## Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC)

## - Annex 3: Application of the methodology to safe water supply projects for public inputs

January 2021

Gold Standard is updating the TPDDTEC methodology to introduce simplification and reduce monitoring requirement and transaction costs for project developers yet maintain the highest level of rigour and robustness associated with Gold Standard, enabling carbon finance to continue to support the delivery of safe water to vulnerable communities with the highest levels of integrity. The update is also intended to reflect the latest developments/advancements made in the distributed energy sector.

As first step, Gold Standard has updated the Annex 3 Application of the methodology to safe water supply projects and now seeks stakeholder feedback on the proposed updates.

Stakeholders should note that Gold Standard is contemplating making the Safe Water Supply Annex a standalone methodology; however, a final decision will be taken after the public consultation.

Key updates made to the Annex 3 for safe water supply projects are as follows –

1. Scope expansion – The applicability of the methodology has been expanded to Low-GHG emission safe water treatment technologies, provided associated conditions are met.
2. Methodology applicability – Existing applicability criteria are updated to reflect the latest guidance provided by the World Health Organization (WHO) for the Water, Sanitation, and Hygiene (WASH) sector.
3. Clarity on requirements: The annex clearly distinguishes between requirements for household water treatment (HWT) technologies and community water treatment (CWT) technologies including water quality testing, usage rates, and emission reduction calculation approach.
4. Safeguards:

* The methodology introduces the requirements to align project with host country regulatory framework for provision of safe drinking water.
* Institutional/Commercial installations may not consider Suppressed demand in establishing baselines.

1. Emission reduction calculation:

* The existing emission reduction calculation approach is updated to simplify and provide clarity on quantification methods. Default values, where available, have been provided for various input parameters and may be used to streamline the monitoring and verification process, though developers still have the option of monitoring various parameters and providing evidence for values higher than the default figures.

1. Field studies and monitoring requirements:

* Baseline – Options and guidance on fuel/technology considerations for baseline establishment are provided.
* Specific Energy requirement approach to quantify the energy required to boil water has been introduced. It replaces the baseline water boiling test (BWBT) requirement of current version of TPDDTEC methodology. This method applies default values and simplifies the requirements by removing the needs to conduct field test. Developers still have the option of implementing a field test according to the guidance and providing evidence for values higher than the default figures.
* Water quality testing – Updated requirements on frequency of testing, quality parameters to be considered.
* Quantity of treated water –
* Alternative options have been introduced to determine/measure the quantity of treated water.
* Caps for claimable water volume have been updated.
* Tier-based modifiers are introduced for water quality results and hygiene levels followed by the project end users. The modifiers are based on the monitoring approach (telephone/in-person) for hygiene surveys and level of testing/compliance with water quality requirements.

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| **PERIOD OF CONSULTATION:**  24 Dec 2020 – 10 Feb 2021 (extended beyond 30 days due to holidays)  **HOW TO SUBMIT YOUR CONSULTATION:** Stakeholders are requested to provide their feedback directly into the draft methodology document with specific attention to the following –   1. The changes made to the methodology as highlighted above 2. The current draft includes options in certain sections, indicated by text in square brackets ‘[ ]’). Gold Standard invites stakeholders to provide input on these options. The input provided for preferred options are requested to be accompanied with justification/rationale.   Please submit your feedback and comments by COB 10 February 2021 to [standards@goldstandard.org](mailto:standards@goldstandard.org).  A stakeholder webinar to present the summary of the updates will be held on **20th Jan 2021**. Please use the link below for registration. Interested stakeholders are encouraged to submit the feedback before the webinar.    [REGISTER TO THE Webinar](https://attendee.gotowebinar.com/register/2929787682461293327) |

## [Annex] [Methodology] for emission reductions from safe drinking water supply

##### DEFINITIONS

**TBC**

##### SCOPE

This [Annex] [Methodology] is for project technologies and practices that introduce a new low-emission or zero-emission[[1]](#footnote-1) technology to supply safe drinking water.

Technologies include both household water treatment technologies (HWT) and community water supply technologies (CWT). The calculation methods and monitoring requirements differ for these two broad groups of technologies.

Under this [Annex] [Methodology], a project’s objectives are to reduce greenhouse gas emissions from boiling unsafe drinking water in the baseline, and to supply water that is safe when it enters the project households. In other words, the water that comes out of the HWT in the household should be safe. Similarly, the water that is retrieved from the CWT and enters the household should be safe. In the case of commercial or institutional premises, the water consumed by end users should be safe.

##### APPLICABILITY

1. Eligible household water treatment technologies (HWT) include gravity household water filters, ultraviolet radiation treatment, reverse osmosis, chlorine tablets, etc.
2. Eligible community water supply technologies (CWT) include new installation of borehole hand-pumps, borehole hand-pump rehabilitation, solar pumps, water kiosks, etc. All CWT projects also must include ongoing maintenance and repair of the project technology. Pumps powered by fossil-fuel engines are not eligible, with the exception of back-up engines that are used for no more than 10% of operating hours. See data and parameters monitored, Pp,f,y.
3. This methodology allows for project activities to include safe water supply technologies implemented in households, and/or commercial premises such as shops or institutional premises including schools, prisons, army camps & refugee camps.
4. In the case of CWTs, the water in its improved form shall be available within [a distance of 1 km or less from the households, as demonstrated by satellite imaging or GPS evidence. In this case, projects are not eligible to make SDG 6.1.1 claims.][a total collection time of 30 minutes or less for a round trip, including queuing, using the travel modes of walking or pedaling. As a proxy, project developers may measure this as a distance of 250 m or less from the households, as demonstrated by satellite imaging or GPS evidence.] See data and parameters not monitored.
5. Water quality in the case of HWT: It shall be demonstrated based on laboratory testing[[2]](#footnote-2) or official notification[[3]](#footnote-3) that the project technology or equipment achieves either (i) the performance target classification 3-star or 2-star level, meaning “*Comprehensive Protection,”* as per the WHO International Scheme to Evaluate Household Water Treatment Technologies[[4]](#footnote-4) (WHO, 2011), or (ii) compliance with an applicable national standard or guideline[[5]](#footnote-5) for household drinking water treatment.
6. Water quality in the case of CWT: for each individual project water source (each borehole, well, etc., that is installed or rehabilitated in the project), it shall be demonstrated at the beginning of [the first] [each] crediting period with water quality testing reports that the water directly supplied by the project water source achieves both:
7. Bacteriological quality in line with either (i) national standards or guidelines for bacteriological quality of drinking water, or in the absence of such requirements, (ii) the minimum guidelines from the Guidelines for drinking-water quality, 2nd edition: Volume 3 - Surveillance and control of community supplies (WHO, 1997), and
8. compliance with (i) national standards or guidelines on priority chemical contamination and physical and aesthetic aspects, or in the absence of such requirements, (ii) international standards or guidelines on priority chemical contamination[[6]](#footnote-6) and physical and aesthetic aspects.
9. For both for HWT and CWT, the project must provide annual water hygiene education campaigns.

