

**CDM-MP60-A15**

## Draft Large-scale Methodology

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AM0086: Installation of zero energy water purifier for safe drinking water **application**

Version 03.0 Draft

Sectoral scope(s): 03

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## COVER NOTE

### 1. Procedural background

1. The Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) at its seventy-third meeting requested the Methodologies Panel (hereinafter referred to as the Meth Panel) to revise or develop large-scale methodologies for installation of efficient lighting systems and distribution of low greenhouse gas water purification systems. Public inputs are sought for the revisions and questions are presented in the body of the draft methodology.

### 2. Purpose

2. The draft methodology proposed in this document aim to:
  - (a) Include simplified procedures and objective criteria to demonstrate additionality while maintaining environmental integrity;
  - (b) Introduce further simplifications to the methodology which result from the additionality related simplifications; and
  - (c) Increase consistency with small-scale CDM methodologies which deal with similar technologies.
3. The purpose of the call for public input is to allow the Meth Panel to take into account feedback/comments received on the revision of the methodologies.

### 3. Key issues and proposed solutions

4. None.

### 4. Impacts

5. The standardized approach for additionality demonstration will facilitate the implementation of CDM project activities apply distributed units, which is very relevant for the least developed countries (LDCs) and other regions that are underrepresented in the CDM.

### 5. Proposed work and timelines

6. The Meth Panel, at its 60<sup>th</sup> meeting, agreed on the draft revision of the methodology. After receiving public inputs on the document, the Meth Panel will continue working on the revision of the approved methodology, at its 61<sup>st</sup> meeting, for recommendation to the Board at EB 76.

### 6. Budget and costs

7. No budget implication.

**7. Recommendations to the Board**

8. Not applicable (call for public input).

**8. References**

9. Small scale methodology “AMS-III.AV: Low greenhouse gas emitting safe drinking water production systems”;
10. Decision 5/CMP.8 Paragraph 35 “encourages the CDM Executive Board to continue its work on the simplification and streamlining of methodologies, with the aim of reducing transaction costs for all project activities and programme of activities, especially those in regions underrepresented in the clean development mechanism;
11. Workplan for panels and working groups for 2013 (EB 72, annex 4), MAP project 164.

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## 1. Introduction

1. The following table describes the key elements of the methodology:

**Table 1. Methodology key elements**

<b>Typical projects</b>	Zero-energy water purification systems are distributed to consumers to provide safe drinking water
<b>Type of GHG emissions mitigation action</b>	Energy efficiency. Displacement of more GHG intensive technology/technique used for the purification of water

## 2. Scope, applicability, and entry into force

### 2.1. Scope

2. This methodology comprises introduction of zero energy (i.e. without input of thermal or electrical energy) water purification systems to provide safe drinking water (SDW). Water purification technologies that involve point-of-use treatment systems for residential or institutional applications such as systems installed at a school or a community centre are included. The examples include, but are not limited to water filters (e.g. membrane, activated carbon, ceramic filters), solar energy powered ultraviolet (UV) disinfection devices, solar disinfection techniques, photocatalytic disinfection equipment, pasteurization appliances, chemical disinfection methods (e.g. chlorination), combined treatment approaches (e.g. flocculation plus disinfection).
3. The project participants either: (a) purchase the zero energy water purification systems from a manufacturer and only arrange for their sale or distribution in the host country; or (b) both manufacture and sell or distribute the zero energy water purification systems. The individual households that use the water purification systems distributed or sold under the project activity are not the project participants. One water purification unit may serve several households, if the SDW dependency can be clearly established.
4. A project activity implementation plan which specifies how the project is implemented should be established and documented in the CDM-PDD, including, inter alia, information on:
  - (a) The type of water purification systems that are distributed or sold by the project participants, including information on the manufacturer, any label, the product number, the life span, etc.;
  - (b) The total number of water purification systems by type that is planned to be distributed by the project activity over each year of the duration of the crediting period;
  - (c) Under which conditions are users eligible to participate in the project activity (e.g. households with a certain income, etc.);
  - (d) How the water purification systems will be distributed or sold to consumers, including a description of all measures employed under the project and a description how final consumers are motivated to participate in the project.

