	$EC_{PJ,n,y}$
Unit	MWh/unit/year
Description	Quantity of electricity consumed by the Category II system in year *y*
Source of data	Electricity meter
Value(s) applied	0.88
Measurement methods and procedures	Some systems will have a forced flow pump installed. All systems with a pump will have a power meter installed to determine the project emissions. The meters should be installed to record the electricity consumption of all pumps in the system. The monitoring shall be continuous. In situations where these pumps are not monitored for the quantity of electricity consumed by the SWH systems, the respective SWHs systems will not be included for emission reduction calculations.
Monitoring frequency	Continuous measurement and at least monthly recording
QA/QC procedures	Maintenance of electricity meters according to the requirements of the manufacturer. Electricity meters shall be calibrated according to the "General guidelines to SSC CDM methodologies".
Purpose of data	Calculation of Project Emissions

Additional comment	This is the sum of the all data collected by electricity meters of the SWH systems with a pump, operating under category I and II in the SSC-CPA. This parameter constitutes parameter 4 of AMS-I.C. version 21, paragraph 582. In case SWH systems with pumps do not have electric meters installed to determine the project emissions, the respective SWH systems will not be included for emission reduction calculations too. This is a conservative approach, as the emission reductions from the systems are much higher than the project emissions from the use of flow pumps.

Data / Parameter	**$EF_{CO2,grid,n,y}$**
Unit	tCO_2/MWh
Description	The CO_2 emission factor of the Indian grid
Source of data	The latest version of the CO_2 Baseline Database for the Indian Power Sector User Guide updated each year by the Government of India, Ministry of Power, Central Electricity Authority, available at: http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver15.pdf
Value(s) applied	0.9029 as ex ante value. For the ex ante calculations latest CO_2 emission factor of the Indian grid has been used. Since this is the 2nd crediting period, wOM=0.25 and wBM= 0.75 has been applied, following *TOOL07 Methodological tool: Tool to calculate the emission factor for an electricity system* Version 07.0, paragraph 86
Measurement methods and procedures	TOOL07 Methodological tool: Tool to calculate the emission factor for an electricity system Version 07.0
Monitoring frequency	The carbon intensity of the grid will be annually updated as per AMS-I.D.. For each monitoring report the latest value for the Indian national grid baseline will be used.
QA/QC procedures	For each monitoring report the latest value for the Indian national grid baseline will be used.
Purpose of data	Calculation of baseline emission
Additional comment	This parameter constitutes parameter 2 in AMS-I.C,, version 21. paragraph 82.

B.5.2. Sampling plan

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The monitoring plan is based on AMS-I.C. version 21, and describes the ways in which data is gathered that is needed to determine the emission reductions from each CPA individually. For further details on the monitoring plan we refer to the CME manual. The sampling plan can apply to a group of CPAs as referred to in paragraph 21 of CDM-EB50-A30-STAN, Version 07.0 and CDM-EB67-A06-GUID, Version 04

The essence of the monitoring plan is to gather data on the energy delivered by the SWH systems, which determines the amount of electricity that is saved by the programme. In addition, some of the larger installations can be equipped with forced flow pumps. The power consumption of these pumps will be measured.

The following parameters will be monitored to determine the actual emission reductions ex post.[31]

[31] AMS-I.C., version 21, paragraph 82.

1. Continuous operation of the equipment/system[32] (including a sampling plan)

The first monitoring parameter in AMS-I.C. version 21, "Continuous operation of the equipment/system for CAT I systems" has two components:

(i) Recording annually the number of systems operating
(ii) Estimating the annual hours of operation of an average system

Both the components of this parameter can be monitored using survey methods according to the methodology for Cat I systems.

For Cat II systems, all the SWHs will be monitored using BTU meters.