##### SAFEGUARDS

Document the national, regional and local regulatory framework for provision of safe drinking water in the project boundary (see data and parameters not monitored). The project shall not undermine or conflict with any national, sub-national and local regulations or guidance for safe drinking water supply, operation and maintenance, including any tariff requirements.

If the expected technical life of project technology (see data and parameters not monitored) is shorter than the crediting period, describe measures to ensure that end users are provided replacement systems of comparable quality at the end of the technical life (for example, replace with comparable or better technology, retrofit with performance guarantee, etc.). This applies both for new technology and existing technology that will be rehabilitated.

##### PROJECT BOUNDARY

The project boundary includes:

* the physical, geographical sites of the low- or zero-greenhouse gas emitting technologies to supply safe drinking water installed by the project activity, and
* the household, commercial and institutional buildings where the end users of safe water provided by the project are located.

##### BASELINE SCENARIO

**General baseline scenario**

For users that boil unsafe water in the pre-project scenario, the general baseline scenario is that users would have boiled drinking water in the absence of the project activity.

For household users currently drinking unsafe water, the principles of suppressed demand are applied, such that the general baseline scenario is assumed to be that users would have boiled drinking water in the absence of the project activity. This suppressed demand baseline assumption does not apply for large-scale projects[[7]](#footnote-7) or commercial and/or institutional premises, which only apply to users that boil water in the pre-project scenario.

For the case of users currently drinking unsafe water because e.g. energy poverty barriers result in less than the minimum required amount of safe drinking water, the principles of suppressed demand are applied and the hypothetical baseline is set as a proxy technology (water boiling of an adequate quantity of drinking water) based on the standard of living achieved by peers (adequate supply of safe drinking water). Projects applying the hypothetical suppressed demand baseline shall take into account any general rules or guidelines for suppressed demand published by the Gold Standard at the time of crediting period renewal.

**Selection and justification of the specific baseline scenario**

Each Project or VPA shall determine the applicable baseline scenario for fuel, technology and/or user group as applicable following the TPDDTEC methodology, section 2. Selection of baseline scenarios and project scenarios. Each project or VPA must document the following pre-project conditions that define the specific baseline scenario of the project or VPA:

1. Practices of boiling water or drinking unsafe water: Document the safe drinking water sources and/or treatment technologies available and used in the project boundary (e.g. no treatment, boiling, piped water, chlorine tablets, etc.).
2. Efficiency of water boiling systems: Document the stove or water boiling technologies used in the project boundary.
3. Baseline fuels: Document the cooking fuels used in the project boundary.

##### EMISSIONS SOURCES

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Source** | **Gas** | **Included** | | **Justification/Explanation** |
| Baseline scenario | Emissions from wood fuels utilized for obtaining safe drinking water displaced due to project activity | CO2 | | Yes | Major source of emissions |
| CH4 | | Yes | Minor source of emissions |
| N2O | | Yes | Minor source of emissions |
| Emissions from fossil fuels utilized for obtaining safe drinking water displaced due to project activity | CO2 | | Yes | Major source of emissions |
| CH4 | | No | Excluded for simplification |
| N2O | | No | Excluded for simplification |
| Project scenario | Emissions from electricity for operating project water treatment technology | CO2 | | Yes | Limited electrical energy may be required. |
| CH4 | | No | Excluded for simplification |
| N2O | | No | Excluded for simplification |
| Emissions from fossil fuels for operating project water treatment technology | CO2 | | Yes | Limited fuel energy may be required. |
| CH4 | | No | Excluded for simplification |
| N2O | | No | Excluded for simplification |

##### BASELINE EMISSIONS

First, determine the baseline emission factor.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Emission factor for the use of fuel to obtain safe water in the baseline (tCO2e/L) |
|  | = | Specific energy required to boil water (kJ/L), to be calculated as per the paragraph below |
|  | = | Proportion of fuel *f* used in the baseline (fraction) |
|  | = | CO2 emission factor from use of fuel *f* (tCO2/TJ) |
|  | = | Non-CO2 emission factor arising from use of fuel *f*, when the baseline fuel *f* is biomass or charcoal (tCO2e/TJ). This parameter is omitted when *f* is a fossil fuel. |
|  | = | Fractional non-renewability status of woody biomass fuel during year *y* (fraction). For biomass, it is the fraction of woody biomass that can be established as non-renewable. This parameter is omitted when *f* is a fossil fuel. |
| *f* | = | Index for baseline fuel types |

The specific energy required to boil water using the baseline technology () is determined as follows, by calculating the energy input required to obtain 1 L of boiling water, including boiling and vaporization losses[[8]](#footnote-8).