## 2.2. Applicability

5. The methodology is applicable under the following conditions:
  - (a) Prior to the implementation of the project activity, a public distribution network supplying SDW to the project boundary does not exist. If during the crediting period SDW is made available through a public distribution network, the emission reductions pertaining to the households/buildings supplied by the public system cannot be claimed from that point onwards. This condition should be checked annually during the crediting period;
  - (b) The CDM-PDD shall specify the technology(ies) of the purification systems distributed under the project activity, including information on the manufacturer, any label, the product number, life span. It shall be demonstrated based on laboratory testing or official notifications (for example notifications from the national authority on health) that the application of the project technology/equipment achieves compliance either with: (i) at a minimum the performance target as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011); or (ii) an applicable national standard or guideline;
  - (c) Emission reductions pertaining to the use of a replacement water purification system can be claimed only if there are documented measures in place by the project proponent to ensure that end users have access to replacement purification systems of comparable quality;
  - (d) The project participants shall implement a management system to coordinate the distribution and to ensure the installation of the zero energy water purification systems to the consumers. A contractual agreement with manufacturers, intermediary distributors and consumers and unique identification of the systems shall ensure that there is no double counting of emission reductions.
6. In addition, the applicability conditions included in the tools referred to below apply.

## 2.3. Entry into force

7. Not applicable (call for public input).

## 3. Normative references

8. This baseline and monitoring methodology is based on the following approved baseline and monitoring methodologies and proposed new methodologies:
  - (a) "NM0280: Installation of zero energy water purifier in India" prepared by Hindustan Unilever Limited & their Associate Consultants;
  - (b) "AM0046: Distribution of efficient light bulbs to households" prepared by Perspectives Climate Change GmbH, Hamburg, Germany;
  - (c) "AMS-III.AV: Low greenhouse gas emitting safe drinking water production systems".

9. This methodology also refers to the latest approved versions of the following tools:
  - (a) "Tool to calculate the emission factor for an electricity system";
  - (b) The methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period."
10. For more information regarding the proposed new methodologies and the tools as well as their consideration by the Executive Board (hereinafter referred to as the Board) of the clean development mechanism (CDM) please refer to <<http://cdm.unfccc.int/goto/MPappmeth>>.

### 3.1. Selected approach from paragraph 48 of the CDM modalities and procedures

11. "Existing actual or historical emissions, as applicable".

## 4. Definitions

12. The definitions contained in the Glossary of CDM terms shall apply.
13. For the purpose of this methodology, the following definitions apply:
  - (a) **Safe drinking water (SDW)** - water that conforms to drinking water quality specified in relevant national microbiological quality standards of the host country. In case a national standard is not available, the water shall comply with the performance target as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011);
  - (b) **Improved drinking-water source, urban area and rural area** - are defined in accordance with the WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (<http://www.wssinfo.org/>).

## 5. Baseline methodology

### 5.1. Project boundary

14. The spatial extent of the project boundary encompasses the physical, geographical location of each zero energy water purification system installed under the project activity.
15. The greenhouse gases included in or excluded from the project boundary are shown in Table 2.

**Table 2. Emission sources included in or excluded from the project boundary**

Source		Gas	Included	Justification/Explanation
Baseline	Emissions from electricity/fossil fuels utilized for obtaining safe drinking water displaced due to project activity	CO <sub>2</sub>	Yes	Major source of emissions
		CH <sub>4</sub>	No	Minor source of emissions
		N <sub>2</sub> O	No	Minor source of emissions
Project activity	Emissions from operating project water purification systems	CO <sub>2</sub>	No	No thermal or electrical energy is required.
		CH <sub>4</sub>	No	No thermal or electrical energy is required
		N <sub>2</sub> O	No	No thermal or electrical energy is required

## 5.2. Identification of the baseline scenario and demonstration of additionality

16. The project activity is considered additional if:
- Within the project boundary, a public distribution network supplying SDW does not exist; and
  - The proportion of the population using improved drinking-water sources is equal to or less than 60 per cent; and
  - Within the project boundary, the fraction of population served by point-of-use treatment technologies is less than 50 per cent in the project boundary before the implementation of the project activity.
17. To demonstrate that the proportion of the population using improved drinking-water sources is equal to or less than 60 per cent, the project area shall be divided into urban areas and rural areas, and for each area one of the following data sources shall be used:
- Proportion of populations using an improved drinking-water source is less than 60 per cent, based on the most recent year for which data is available from WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (<http://www.wssinfo.org/data-estimates/table/>); in this case, the country-level proportion for urban and rural areas may be used for all project urban and rural areas, respectively;
  - Official data such as publicly available statistical data from a government agency or an independently commissioned study by an international organization or an university;
  - Survey methods, following the standard for "Sampling and surveys for CDM project activities and programme of activities".
18. It is assumed that electricity, fossil fuel or biomass is used to boil water as means of water purification in the absence of the project activity.