The annual sample survey of randomly selected SHWs determined statistically will capture both the above parameters. The response to the survey question as to "how many days during the last 365 days did you rely on the SWH system for hot water supply?" will capture the following:

1. If operational, the annual days of operation in a year will capture its operation on sunny days. The questionnaire estimates the days in which the system was operational, there was sufficient sunlight and the people in the premises were using the hot water produced. This excludes, amongst others, cloudy days, days when people were not present, or when the system was in repair. The result is an estimate of the number of operational days i.e. operational hours of units in a year.
2. Units that are dysfunctional or not operational, the response to the question of the number of days of operation will be zero, which will account as non-operational units and captured in the surveys. From there the proportion of units that is operational is determined.
3. The proportion of operational units which is determined through the survey will be applied to quantify the total heat generated from the capacity installed in the CPA. In effect, emission reductions will only be claimed from the share of systems which is operational. They survey results on the systems that are no longer operational, will be used to calculate the share of the capacity of the sample which is operational. Since systems vary in size, this can have a slightly different outcome from just counting the number of systems which is operational. The share of the capacity in the survey which is operational will then be used to determine the capacity, and resulting heat output and emission reductions from the whole population of SWHs in the CPA.

For example, of the sample survey shows that 98% of the surveyed capacity was operational at an average of 280 operational days. Then the emission reduction will be calculated for only 98% of the heat generated from the capacity installed in the CPA and for this average of 280 days.

Annually, a sample of owners of a category I SWH will be approached with a survey to determine to what extend their systems have been used. Key questions in this survey will be "How many days during the last 365 days did you rely on the SWH system for hot water supply?". The average outcome of the question , weighted against system size, will be used to determine annually the number of days the systems has been operating during the last year. The survey will be implemented at a sample of SWH users included in the CPA. For samples at CPA level the size will be determined with 90% confidence and 10% precision, following the EB guidance on this topic.[33] For a single sampling plan with more than one CPA, 95/10 will be followed.

Table 9: Sampling design.

Objective	Determine how many days the systems have been operating during the last year.
Reliability requirements	90/10 confidence/precision or 95/10 when moving to a single sampling plan across CPAs.

[32] AMS-I.C., version 21, paragraph 82, parameter 1.

[33] CDM-EB67-A06-GUID. Guideline Sampling and surveys for CDM project activities and programmes of activities Version 04.0.

Target population	The population of Category I SWH systems in the CPA or the population of several CPAs as the PoA expands further.
Sampling method	Stratified sampling: the Category I systems will be divided in systems located in regions with relatively high radiation and systems located in regions with lower radiation. The number of days of operation shows to what extend the system can meet the supply of the user throughout the year. This differs typically depending on the latitude in which the systems are located. Whether a system is a low radiation or high radiation area will be determined according to the state in which the SHW is located, following the overview in Appendix 5 of the PoA-DD. If the results from the actual samples fail to achieve the target minimum levels of precision, the CPAI(s) shall perform additional data collection that is a supplemental sample to reach the required precision level.
Sample size	The sample size depends on the number of Category I systems located in states with relatively high solar radiation and states with relatively low solar radiation (see Appendix 5 of the PoA-DD). The sample size will be determined with equation (21) of the Guideline for sampling and surveys for CDM project activities and programmes of activities Version 4., CDM-EB67-A06-GUID, which is as follows: $n \geq \frac{1.645^2 NV}{(N-1)\times 0.1^2 + 1.645^2 V}$ Where: $V = \left(\frac{SD}{mean}\right)^2$ n = Sample size N = Total number of SWHs Mean = Mean SD = Standard Deviation 1.645= Represents the 90% confidence required For a single sampling plan applied to population that include Category I systems in several CPAs, 95% confidence will be applied. Hence 1.645 will be replaced by 1.96. Thus for a single sampling applied to several CPAs, the equation will be $n \geq \frac{1.96^2 NV}{(N-1)\times 0.1^2 + 1.96^2 V}$ Overall Standard Deviation (Equation 22): $SD = \sqrt{\frac{(g_a \times SD_a^{\ 2}) + (g_b \times SD_b^{\ 2})}{N}}$ Where: SD = Weighted overall standard deviation, SD_a is the standard deviation for SWHs in high solar radiation states and SD_b is the standard deviation for SWHs in low radiation states. g_a = size of the group in high solar radiation states g_b = size of the group in low solar radiation states N = Population total