Equation ()

Where

|  |  |  |
| --- | --- | --- |
| *360.83* | = | Default amount of energy required to boil 1 L of water from a first principles approach[[9]](#footnote-9) |
|  | = | Efficiency of the baseline water boiling (%). Weighted average of baseline stove types. |

Next, calculate the baseline emissions. The following equations state the target population as households. In case the project includes instead commercial or institutional premises, the concept of “household” shall be replaced with “individual”.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Baseline emissions from the use of fuel to obtain safe water in the baseline (tCO2e) |
|  | = | Proportion of project households who in the baseline were already using a safe water supply that did not require boiling it (%) |
|  | = | Proportion of project households that boil safe water in the project year *y* (%) |
|  | = | Quantity of safe drinking water provided by the project in year *y* (L) |
|  | = | Modifier for the water quality in year *y* |
|  | = | Modifier for the hygiene practices of the project households in year *y* |

The quantity of safe drinking water provided by the project is calculated using one of two methods. Method 1 applies to CWT projects, while method 2 applies to HWT projects.

**Method 1. Community water treatment technologies.**

In the case of community water treatment technologies, the quantity of safe drinking water provided by the project is determined as follows.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Monitored quantity of safe water provided by the project in year *y* (L). |
|  | = | Quantity of safe drinking water that could be consumed by project households in year *y* (L) |

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Number of households served by the project in year *y* |
|  | = | Number of individuals per household |
|  | = | Volume of drinking water per person per day. Apply the default value of 4 L for adults and 1 L for children 10 years and under or monitored value through water consumption field tests in the project scenario. Monitored value shall be capped at maximum 5.5 L[[10]](#footnote-10) for adults and 1.4 L for children 10 years and under. |
|  | = | Days the project technology is operational in year *y* |

**Method 2. Household water treatment technologies.**

In the case of household water treatment technologies, the quantity of safe drinking water provided by the project is determined as follows.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Number of households with at least one project device in year *y* |
|  | = | Usage rate of the project device by households during year *y* |
|  | = | Volume of drinking water per household per day in year *y* |
|  | = | Days the project technology is present in the households in year *y* |

The volume of drinking water per household per day is determined by considering whether the capacity of the project device is sufficient to provide at least the default amount of drinking water, as follows.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Capacity of the household water treatment technology (L/h) |
| *ty* | = | Usage time of the household water treatment technology in year *y* (h/day) |
|  | = | Average number of project devices in each project household in year *y* |
|  | = | Number of individuals per household |
|  | = | Volume of drinking water per person per day. Apply the default value of 4 L for adults and 1 L for children 10 and under or monitored value through water consumption field tests in the project scenario. Monitored value shall be capped at maximum 5.5 L[[11]](#footnote-11) for adults and 1.4 L for children 10 years and under. |

##### PROJECT EMISSIONS

Project emissions may result from the operation of new low-emission water treatment technologies.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Project emissions in year *y* (tCO2) |
|  | = | Project emissions from fossil fuel use in year *y* (tCO2) |
|  | = | Project emissions from electricity use in year *y* (tCO2) |

Project emissions from fossil fuel use are determined as follows.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Quantity of fossil fuel *f* that is consumed in the project during year *y* (mass or volume units) |
|  | = | Net calorific value of fossil fuel *f* (TJ/fuel units) |
|  | = | Emission factor of fossil fuel *f* (tCO2/TJ) |

Project emissions from electricity use are estimated as follows.

Equation ()

Where

|  |  |  |
| --- | --- | --- |
|  | = | Quantity of electricity that is used by the project during year *y* (kWh) |
|  | = | Emission factor associated with the electricity use (tCO2/kWh) |

##### LEAKAGE EMISSIONS

Where relevant, leakage relating to the non-renewable woody biomass shall be assessed as per the procedures of the TPDDTEC methodology.

##### EMISSION REDUCTIONS

The emission reductions of the project are calculated as follows.

Equation ()

##### GENERAL REQUIREMENTS FOR SAMPLING

When sampling is applied to determine mean (average) parameter values or proportion (yes/no) parameter values for both ex-ante and monitored data and parameters, the following guidelines shall always be applied. Additionally, for the sampling related to some parameters, specific requirements apply, and these are described in the parameter tables.

A statistically valid sample can be used to determine parameter values, as per the relevant requirements for sampling in the "Standard for sampling and surveys for CDM project activities and programme of activities." 90% confidence interval and a 10% margin of error requirement shall be achieved for the sampled parameters. In any case, a minimum sample size of 30, or the whole group size if this is lower than 30, must always be applied.

When a baseline and project survey is used following sample size guidelines should be applied, unless otherwise stated for specific parameters:

* Group size <300: Minimum sample size 30 or population size, whichever is smaller
* Group size 300 to 1000: Minimum sample size 10% of group size
* Group size > 1000: Minimum sample size 100

##### EX-ANTE PARAMETERS

**Related to water quality**

|  |  |
| --- | --- |
| **Data / Parameter:** | Households within [1 km distance of project water source][a total collection time of 30 minutes or less for a round trip, including queuing, using the travel modes of walking or pedaling. As a proxy, project developers may measure this as a distance of 250 m or less from the households] |
| Data unit: | Number |
| Description: | Number of households within a [1 km] [250 m] radius of the project safe water source at the start of the crediting period |
| Source of data: | Using satellite imaging or GPS technology.  If there are any insurmountable barriers (e.g. river without bridge) transecting the circle defined by the radius, then households on the far side of the barrier shall be excluded from the count. |
| Any comment: | All households included in any baseline or project survey or sampling shall fall within the [1 km] [250 m] radius.  Applies only for CWT |

|  |  |
| --- | --- |
| **Data / Parameter:** | Project technology description |
| Data unit: | NA |
| Description: | The detailed description of the planned project technology shall include as a minimum:  HWT: manufacturer, product name (if applicable), technology type, and performance target classification as per the WHO International Scheme to Evaluate Household Water Treatment Technologies or proof of compliance with an applicable national standard or guideline for drinking water treatment.  CWT: manufacturer, product name (if applicable), technology type, capacity (in case of pumps: rated flow rate, or flow-rate calculation)  For both HWT and CWT, any performance certifications also shall be provided. |
| Source of data: | HWT: Any of the following sources shall be used:  Manufacturer specifications  Third-party certification by a qualified entity  Commercial guarantee  CWT: Any of the following sources shall be used:  Manufacturer specifications  Commercial guarantee  Technical reports from the installer  Technical reports from a qualified entity that undertakes the rehabilitation  Third-party certification by a qualified entity |
| Any comment: | Professional opinion or expert opinion is not accepted as a source for this parameter.  Any information not available at validation shall be provided and verified at the first verification. |