### 5.3. Baseline emissions

19. The baseline emissions are calculated based on the energy demand for boiling water, corrected for the energetic fraction of the fossil fuel used. Only purified water consumed for drinking purposes can be used in the baseline calculation.

20. The baseline emissions shall be calculated as follows:

$$BE_y = f_{PS} \times QPW_y \times SEC \times EF_{SDW} \times 10^{-9} \quad \text{Equation (1)}$$

Where:

$BE_y$	=	Baseline emissions during the year $y$ in (t CO <sub>2</sub> e)
$f_{PS}$	=	Factor accounting for the fraction of population served by point of use zero-energy water purification technologies in the absence of the project activity (fraction)
$QPW_y$	=	Quantity of purified water in year $y$ (litre)
$SEC$	=	Specific energy consumption required to boil one litre of water (kJ/L)
$EF_{SDW}$	=	Emission factor associated with the baseline water purification (t CO <sub>2</sub> /TJ)

21. The quantity of water purified shall be calculated as follows:

$$QPW_y = \min(QPW_{M,y}, (P \times PFR_y \times \min(QPW_{PP}, 5.5))) \quad \text{Equation (2)}$$

Where:

$QPW_y$	=	Quantity of purified water in year $y$ (litre)
$QPW_{M,y}$	=	Monitored quantity of purified water in year $y$ (litre)
$P$	=	Population serviced by the project equipment
$QPW_{PP}$	=	Average volume of drinking water per person per day (litre)
5.5	=	Cap of water use per person per day <sup>1</sup> (litre)
$PFR_y$	=	Failure rate of the project water purification systems in year $y$ (fraction)

22. The factor for accounting for the fraction of population served, prior to the implementation of the project activity, by point of use zero-energy water purification technologies shall be determined as follows:

$$f_{PS} = \begin{cases} 1, & PS < 0.2 \\ 1 - PS, & PS \geq 0.2 \end{cases} \quad \text{Equation (3)}$$

<sup>1</sup> Based on WHO recommendations (Domestic Water Quantity, Service Level and Health, Table 2: Volumes of water required for hydration, WHO 2003).

Where:

- $f_{PS}$  = Factor accounting for the fraction of population served by point of use zero-energy water purification technologies in the absence of the project activity (fraction)
- $PS$  = Fraction of population served by point of use zero-energy water purification technologies in the absence of the project activity (fraction)

23. The monitored quantity of water purified ( $QPW_{M,y}$ ) shall be monitored directly for all systems or a sample of the systems. This could be inter alia:
- Integrated flow meters;
  - Count of cleaning kits replacements and a cleaning kit's capacity;
  - Count of purification cycles and the volume of each cycle;
  - Capacity of the equipment established by manufacturers' specifications.
24. Specific energy consumption required to boil one litre of water is to be calculated as follows:

$$SEC = [WH \times (T_f - T_i) + 0.01 \times WHE] / \eta_{WB} \quad \text{Equation (4)}$$

Where:

- $WH$  = Specific heat of water (kJ/L °C)  
Use a default value of 4.186 kJ/L °C
- $T_f$  = Final temperature (°C)  
Use a default value of 100 °C<sup>2</sup>
- $T_i$  = Initial temperature of water (°C)
- $WHE$  = Latent heat of water evaporation (kJ/L)  
Use a default value of 2260 kJ/L<sup>3</sup>
- $\eta_{WB}$  = Efficiency of the water boiling systems being replaced (fraction)

25. The SDW emission factor shall be calculated as follows. Note that in project areas without connection to a national/regional electricity grid, the capping by the grid emission factor is not applicable:

<sup>2</sup> Boiling point of water at standard conditions.