And the mean (Equation 23):

$$\text{mean} = \frac{(g_a \times m_a) + (g_b \times m_b)}{N}$$

where:
mean = weighted overall mean
m_a = mean of high solar radiation states
m_b = mean of low solar radiation states

Further, proportional allocation to high solar radiation and low solar radiation will be done based on the proportion of the strata to the total SWHs for each CPA, according to Equation 28,as follows:

$$n_a = \frac{g_a}{N} \times n \text{ and } n_b = \frac{g_b}{N} \times n$$

n_a is the sample size for high radiation and
n_b for low radiation

According to paragraph 21 of CDM-EB50-A30-STAN, the CME can decide to apply a single sampling plan for category I systems across CPAs. This approach will apply the same approach as described in table 9 with the only change that the "target population" will be "All Category I SWH systems implemented in a period of two calendar years". In addition, the reliability requirements will be 95/10 confidence/precision and the sample size will be determined using this criterion. In that case in the formula above, the 1,645 will be replaced with 1.96.

The use of a single sampling plan is possible because the population of Category I systems are very homogenous, in particular with respect to the parameter sampled (days of operation). By increasing the confidence level and limiting the single sampling plans to systems implemented in a period of max 2 years, the limited variations are both reduced and recorded. For this CPA the use of a single sampling plan in combination with other CPAs might become an option as the PoA expands.

If one stratum has zero elements, the sampling will be done in one stratum alone. The difference between the solar radiation intensity throughout India is too small to further subdivide populations with a representation in only one stratum.

The categorisation between the strata is done based on individual SWH.

In anticipation of a certain amount of non-response the survey will use larger sample than the minimum required according to the formula above. The factor with which the sample will be expanded will be adjusted based on experience with non-response throughout the programme. For the first survey in this first CPA a non-response of 20% will be assumed.

If the results of the survey show that the level of accuracy is insufficient the sample will be expanded with a new survey. For this survey a new random sample will be taken from the total population in CPA-1. Any duplication with systems that were already surveyed will be removed. The new survey will expand the total sample size to reach the required level of accuracy. Since the 20% non-response already expands the sample size beyond what is needed to address non-response we expect that an additional sample will be required.

The expected proportion (p) will be updated based on the latest survey undertaken.

The Excel based sample size calculator available on the UNFCCC website[34] will be used to determine the sample size using the sheet "Stratified – Mean".

Reliability Calculations:

To demonstrate that the conducted sample meets the confidence and precision level, the following analysis will be made:

Based on the guideline on sampling and surveys for CDM activities and programme of activities (CDM-EB67-A06-GUID), Version 4, the calculation for level of precision will be done as follows:

m_{strat} ± z value x s.e. (m_{strat})

Where
m_{strat} is the stratified estimated overall mean
z value corresponding to 90% confidence level (for a single CPA) and 95% for several CPAs together
s.e. (m_{strat}) = standard error of the stratified estimated overall mean

The m_{strat} is calculated as

$$m_{Strat} = \sum_{i=a}^{k} \frac{g_i}{N} \times m_i$$

Where:

m_{Strat}	=	The stratified estimated overall mean
g_i	=	Size of the i^{th} group (CPA) where i=a,…,k
N	=	Population total
m_i	=	Mean of the i^{th} group (CPA) where i=a,…,k

The standard error of stratified estimated overall mean will be calculated as follows:

$$s.e.(m_{Strat}) = \sqrt{\sum_{i=a}^{k} \left(\frac{g_i}{N}\right)^2 \times \left(1 - \frac{n_i}{g_i}\right) \times \frac{SD_i^2}{n_i}}$$ Eq

Where:

$s.e.(m_{Strat})$	=	Standard error of the stratified estimated overall mean
g_i	=	Size of the i^{th} group (CPA) where i=a,…,k
N	=	Population total
n_i	=	Number of sampled units in the i^{th} group (CPA) where i=a,…,k
SD_i^2	=	Variance of the i^{th} group (CPA) where i=a,…,k

Reliability will be calculated as follows:

[34] https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150813144045237/Meth_guid48Calculator.xlsx

	Reliability, expressed as a percentage, is quantified using the following equation: $Reliability = \frac{0.5 \times Width\ of\ Confidence\ Interval}{Estimated\ Stratified\ Overall\ Mean} \times 100$ Equation (50) Even though the sample size estimate may consider non-response, SWHs which can not be located of where no communication with the owner can be established for the survey, will be assumed to be not operational (zero operational days). This is very conservative.
Sampling frame	The category I systems will be divided in two strata. The first consists of systems in states in states with high radiation and the second of systems in states with lower radiation (see Appendix 5 of the PoA-DD).
Field measurements	The survey targets days of operation in the year before the survey is conducted. The timing therefore is not relevant. The survey will be done at least once within the monitoring period.
QA/QC	The value targeted is the number of operation days of the system. The response will be verified with verification questions. These questions are listed in Appendix 6 of the PoA DD.
Analysis	The normalised average result for the number of days of operation in the sample will be used in the monitoring report. The results will be corrected for the size of the individual systems that were surveyed. Non-response will not be taken into account (see also: Sampling method above). The proportion of operational units will also be determined from the sample survey.
Implementation Plan	The monitoring surveys can be implemented in parallel to customer satisfaction surveys. Data collection will be performed by surveyors or local contact persons of the CMAI (s). Data processing will take place centrally by the CMAI(s) or CME by staff which is qualified to process data in excel or a different statistics processing or spread sheet programme, whose knowledge of statistics is/are at least sufficient to implement the Standard (EB 70, Annex 5, paragraph 19). SWHs which can not be located of where no communication with the owner can be established for the survey, will be assumed to be not operational (zero operational days). This is very conservative.

The surveys can be combined with customer satisfaction research surveys. A CPAI may choose not to approach all owners of a category I system but survey a sample of the owners, as long as the sampling and survey approach meets the criteria in the General Guidelines for Sampling and Surveys for Small-Scale CDM Project Activities

The survey will be performed around the end of the monitoring period for which the survey is used. If a monitoring period is more than one year and two surveys have been done for that period, the average of the two surveys will be taken.

B.5.3. Other elements of monitoring plan

>>

1. Net quantity of thermal energy supplied by the project activity during the year y[35]

For all category II SWH, continuous monitoring will demonstrate the total amount of thermal energy supplied. For this purpose, BTU meters will be installed all these systems. For systems that do not have a BTU meter installed, the energy production will assumed to be zero.

2. CO2 emission factor for the grid electricity in year y[36]

[35] AMS-I.C. version 21, paragraph 82, parameter 5.

[36] AMS-I.C, version 21, paragraph 65.

The carbon intensity of the grid will be annually updated.[37] For each monitoring report the latest value for the Indian national grid baseline will be used.

3. Electricity consumption by the project[38]

Some systems will have a forced flow pump installed. All systems with a pump will have a power meter installed to determine the project emissions. In case the power meter is not installed, these SWHs will not be considered for emission reduction for the entire crediting period.

SECTION C. Start date, crediting period type and duration

C.1. Start date of CPA

>>
02/07/2007

C.2. Expected operational lifetime of CPA

>>
21 Years

C.3. Crediting period of CPA

C.3.1. Type of crediting period

>>
Renewable crediting period.

C.3.2. Start date of crediting period

>>
First crediting period - 01/02/2013
This is the second crediting period. The start of the second crediting period will be 01/02/2020.

C.3.3. Duration of crediting period

>>
7 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The environmental of a SWH system is identical for each system. The impact of SWH systems on the environment is positive.

Assessment done on PoA level. For further information, see section E of the PoA-DD.

D.2. Environmental impact assessment

>>
The Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) from the Ministry Of Environment And Forests, published on 24 September 2006 lists the projects for which an Environmental Impact Assessment is required.[39]. Solar water heaters are not among the activities that requiring an EIA since it will not have negative environmental impacts.

[37] TOOL05, version 03.0, section 72.

[38] AMS-I.C, version 21, paragraph 66.