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| --- | --- |
| **Data / Parameter:** | Regulatory framework for safe water supply |
| Data unit: | NA |
| Description: | List and provide a summary of any national, sub-national and local regulations or guidance for safe drinking water supply, operation and maintenance, including any tariff requirements.  Describe how the project complies with the regulatory framework.  Undertake at the start of each crediting period. |
| Source of data: | National, sub-national and local authorities |
| Any comment: | The project shall not undermine or conflict with any national, sub-national and local regulations or guidance for safe drinking water supply, operation and maintenance, including any tariff requirements.  Where the regulatory framework establishes any cap on parameters used by the methodology, for example number of users per borehole, this shall be accounted for in emission reduction calculations. |

|  |  |
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| **Data / Parameter:** | Water sources in the project boundary |
| Data unit: | NA |
| Description: | Identify all water sources in the project boundary (e.g. ponds or other surface water, rainwater collection, protected springs, uncontaminated hand-dug wells, hand pumps, electric pumps, paid tap-stands, piped water, etc.), identify whether they are used for drinking water, and for all that are used for drinking water classify them as safely managed, basic, limited, unimproved or surface water, in line with (JMP 2017).  Undertake at the start of each crediting period. |
| Source of data: | Any of the following sources shall be used:  Baseline study  Credible published literature for project region  Studies by academia, NGOs or multilateral institutions, or  Official government publications or statistics  Source applied must not be more than 3 years old |
| Any comment: |  |

**Related to emission reductions**

|  |  |
| --- | --- |
| **Data / Parameter:** | Expected technical life of project technology |
| Data unit: | Treatment volume or operational hours or time period (e.g. “eight years”) |
| Description: | The expected technical life of an individual project technology shall be defined in the PDD. In the case of HWT, the details include both technology/device life and filter life, if a filter is used and it is replaceable. |
| Source of data: | HWT: Any of the following sources shall be used:  Manufacturer specifications  Third-party certification by a qualified entity  Commercial guarantee  CWT: Any of the following sources shall be used:  Manufacturer specifications  Guarantee from the installer  Guarantee from a qualified entity that undertakes the rehabilitation  Third-party certification by a qualified entity |
| Any comment: | Professional opinion or expert opinion is not accepted as a source for this parameter.  If the expected technical life of the project technology is shorter than the crediting period, describe the measures to ensure that end users are provided replacement systems of comparable quality, e.g. replace with comparable or better technology, retrofit with performance guarantee, etc. This applies both for new technology and existing technology that will be rehabilitated.  The project shall ensure that the units are replaced or retrofitted at the end of their technical life in order to continue claiming emission reductions. |

|  |  |
| --- | --- |
| **Data / Parameter:** | *qi* |
| Data unit: | Litres per hour |
| Description: | Capacity of the household water treatment technology |
| Source of data: | Any of the following sources shall be used:  Manufacturer specifications  Third-party certification by a qualified entity  Commercial guarantee by the seller |
| Any comment: | Professional opinion or expert opinion is not accepted as a source for this parameter.  Applies only for HWT |

|  |  |
| --- | --- |
| **Data / Parameter:** | *Stove technologies used in the project boundary* |
| Data unit: | NA |
| Description: | The proportion of different stove types used in households in the geographical area of the project.  If the project covers commercial and/or institutional premises, then the water boiling systems used by these types of entities in the geographical area of the project are to be determined.  Undertake at the start of each crediting period. |
| Source of data: | Any of the following sources shall be used:  Baseline survey,  Credible published literature for project region,  Studies by academia, NGOs or multilateral institutions, or  Official government publications or statistics  Source applied must not be more than 3 years old  When a baseline survey is used, follow the “general requirements for sampling.” |
| Any comment: | The classification shall consider at least the following categories of stoves types:  Three-stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system;  other conventional systems using woody biomass;  improved cookstoves; and  fossil fuel combusting systems.  If the project or VPAs are implemented in different geographical locations, then the proportion of different stove types shall be defined for each location. |

|  |  |
| --- | --- |
| **Data / Parameter:** | *xf* |
| Data unit: | Percentage of fuel *f* |
| Description: | The proportion of each different household cooking fuel *f* used in the project boundary  If the project covers commercial and/or institutional premises, then the fuels used in the geographical area of the project by the same types of entities are to be determined.  Undertake at the start of each crediting period. |
| Source of data: | Any of the following sources shall be used:  baseline survey,  Credible published literature for project region,  Studies by academia, NGOs or multilateral institutions, or  Official government publications or statistics  Source applied must not be more than 3 years old  When a baseline survey is used, follow the “general requirements for sampling.” |
| Any comment: | The percentages applied shall be cross-checked against at least one other source on the list  If the project or VPAs are implemented in different geographical locations, then the proportion of different fuel types shall be defined for each location. |

|  |  |
| --- | --- |
| **Data / Parameter:** | *EFb,f,CO2* |
| Data unit: | tCO2/TJ |
| Description: | CO2 emission factor from use of fuels |
| Source of data: | In order of preference:  National defaults  Credible published literature for project region  IPCC defaults |
| Any comment: |  |