<sup>3</sup> The latent heat required to boil one litre of water for five minutes is assumed to be equivalent to latent heat for the evaporation of 1 per cent of the water volume (WHO recommends a minimum duration of five minutes of water boiling), WHO guidelines for Emergency Treatment of drinking water at point of the use  
<[http://www.searo.who.int/LinkFiles/List\\_of\\_Guidelines\\_for\\_Health\\_Emergency\\_Emergency\\_treatment\\_of\\_drinking\\_water.pdf](http://www.searo.who.int/LinkFiles/List_of_Guidelines_for_Health_Emergency_Emergency_treatment_of_drinking_water.pdf)>.

$$EF_{SDW} = (1 - f_{BM}) \times \min \left( \sum_i f_{FF,i} \times EF_{FF,i}, EF_{grid}/0.0036 \right) \quad \text{Equation (5)}$$

Where:

$EF_{SDW}$	= Emission factor associated with the baseline water purification (t CO <sub>2</sub> /TJ)
$f_{BM}$	= Fraction of biomass used for boiling water in the absence of the project activity
$f_{FF,i}$	= Fraction of population which would use fossil fuel type <i>i</i> to boil water, in the absence of the project activity
$EF_{FF,i}$	= Emission factor of fossil fuel type <i>i</i> (t CO <sub>2</sub> /TJ)
$EF_{grid}$	= Grid emission factor (t CO <sub>2</sub> /MWh), determined according to the “Tool to calculate the emission factor for an electricity system”

#### 5.4. Project emissions

26. Project emissions ( $PE_y$ ) are assumed to be zero, because it is required that no thermal or electrical energy is used for the operation of the project water purification systems.

#### 5.5. Leakage

27. No leakage is considered.

#### 5.6. Emission reductions

28. As project emissions and leakage are zero, emission reductions equal the baseline emissions.

#### 5.7. Generic instructions for conducting sampling

29. “Standard for sampling and surveys for CDM project activities and programme of activities” shall be followed while conducting the sampling.
30. A project database shall be established containing all relevant information for estimating baseline emissions and sampling the project water purification systems, including, inter alia:
- Details of each user of the water purification systems (name, address, contact details);
  - Model and unique serial number of the water purification device;
  - Life span of the water purification device;
  - Date of installation/distribution of the water purification device;

- (e) Dates of expiration, replacement or drop-out of the device if such events occur;
- (f) Checks of operational status.

## 5.8. Changes required for methodology implementation in 2<sup>nd</sup> and 3<sup>rd</sup> crediting periods

31. Consistent with guidance by the Board, project participants shall use the latest version of the methodological tool “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period”.

## 5.9. Data and parameters not monitored

32. In addition to the parameters listed in the tables below, the provisions on data and parameters not monitored in the tools referred to in this methodology apply.

**Data / Parameter table 1.**

<b>Data / Parameter:</b>	<b>PS</b>
Data unit:	fraction
Description:	The fraction of population served by point-of-use zero-energy water purification technologies in the absence of the project activity
Source of data:	Sampling of the population in the project boundary, before the implementation of the project
Measurement procedures (if any):	The market share shall include all point-of-use water purification technologies systems which reliably supply SDW
Any comment:	-

**Data / Parameter table 2.**

<b>Data / Parameter:</b>	<b>P</b>
Data unit:	number
Description:	Population serviced by the project equipment
Source of data:	Estimated using surveys
Measurement procedures (if any):	-
Any comment:	-

**Data / Parameter table 3.**

<b>Data / Parameter:</b>	<b>QPW<sub>PP</sub></b>
Data unit:	litre
Description:	Average volume of drinking water per person per day
Source of data:	Estimated using surveys, official data, peer reviewed literature or local expert opinion
Measurement procedures (if any):	-
Any comment:	-

**Data / Parameter table 4.**

<b>Data / Parameter:</b>	$T_i$
Data unit:	°C
Description:	Initial temperature of water
Source of data:	Use annual Average ambient temperature; or use a default value of 20 °C
Measurement procedures (if any):	-
Any comment:	Ambient temperature data must be from globally accepted data sources, e.g. data published by the National Aeronautics and Space Administration (NASA) or the National Renewable Energy Laboratory (NREL). Data can be used only if they are for a location that can be demonstrated to be representative of the project location

**Data / Parameter table 5.**

<b>Data / Parameter:</b>	$f_{FF,i}$
Data unit:	fraction
Description:	Fraction of population which would use fossil fuel type $i$ to boil water, in the absence of the project activity
Source of data:	Sampling of the population in the project boundary, before the implementation of the project
Measurement procedures (if any):	-
Any comment:	-