[39] Indian Ministry of Environment and Forest, document available at: http://envfor.nic.in/legis/eia/so1533.pdf.

The environmental impact of the SWH system has been assessed on PoA level. No formal Environmental Impact Assessment is required for SWH systems. For further information, see section E of the PoA-DD.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

>>

Comments by stakeholders have been invited during a Local Stakeholder Meeting held on 14 December 2009 at Bengaluru. Personal invitations were sent out by mail and email 15 days in advance of the meeting. The meeting was chaired by the Mr. Surendra Kumar Managing Director of Nuetech. After the presentation of the project, participants have been invited to comment on the project. After the meeting, comments have been invited for a period of more than three weeks using the Nuetech website, Comments have been compiled from 20 December 2009 until 20 January 2010.

E.2. Summary of comments received

>>

All the stakeholders were informed about the agenda, venue and date of the meeting through invitation issued 15 days prior to the meeting. Further, a project concept note, which gave a clear overview on the project activity including the measures taken under the project and the benefits achieved by the project, was also issued as information to the stakeholders concerned.

The stakeholder consultation meeting was attended by about 50 participants representing various groups of stakeholders. The meeting was started with a welcome note and opening remarks by Mr. Surendra Kumar; MD Nuetech. Mr. T.Ananth, CEO of Nuetech introduced the objective of the meeting.

Agenda set in the notification for the meeting by Nuetech was approved by Mr. Surendra Kumar and obtained the consent of the participants to the agenda. Mr. Rahul Rai was invited to provide a brief on the CDM Programme of Activities. Subsequently, Mr. T. Ananth was invited to provide a brief on CDM project cycle and the role of local stakeholders in the project. He briefed the participants about the Kyoto Protocol and Clean Development Mechanism there in and elaborated the need for the project under this mechanism to catalyze sustainable development. He also outlined that the local stakeholders are to be internalized in any project under Clean Development Mechanism of the Kyoto Protocol. Brief understanding of the project, explaining the likely environmental and social impacts of the project, followed by the salient technical and environmental features of the project and how the proposed Solar
Water Heater program would reduce greenhouse gas emissions was also elaborated.

The Chairman called upon the participants to seek clarifications and express their views, suggestions and concerns on the likely impacts of the project, and it being structured as a Clean Development Mechanism project under Kyoto Protocol. Participants were also given further time to go through the project documents that are made available at the venue of the meeting.

The stakeholders viewed Nuetech as a reputed company contributing to economy and environment. The participants sought clarifications on Kyoto Protocol and Clean Development Mechanism process. Overall there was agreement that the proposed project was a beneficial project from sustainability viewpoint.

E.3. Consideration of comments received

>>
During the meeting the following comments or questions were received.

Q1. Does the project increase employment opportunities in the area?
A1. Project will employ people for solar water heater manufacturing, distribution, installation and maintenance.

Q2. How many CDM projects have happened in India so far?
A2. Around 474 registered projects and many others in various stages of development.

Q3. Who is responsible for project monitoring, dealer or NUETECH?
A3. Project will be monitored by NUETECH in association with dealer network.

Q4. What is the need of back-up electric heater in solar water heater?
A4. Solar water heaters in the project activity are equipped with electric back-up heaters to meet the requirement of providing hot water on cloud/rainy and not-so-sunny days to the satisfaction of the users.

Q5. What is the role of CME?
A5. CME is the coordinating/managing entity of this SSC-PoA. As CME NUETECH has a role which requires:
a) To propose the PoA.
b) It shall communicate with the Board, including on matters relating to the distribution of CERs.
c) Establishing CER ownership agreements with the implementing partner organizations.

Q6. How much time it takes to register a CDM project?
A6. On an average 8-10 months after publication of project documents on UNFCCC website.