|  |  |
| --- | --- |
| **Data / Parameter:** | *EFb,f,nonCO2* |
| Data unit: | tCO2e/TJ |
| Description: | Non-CO2 emission factor from use of fuels, in case the baseline fuel is biomass or charcoal |
| Source of data: | In order of preference:  National defaults  Credible published literature for project region  IPCC defaults (apply lower bound of the provided range) |
| Any comment: | If the emission factor is expressed in tonnes of CH4 or N2O, it shall be converted to tCO2e using the applicable GWP and this shall be documented in the PDD. |

|  |  |
| --- | --- |
| **Data / Parameter:** |  |
| Data unit: | Percentage |
| Description: | Weighted average efficiency of the baseline water boiling. Calculate the weighted average of the water boiling efficiency in the project boundary using the proportion of different stove types used and the stove efficiencies. |
| Source of data: | The following default values may be applied to calculate the weighted average of the water boiling efficiency in the project boundary:   * Three-stone fire or a conventional system for woody biomass lacking improved combustion air supply mechanism and flue gas ventilation system, that is without either a grate or a chimney: default efficiency 10%. * Other conventional systems using woody biomass: default efficiency 20% * Improved cookstoves: manufacturer specification, or if not available, default efficiency 30% * Fossil fuel combusting system: default efficiency 50%   In case other types of stoves are found in the project area, or if significant efficiency differences from the default values are suspected [in the case of improved cookstoves or fossil fuel combusting systems], standard Water Boiling Tests may be undertaken to determine stove efficiency using representative sampling methods, following the most recent WBT protocol. When a sampling is used, follow the “general requirements for sampling.” |
| Any comment: |  |

|  |  |
| --- | --- |
| **Data / Parameter:** | Cb |
| Data unit: | Percentage |
| Description: | Proportion of project households who in the baseline were already using a safe water supply that did not require boiling.  At the start of each crediting period. |
| Source of data: | Any of the following sources shall be used:  Baseline survey  Credible published literature for project region  Studies by academia, NGOs or multilateral institutions  Official government publications or statistics  When a baseline survey is used, follow the “general requirements for sampling.” |
| Any comment: | The percentages applied shall be cross-checked against at least one other source on the list  Source applied must not be more than 3 years old  The safe water sources and percentages shall be consistent with the information reported for parameter *Water sources in the project boundary*  Users who have access to an improved source in the baseline may not be credited under the project, unless project demonstrates that the baseline source of water does not meet safe water quality criteria, by conducting water quality tests over a representative period of time or by referring to credible published literature or other sources. |

|  |  |
| --- | --- |
| **Data / Parameter:** | HNp |
| Data unit: | Number |
| Description: | Number of individuals per household in the project boundary |
| Source of data: | One of two options, with the option defined and fixed at project design certification stage:   1. Determined ex-ante and fixed for a given crediting period, or 2. Updated annually (if updated annually, then include HNp,y in the “data and parameters monitored” section of the PDD)   Any of the following sources shall be used:  Baseline or Project survey  Credible published literature for project region  Studies by academia, NGOs or multilateral institutions, or  Official government publications or statistics  When a baseline or project survey is used, follow the “general requirements for sampling.” |
| Any comment: | The value applied shall be cross-checked against at least one other source on the list.  Source applied must not be more than 3 years old  Does not apply in case the project is for commercial or institutional premises. |

|  |  |
| --- | --- |
| **Data / Parameter:** | *NCVf* |
| Data unit: | TJ/fuel units, i.e. mass or volume units |
| Description: | Net calorific value of fossil fuel *f* |
| Source of data: | In order of preference:  Fuel-specific value from invoice / fuel supplier  National defaults  Credible published literature for project region  IPCC defaults |
| Any comment: |  |

|  |  |
| --- | --- |
| **Data / Parameter:** | *EFf* |
| **Data unit:** | tCO2/TJ |
| **Description:** | Emission factor of fossil fuel *f* |
| **Source of data:** | In order of preference:  Fuel-specific value from invoice / fuel supplier  National defaults  Credible published literature for project region  IPCC defaults |
| **Any comment:** |  |

|  |  |
| --- | --- |
| **Data / Parameter:** | *EFec* |
| Data unit: | tCO2/kWh |
| Description: | Emission factor associated with the electricity use |
| Source of data: | In order of preference:  Literature – based on data as obtained from local authorities  Where such data is either not available or available but suspect, then calculated according to the CDM Tool 05, “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”. |
| Any comment: | Data available from local authorities must not be more than 3 years old |

##### DATA AND PARAMETERS MONITORED

**Related to water quality**

|  |  |
| --- | --- |
| **Data / Parameter:** | Quality of the water supplied by the CWT |
| Data unit: | NA |
| Description: | The water supplied by the project technology at the water source must comply with   1. Bacteriological quality in line with (i) national standards or guideline for bacteriological quality of drinking water, or in their absence, (ii) Table 1.1. guideline values for bacteriological quality, WHO, 1997); and 2. It also must be compliant with national standards or guidelines on chemical contamination and physical and aesthetic aspects of drinking water.   The sampling and analysis may follow the guidelines in WHO, 1997 Chapter 4. |
| Source of data: | Water quality test report |
| Monitoring frequency: | Once at the start of the crediting period, and  Bacteriological quality at the water source must be retested following an event that could lead to contamination of the source water (e.g. flooding). |
| QA/QC procedures: | 1. Laboratories used for water quality testing must be approved by local health authorities and/or have quality accreditation; and  2. The laboratory used must demonstrate that it has an adequate quality management plan in place which addresses both quality assurance and quality control test procedures.  Table 4.6 Checklist for effective analytical quality assurance of WHO, 1997 may be used as a guideline for laboratory compliance with quality assurance practices. |
| Any comment: | Applies in the case of CWT |