**Data / Parameter table 6.**

<b>Data / Parameter:</b>	$EF_{FF,i}$
Data unit:	t CO <sub>2</sub> /TJ
Description:	Emission factor of fossil fuel type $i$
Source of data:	Regional or national default values, or IPCC default values at the upper limit of the uncertainty at a 95 per cent confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Measurement procedures (if any):	-
Any comment:	-

**Data / Parameter table 7.**

<b>Data / Parameter:</b>	$f_{BM}$
Data unit:	fraction
Description:	Fraction of biomass used for boiling water in the absence of the project activity
Source of data:	Sampling of the population in the project boundary, before the implementation of the project

Measurement procedures (if any):	-
Any comment:	-

**Data / Parameter table 8.**

<b>Data / Parameter:</b>	$\eta_{WB}$
Data unit:	fraction
Description:	Efficiency of the water boiling systems being replaced
Source of data:	-
Measurement procedures (if any):	Efficiency of the water boiling systems being replaced shall be determined using one of the following options: (a) The efficiency of the water boiling system shall be established using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of systems are encountered; (b) 0.10 default value may be optionally used if the replaced system or the system that would have been used is a three stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system i.e. without a grate as well as a chimney; for the rest of the systems using woody biomass 0.2 default value may be optionally used; (c) 0.5 default value may be used if the replaced system or the system that would have been used is a fossil fuel combusting system; (d) 1.0 default value may be used if the replaced system or the system that would have been used is an electric heating system
Any comment:	-

## 6. Monitoring methodology

33. All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period. All measurements should be conducted with calibrated measurement equipment according to relevant industry standards.
34. Furthermore, all parameters required by tools referred to by this methodology shall be monitored.

### 6.1. Data and parameters monitored

**Data / Parameter table 9.**

<b>Data / Parameter:</b>	$QPW_{M,y}$
Data unit:	litre
Description:	Monitored quantity of purified water in year $y$
Source of data:	See paragraph 23 for suggested options

Measurement procedures (if any):	The precise measurement procedure depends on the information available for the specific purification system used by the project activity. The most precise method shall be used, for instance when integrated flow meters exist, they should be used, and not manufacturer's specifications. The failure rate of the project water purification systems shall be taken into consideration, if the monitoring procedure does not account for failed systems. For example, if all systems are monitored, the quantity of purified water is derived directly, whereas if only a sample of the functional systems is taken, it has to be multiplied with $PFT_y$
Monitoring frequency:	-
QA/QC procedures:	
Any comment:	-

**Data / Parameter table 10.**

<b>Data / Parameter:</b>	<b>PFR<sub>y</sub></b>
Data unit:	Fraction
Description:	Failure rate of the project water purification systems in year <i>y</i>
Source of data:	Directly monitored or survey
Measurement procedures (if any):	-
Monitoring frequency:	At least annually
QA/QC procedures:	-
Any comment:	Replacement water purification system can be claimed to be operating only if there are documented measures in place by the project proponent to ensure that end users have access to replacement purification systems of comparable quality

**Data / Parameter table 11.**

<b>Data / Parameter:</b>	<b>Check for public distribution system providing SDW</b>
Data unit:	(Dimensionless)
Description:	-
Source of data:	-
Measurement procedures (if any):	-
Monitoring frequency:	Annual
QA/QC procedures:	-
Any comment:	The project participants should determine whether new public distribution system has been introduced in the area and whether SDW is made available through the public distribution network. In case the SDW is made available through the public distribution network, no claim for emission reduction can be made within the affected project area

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## Document information

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<i>Version</i>	<i>Date</i>	<i>Description</i>
Draft 03.0	30 August 2013	<p>MP 60, Annex 15</p> <p>A call for public input will be issued on this draft revised methodology.</p> <p>The revision:</p> <ul style="list-style-type: none"> <li>• Simplifies additionality assessment and monitoring requirements;</li> <li>• Changes the title from “Installation of zero energy water purifier for safe drinking water application” to “Installation of zero energy water purifier for safe drinking water”.</li> </ul> <p>Due to the overall modification of the document, no highlights of the changes are provided.</p>
02.0.0	23 November 2012	<p>EB 70, Annex 18</p> <p>Revision to delete the restriction to one single crediting period and provide guidance with regard to the renewal of the crediting period.</p>
01.1.0	26 November 2010	<p>EB 58, Annex 5</p> <p>Revision to improve the clarity and correct the units of several parameters.</p>
01	26 March 2010	<p>EB 53, Annex 5</p> <p>Initial adoption</p>

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