SECTION F. Eligibility for inclusion

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
1	(a) Geographical boundaries	All SWH listed in the proposed SSC-CPA must be within the geographical boundary of India.	The address at which all SWHs are installed, and the state, is recorded in the order form and invoice. The database can only include addresses and states in India.	Data entry into the database only allows Indian states to appear in a drop-down menu. This menu also ensures consistency in spelling of the state names and allows for easy cross-checking of data and use of pivot tables to get an overview of all SWH installed per state

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
2	(d) Specifications of technology/ measure	The technology used under the proposed SSC-CPA consists of a solar energy based water heating system.	The technology that can be used in the CDM project is described in section A.4.2.1. It allows for the use of technologies other than the ETC and FPC systems described there.	Innovation and deviations from the standards ETC and FPC technology will be recorded in the CPA. Any technology that is not a Solar Water Heater will not be included in the PoA. For CPAIs other than Nuetech, this will be checked through the SWH test reports. Internal checking includes limiting data entry into the database by only allowing SWH models to appear in the drop-down menu. New model types can be added to the list as and when they are added to the PoA. Each model type will be connected to a default ratio between the capacity of the system in litres and the surface area. Since this ratio differs only for a few systems that require deviating output temperatures, it does allow for cross-checking.
3	(k) small-scale or microscale threshold	The aggregated surface of the collectors of all systems in the CPA should not exceed 64,000 m^2.[40]	The total surface area of the SWHs will be recorded as part of the CME's database, derived from the installation record.	The total surface area of all the SWHs for CPA-01 is 59,412 m^2 , which is less than 64,000 m^2.

[40] Value obtained from Annex 3 of the Small Scale Working Group (SSC WG) Meeting 07.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
4	(f) compliance with the applicability of the applied methodologies	The SSC-CPA follows the baseline and monitoring methodology AMS-I.C. version 21 and should meet its eligibility criteria as discussed in section B.2. of Part II.	The eligibility criteria include that the technology employed are solar water heaters (already covered above), and that the total installed/rated thermal energy generation capacity of the project equipment stays below the small-scale limit of 64,000 m^2.	The total capacity in the CPA is with of 59,412 m^2, below the small-scale limit of 64,000 m^2. Referring to the next criteria, the largest system it no more than 0.45 MW_{th}. The baseline and monitoring methodologies are applied and fixed in the generic CPA-DD template. This ensures that the approach in AMS-I.C. version 21 and in the PoA-DD is followed in detail.
5	(l) requirements for the debundling check	The SWH collector area of an individual system should not be more than 640 m^2.	The size of each system will be recorded in the order form and installation form entered into the CME database. In the SWH database, which will be used to show the SWH in each CPA as well, a dedicated cell will select the SWH with the largest surface area. This allows for easy checking that the surface stays below 640m^2. Cross-checks will be performed to ensure that the actual SWH capacity corresponds with that recorded in the database.[41]	The largest system in the database has a surface area of 104 m^2, well below 640m^2.