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| **Data / Parameter:** | Water hygiene education campaigns |
| Data unit: | NA |
| Description: | Hygiene campaigns carried out among project technology users.  The following guidelines may be adopted for conducting these campaigns[[12]](#footnote-12)   * Hygiene refers to access to sanitation amenities, equipment and infrastructure, as well as to the behaviour in respect to regular and correct use of such amenities. It also refers to behaviour that prevents infections from water-related diseases. * The project proponent shall report the activities conducted each year in a detailed “Report of annual hygiene campaigns results” and summarize the results in the project monitoring reports. * Any major changes in the health status of the water users as a result of contaminated water (e.g. an outbreak of water related disease) must be reported and, if relevant, a strategy put in place to address it through the subsequent hygiene campaign. * The detailed method used to assess hygienic handling of clean water must be provided with the PDD and validated by the DOE. * The details of the method should be adjusted to suit the circumstances of each project and also to suit learning year on year. |
| Source of data: | Report of annual hygiene campaigns results |
| Monitoring frequency: | Annually |
| QA/QC procedures: | NA |
| Any comment: | Applies in the case of HWT and CWT |

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| **Data / Parameter:** | Mq,y |
| Data unit: | fraction |
| Description: | Ongoing water quality indicated as the fraction of the samples that pass the test of bacterial quality to a standard of <1cfu/100ml. |
|  | [Biannual] [Annual] testing of water at a representative sample of households at the point where the water reaches the project household. In the case of HWT, this is when the water exits the treatment technology. In the case of CWT, this is when the water reaches the household.  The water quality test applies the bacterial quality standard <1 cfu/100ml, and the sampling determines the proportion of pass and fail results. Follow the “General requirements for sampling.” The sampling results shall satisfy the 90/10 rule, i.e. the endpoints of the 90% confidence interval lie within +/- 10% of the estimated proportion in relative units. For example, the interval around a proportion of 90% tests passed, would have to lie between 81% and 99%.  A minimum sample size of 30 must be selected. |
| Monitoring frequency: | At least [biannual] [annual] sampling |
| QA/QC procedures: | 1. Laboratories used for water quality testing must be approved by local health authorities and/or have quality accreditation; and  2. The laboratory used must demonstrate that it has an adequate quality management plan in place which addresses both quality assurance and quality control test procedures.  3. Field testing kits also are eligible, e.g. based on Colony Forming Unit method or Most Probable Number method. To use the field testing kits the project shall meet the following requirements:  Testing kits must be approved by national agency or meet standards set by relevant international organisation e.g. US-EPA, or  Testing kits shall be tested for its accuracy and robustness prior to application for project level monitoring. Local or accredited laboratory shall conduct water quality tests using testing kits and a relevant ISO standard or an equivalent standard, in parallel with field testing kits, and |
| Any comment: | Applies in the case of HWT and CWT  If the proportion of samples not meeting Safe Drinking Water Standards [exceeds 10%] [exceeds a threshold that reduces over time], no emission reductions can be claimed for the corresponding monitoring period.  [Project or VPA year 1: 20%  Project or VPA year 2: 15%  Project or VPA year 3 or above: 10%]  Additionally, the project shall provide an explanation for why this occurred and provide a remediation plan. |

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| **Data / Parameter:** | *Mh,y* |
| Data unit: | fraction |
| Description: | Modifier for the hygiene practices of the project households |
| Source of data: | The drinking water and hygiene practices will be assessed using the WHO/UNICEF Joint Monitoring Programme guidelines[[13]](#footnote-13) (JMP 2018).  Option 1: In-person survey including all the JMP core questions for drinking water and core questions for hygiene. Apply the fraction of the households where Safe water and Hygiene practices are found to fulfill “safely managed” or “basic” requirements. Multiply the fraction by 100% to determine *Mh,y*  Option 2: Survey performed by telephone or by messaging (e.g. text, app), covering all JMP core questions for drinking water and core questions for hygiene. Apply the fraction of the households where Safe water and Hygiene practices are found to fulfill “safely managed” or “basic” requirements. Multiply the fraction by 75% to determine *Mh,y*  For sampling, follow the “General requirements for sampling.” |
| Monitoring frequency: | Annual |
| QA/QC procedures: | NA |
| Any comment: | Applies in the case of HWT and CWT |

**Related to emission reductions**

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| **Data / Parameter:** | *fNRB,f,y* |
| Data unit: | percentage |
| Description: | Fractional non-renewability status of woody biomass fuel during year *y*, in case the baseline fuel is biomass or charcoal |
| Source of data: | Determined by following the CDM TOOL30[[14]](#footnote-14), Calculation of the fraction of non-renewable biomass |
| Monitoring frequency: | One of two options, with the option defined and fixed at project design certification stage:   1. Determined ex-ante and fixed for a given crediting period (if it is fixed ex-ante, then include fNRB,b,y in the “data and parameters fixed ex ante” section of the PDD), or 2. Updated biennially or at each monitoring and verification |
| QA/QC procedures: | Requirements of the CDM TOOL30 |
| Any comment: |  |

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| **Data / Parameter:** | *Xcleanboil,y* |
| Data unit: | percentage |
| Description: | Proportion of project households that boil safe (treated, or from safe supply) water after installation of project technology in year *y* |
| Source of data: | Usage survey  This survey may be performed in person, by telephone, by messaging (e.g. text, app), appropriate to the context.  For sampling, follow the “General requirements for sampling.” |
| Monitoring frequency: | Annually |
| QA/QC procedures: |  |
| Any comment: |  |

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| **Data / Parameter:** | *Qm,y* |
| Data unit: | Liters |
| Description: | Monitored quantity of safe water provided by the project in year *y* |
| Source of data: | Option 1: Flow meter measures water volume directly  Option 2: Operation sensor measures directly operation time or pump stroke count, and volume is calculated as capacity (defined in *Project technology description*) multiplied by operation time or pump strokes, depending on the sensor type. |
| Monitoring frequency: | Continuously |
| QA/QC procedures: | Follow manufacturer, sector, national or international standards or guidelines for calibration and maintenance of the measurement device |
| Any comment: | Applies to CWT projects |