[41] These cross-checks will be implemented from CPA-2 onwards.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
6	(c) CPAs are neither registered as CDM project activities, included in another registered PoAs	Confirmation that this SSC-CPA, nor any of its SWH systems is not yet registered and not being registered as a standalone CDM project by ensuring that the CPAI has the full title over the emission reductions generated by the SWH users listed in the CPA. To confirm this, all owners of the SWH systems in the CPA should have transferred the title to the emission reductions to the CME, either directly or through the CPAI.	Ensure that each SWH owner participating in the PoA signs an agreement in which it ultimately transfers the title to the emission reductions to the CPAI or CME. This agreement can be part of the sales contract. Ensure that each CPAI signs an agreement with the CME before its participation in the PoA in which its commits to signing similar agreements with Nuetech. For CPAIs other than Nuetech the title to the CERs can be transferred to Nuetech directly or through the CPAI, as long as ultimately the title rests with Nuetech.	Each SWH owner participating in the PoA is signed a sales agreement in which it transfers the title to the emission reductions to the CPAI or CME.
7	(b) Conditions to avoid double counting	Each SWH in the SSC-CPA shall be uniquely identified and defined in an unambiguous manner by providing the address, and/or the system serial number of the collectors installed at each location.	The address and serial numbers should be collected at completion of the sales agreement and invoice and entered into the centralised database. Data entry for serial numbers can easily be checked for repetition by ranking on serial numbers.	For each SWH there are either address or serial numbers included in the database.
8	(e) conditions to check start dates	The start date of the CPA is not after the date of delivery or construction of the first SWH installed. Documented evidence is available to confirm that date. For example an invoice, installation or delivery form	Invoice dates should be recorded in the SWH database. The earliest data will define the start date of the CPA. Ranking the database on date allows for easy checking.	Invoice dates ae recorded in the SWH database. The earliest date is 02/07/2007.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
9	(g) demonstration of additionality (i) target group	The CPA is additional according to the criteria for confirmation of additionality for its inclusion into the PoA in section C.	Depending on the method used to demonstrate additionality a record of the following will need to be kept: *Option 1: Off-grid activity* that the market penetration of SWH in households does not exceed 33% on state level, as substantiated by latest publications from, commissioned or funded by the Indian government at the time of CPA implementation. Demonstration that there are no legal obligations to use SWH for water heating in states where the SWH in the CPA are located. *Option 2: Micro-scale* – 1. Each of the independent subsystems in the project activity is smaller than or equal to 4500kW thermal installed capacity, 2. End users of the subsystems or measures are households, communities or SMEs (Tool 19, v08.0).	The largest system in CPA-1 is 104 m2. And has a capacity of 70 kW_{th}. That is below 4500kW. All end-users are households, communities or SMEs.
10	(h) affirmation on funding from Annex I Parties	A confirmation that no funding from Annex 1 parties has been used for this CPA or that, if used, this did not result in a diversion of official development assistance.	Confirmation will have to be provided as part of the CPA-DD.	No funding has been received from Annex 1 parties.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion	Description of this CPA in relation to the criterion and supporting evidence
13	Stakeholder consultation	Stakeholder consultations can be organised for a group of CPAs if they can be demonstrated to be in similar geographic areas and time (start of construction/ implementation within the same two years), similar socio-economic situations, identical activity or technology etc.	Stakeholder consultation minutes, or a confirmation from the CME/CPA Implementer that the meeting is conducted.	Stakeholder's consultation was conducted for CPA-01 on 14th December 2009, the details of which were provided during the first crediting period.
14	Leakage	Leakage is not relevant since there is no energy generating equipment transferred from outside the project boundaries and no second-hand installations will be used in the project.	Confirmation by the CME/CPA Implementer that no second-hand installations have been used in the project.	None of the installations are second-hand installations. They are new installations as evidenced by invoices. A confirmation by Nuetech Solar Systems Pvt. Ltd is provided.

Appendix 1. Contact information of CPA implementers

Organization name	Nuetech Solar Systems Pvt. Ltd
Country	India
Address	P.B.#9167, B.M.Shankarappa Indl. Estate, Sunkadakatte, Magadi Main Road, Bangaluru – 560 091, India
Telephone	+91-80-2348-3766
Fax	+91-80-2328-1730
E-mail	ceo@nuetechsolar.com
Website	http://www.nuetechsolar.com
Contact person	Mr.Tyamagundlu

Organization name	Carbonbay GmbH & Co. KG
Country	Germany
Address	Große Theaterstr.14, 20354 Hamburg
Telephone	+491733412363
Fax	-
E-mail	registry@carbonbay.com
Website	
Contact person	Mr. Wolfgang Bruekner

Appendix 2. Affirmation regarding public funding

No public funding or ODA have or will be diverted for the implementation of the PoA.[42]

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

CER calculations spreadsheet “CER calculations CPA-1 v07 07/10/2019 (Public)”. As per the PoA-DD “Solar Water Heater Program in India” Version: 07, dated 07/10/2019.

Appendix 4. Further background information on monitoring plan

As per the PoA-DD “Solar Water Heater Program in India” Version: 010, dated 04/12/2019

Appendix 5. Summary report of comments received from local stakeholders

Included in Section E.

Appendix 6. Summary of post-registration changes

[42] Statement from Nuetech, signed by the CEO, dated 21 November 2011.

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Document information

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

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

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: component project activity, project design document