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| **Data / Parameter:** | *QPWp* |
| Data unit: | Liters/person/day |
| Description: | Volume of drinking water per person per day |
| Source of data: | Option 1 Apply the default value of 4 L for adults and 1 L for children 10 and under  Option 2 Water Consumption Field Tests  The water consumption field test (WCFT) is similar to the Field Test, except project-supplied clean water consumption volumes is measured rather than fuel consumption. The WCFT is conducted with end users representative of the project scenario target population and currently using the project technology. Guidance from TPDDTEC section 2.4.C on Field Test representativeness, sample sizing, and variability is applicable. |
| Monitoring frequency: | Biennial |
| QA/QC procedures: |  |
| Any comment: | Applies to HWT and CWT projects |

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| **Data / Parameter:** | *HHp,y* |
| Data unit: | Number |
| Description: | Number of households served by the project in year *y* |
| Source of data: | Survey the households within [1 km distance] [250 m distance] of project water source to check how often the household used the project water source during the year.  This survey may be performed in person, by telephone, by messaging (e.g. text, app), appropriate to the context.  Households that report at least daily or weekly use may be counted.  For sampling, follow the “General requirements for sampling.” |
| Monitoring frequency: | Annually |
| QA/QC procedures: | NA |
| Any comment: | Applies to CWT projects |

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| **Data / Parameter:** | *Do,y* |
| Data unit: | Days |
| Description: | Days the project technology is operational in year *y* |
| Source of data: | In order of preference:   1. Measure directly using operation sensor, or 2. Demonstrate from log of operation and maintenance system. |
| Monitoring frequency: | Annually |
| QA/QC procedures: | Values higher than 347 days may only be applied when option 1 is used. |
| Any comment: | Applies to CWT projects |

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| **Data / Parameter:** | *Nd,y* |
| Data unit: | Number |
| Description: | Accumulated number of households with at least one project device in year *y* |
| Source of data: | Sales or distribution records |
| Monitoring frequency: | Annually |
| QA/QC procedures: | Sales or distribution records to include:   1. Date of sale/distribution 2. Geographic area of sale 3. Model/type of project technology sold 4. Quantity of project technologies sold 5. Name and telephone number, and address (if available) or other traceable indicator of household location for all end users |
| Any comment: | Applies to HWT projects  Units shall not be counted in *Nd,y* after the end of their technical life, unless this is addressed by the measures to manage the cases where the expected technical life of the project technology is shorter than the crediting period. |

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| **Data / Parameter:** | *Up,y* |
| Data unit: | percentage |
| Description: | Usage rate of the project device by households during year *y* |
| Source of data: | Survey the households with a project technology to check how often the household used the project water source during the year.  Option 1. In-person survey of project households following Annex 9. of TPDDTEC. Households that show at least daily or weekly use may be counted. The resulting fraction is multiplied by 100% to get *Up,y*  Option 2. Survey performed by telephone or messaging (e.g. text, app), covering topics 1, 2 and 3 of Annex 9 of TPDDTEC. Households that report at least daily or weekly use may be counted. The resulting fraction is multiplied by 75% to get *Up,y*  The minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited. |
| Monitoring frequency: | Annually |
| QA/QC procedures: | NA |
| Any comment: | The usage survey provides a single usage parameter that is weighted based on drop off rates that are representative of the age distribution for project technologies in the total sales record.[[15]](#footnote-15)  Applies to all HWT technologies and projects |

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| **Data / Parameter:** | *ty* |
| Data unit: | Hours per day |
| Description: | Usage time of the household water treatment technology |
| Source of data: | Determined via Project survey  Option 1. In-person observational sample-based survey of project household practices.  Option 2. Interview survey performed by telephone or messaging (e.g. text, app).  For sampling, follow the “General requirements for sampling.”  In any case the value is capped at 5 hours |
| Any comment: | The value applied shall be cross-checked against at least one other source on the list Credible published literature for project region  Studies by academia, NGOs or multilateral institutions  Official government publications or statistics  Applies only for HWT |

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| **Data / Parameter:** | Dp,y |
| Data unit: | Days |
| Description: | Average days the project technology is present in the households in year *y* |
| Source of data: | Sales or distribution records  Based on the sales or distribution records of “Date of sale/distribution” and ex-ante parameter “Expected technical life of project technology,” determine for each project device how many days of the 365 days of the year it was in a household and within its technical life. Calculate the average for all the project devices to obtain this parameter. |
| Monitoring frequency: | Annually |
| QA/QC procedures: | NA |
| Any comment: | Applies to HWT projects |

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| **Data / Parameter:** | DNHH,y |
| Data unit: | Number |
| Description: | Average number of project devices in each project household in year *y* |
| Source of data: | Sales or distribution records  Based on the sales or distribution records of “Quantity of project technologies sold” and identifying information of buyer/recipient, calculate the average number of project devices per household. |
| Monitoring frequency: | Annually |
| QA/QC procedures: | NA |
| Any comment: | Applies to HWT projects |

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| **Data / Parameter:** | Pp,f,y |
| Data unit: | mass or volume units (e.g. kg, Litres, standard m3) |
| Description: | Quantity of fossil fuel *f* that is consumed in the project during year *y* |
| Source of data: | Any of the following methods shall be used:  Direct measurement with meter, scales  Estimation with e.g. tank capacity table  Taken from fuel invoice or purchase receipt, or  In the case of direct fuel use by water treatment systems, may be estimated from the manufacturer’s specification of the equipment and operating hours or volumes (e.g. fuel consumption per hour times utilization hours or fuel consumption per litre times the litres of water treated). |
| Monitoring frequency: | Continually |
| QA/QC procedures: | Follow manufacturer, sector, national or international standards or guidelines for calibration and maintenance of the measurement device |
| Any comment: | Where back-up fossil-fuel engine(s) are used, use the monitored fuel amount to estimate the number of operating hours during the monitoring period, and compare this to the total number of operating hours of the project pump for the same period. If the use of the engine surpasses 10% of pump operating hours, then determine the number of days in which the backup technology was used to operate the pump for more than 10% of total operating hours during the day. The project is ineligible for crediting on the days when the use of back-up technology was more than the 10% threshold, and the number of ineligible days shall be subtracted from Do,y. |

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| **Data / Parameter:** | ECp,y |
| Data unit: | kWh |
| Description: | Quantity of electricity that is used by the project during year *y* |
| Source of data: | Any of the following methods shall be used:  Direct measurement with electric meter  Sample based using electricity loggers, or  In the case of direct electricity use by water treatment systems, may be estimated from the manufacturer’s specification of the equipment and operating hours or volumes (e.g. electricity consumption per hour times utilization hours or electricity consumption per litre times the litres of water treated).  For sampling, follow the “General requirements for sampling.” |
| Monitoring frequency: | Continually |
| QA/QC procedures: | Follow manufacturer, sector, national or international standards or guidelines for calibration and maintenance of the measurement device |
| Any comment: | NA |

##### DEFAULT VALUES APPLICABLE UNDER THIS [ANNEX] [METHODOLOGY]

1. **(l/p/d) :** Volume of drinking water per person per day – 4 for audits and 1 for children
2. *ty* (hours per day): Usage time of the household water treatment technology – 5 hr

# References

Clean Development Mechanism. (2017, September 22). *Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation.* Retrieved from https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf/history\_view

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World Health Organization. (2012). *A toolkit for monitoring and evaluating household water treatment and safe storage programmes.*

World Health Organization. (2015). *BOIL WATER-Technical Brief.*

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World Health Organization. (2018). *Core questions on water, sanitation and hygiene for household surveys.* Retrieved from Joint Monitoring Programme (JMP): https://washdata.org/report/jmp-2018-core-questions-household-surveys

1. Zero emission technology refers here to emissions generated by technologies once installed within the targeted premises and operational – it does not refer to life cycle emissions such as upstream emissions associated with the production or delivery of the technology. [↑](#footnote-ref-1)
2. The testing should be undertaken under conditions that are representative of the operation conditions of the project site(s) including feedwater. [↑](#footnote-ref-2)
3. For example notifications from the national authority on health [↑](#footnote-ref-3)
4. <https://www.who.int/water_sanitation_health/water-quality/household/scheme-household-water-treatment/en/> [↑](#footnote-ref-4)
5. The national standard or guideline shall be based on laboratory efficacy testing that, at a minimum, includes quantitative microbial measures of pre- and post-treatment challenge waters that are representative of potential drinking water sources, and that includes measured reductions based on at least one pathogen class (bacteria, viruses, protozoa). “Challenge water” is synonymous with “test water”. This is the experimental water that has been spiked with microbes (a “microbial challenge”) in order to demonstrate the potential for the technology to reduce microbes. [↑](#footnote-ref-5)
6. At the global level, the priority chemical contaminants are arsenic and fluoride. In absence of relevant national standards, compliance with the WHO guideline values (10 μg/L and 1.5 mg/L, respectively) shall be demonstrated. [↑](#footnote-ref-6)
7. As per GS4GG principle and requirements, suppressed demand is allowed only in case of micro & small scale activities. [↑](#footnote-ref-7)
8. The previous version of TDCCTEC Annex 3 assumed that purifying water by boiling would require boiling water for 10 minutes. This assumption is revised to 5 minutes, following WHO technical information that less than 5 minutes of boiling is sufficient for inactivation of enteric bacteria (Technical Brief WHO/FWC/WSH/15.02, 2015). [↑](#footnote-ref-8)
9. This is calculated from the specific heat of water of 4.186 kJ/L °C, the difference between the initial and final water temperature assuming a start at 20 °C and end at 100 °C, evaporation of 1% of water required initially to obtain 1 L boiled water, and ñatent heat of water evaporation of 2260 kJ/L. [↑](#footnote-ref-9)
10. Based on WHO recommendations (Domestic Water Quantity, Service Level and Health, Table 2: Volumes of water required for hydration, WHO 2003). https://www.who.int/water\_sanitation\_health/diseases/WSH03.02.pdf [↑](#footnote-ref-10)
11. Based on WHO recommendations (Domestic Water Quantity, Service Level and Health, Table 2: Volumes of water required for hydration, WHO 2003). https://www.who.int/water\_sanitation\_health/diseases/WSH03.02.pdf [↑](#footnote-ref-11)
12. Guidance on hygiene technologies, training, and surveys appropriate for rural communities and institutions in low-income areas can be found in many publications. Some examples are:

    * “Water, Sanitation, and Hygiene Improvement, Training Package for the Prevention of Diarrheal
    * “Disease, Guide for Training Outreach Workers” USAID Hygiene Improvement Project, 2009
    * “A manual on hygiene promotion”, Water, Environment and Sanitation Technical Guidelines Series No. 6, United Nations Children’s Fund (UNICEF). The London School of Hygiene and Tropical Medicine (LSHTM), 1999
    * “Water, sanitation and hygiene standards for schools in low-cost settings”, edited by John Adams, Jamie Bartram, Yves Chartier, Jackie Sims, World Health Organization, 2009
    * “Safe Water Storage”, Centres for Disease Control and Prevention, 2012

    [↑](#footnote-ref-12)
13. https://washdata.org/report/jmp-2018-core-questions-household-surveys [↑](#footnote-ref-13)
14. Default values endorsed by designated national authorities and approved by the CDM available at <http://cdm.unfccc.int/methodologies/standard_base/index.html>, can be applied, if default value is valid at the time of project submission for design review. [↑](#footnote-ref-14)
15. To ensure conservativeness, participants in a usage survey with technologies in the first year of use (age0-1) must have technologies that have been in use on average longer than 0.5 years. For technologies in the second year of use (age1-2), the usage survey must be conducted with technologies that have been in use on average at least 1.5 years, and so on.

    [↑](#footnote-ref-15)