

**Gold Standard for the Global Goals
Transition Annex**
*(To be used by all GS CDM/VER stand alone projects and PoAs, Micro
Scale stand alone projects and Micro PoAs)*



Version 1 – September 2017

KEY PROJECT INFORMATION

Title of Project/PoA/Activity:	TerraClear Ceramic Water Purifier Project in Lao PDR
GS ID of the project/PoA/activity:	GS2095
GS Version:	GS2.2
Brief description of Project:	<p>In Lao PDR, the surface water is plentiful but frequently it is of very poor quality and not safe to drink especially in rural areas. Around 30% of Lao population lacks access to a source of improved drinking water and are at risk of getting diarrhoea or other water borne diseases. Though, a significant fraction of Lao population treats water preferable by boiling using woody biomass, charcoal etc to make the water safe for drinking. There is a significant fraction of families even cannot afford firewood to boil water, hence are forced to continue to drink unsafe water. TerraClear is a social enterprise, registered as a private limited company under the Ministry of Industry and Commerce. The enterprise is in the business of getting clean water to more people in Laos by selling the Lao Ceramic Water Purifier (CWP) to the population. CWP's help people access safe drinking water, especially in rural areas, reduce time spent provisioning drinking water or collecting wood, reduce costs for families, reduce child and adult morbidity and mortality, improving attendance at school and increased productivity. Ceramic Water Purifiers provide for removal of microorganisms from water by gravity filtration through porous ceramics, with a typical flow rate at production of 1.5 - 3 litres per hour.</p> <p>^[1]^[SEP]Originally TerraClear plans to sell over 100,000 CWP's between 2012 and 2019 but this target seems a bit high as up to mid-2018, the total sale is just about 58,000 filters. It is estimated that by the end of its first crediting period (15th July 2019), the total sale would be about 67,000 CWPs.</p> <p>With the new target, CWPs will provide safe drinking water for potentially more than 0.3 million people, and at the same time reduce the demand for water treatment through boiling water with non- renewable biomass. The CWP's have a useful life of 5 years or more provided proper care and maintenance. The Lao Ceramic Water Purifiers are manufactured locally in Laos and therefore contribute to building a local industry and value added in Laos, as well as creating much needed sustainable jobs and business opportunities in rural areas. The project start date is 06/06/2012. ^[1]^[SEP]With the assistance of carbon finance, TerraClear can become a unique and on-going sustainable enterprise capable of providing emissions-free household water treatment options to rural households, and thereby improve public health, household welfare and economy, as well as contribute to reduced deforestation in Lao PDR.</p>
Project type: Energy/Land Use	Energy Efficiency-Safe water supply project
For Renewable Energy Projects – intention to apply RECs Labels (y/n)	N
GS Stream (CDM/VER):	VER
Scale (large/scale/micro):	Large Scale

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GS Registration Date:	16/07/2014
GS Crediting period start date:	16/07/2012
CDM Registration Date:	NA
CDM Crediting period start date:	NA
Project Developer:	TerraClear Development Co., Ltd.
Project Representative:	Nathan Cole
Project Participants and any communities involved:	<ul style="list-style-type: none"> - TerraClear Development Co., Ltd. - Nexus Carbon for Development
Host Country/Location:	Lao PDR
Methodologies applied:	Technologies and Practices to Displace Decentralized Thermal Energy Consumption – 11/04/2011
SDG Impacts:	<p>1 – SDG1 - Livelihood of the poor – Amount of fuel save after using project technology; percentage of household noted on money save and percentage of household noted on time save after using the project technology.</p> <p>2 – SDG3: Air quality – number of people who notice less smoke in kitchen after having water filter</p> <p>3 – SDG6: Access to safe and affordable drinking water- number of people served with satisfactory level of safe/potable water.</p> <p>4 – SDG8: Quantitative employment and income generation - The number of new job created by the project with safe and healthy work environment.</p> <p>5 –SDG13: Climate change action – Total emission reduction.</p>
Estimated amount of SDG Impact (GSVERs and others)	38,624 VERs/year ¹

¹ TerraClear (2014) PDD 20150227.Clean

NOTE: This Annex shall be used for all PoAs if the sustainable development assessment is conducted at PoA level. In case sustainable development assessment is conducted at activity level, then this Annex shall be filled for each of the activities.

SECTION A Sustainable Development Goals (SDG) outcomes

A.1 Relevant target for each of the three SDGs

>> (Specify the relevant SDG target for at least each of three SDGs addressed by the project. Refer most recent version of targets [here](#). Contribution to SDG 13 is mandatory to be demonstrated for all projects and activities. Contribution to SDG 7 is recommended to be demonstrated for all community service projects and activities)

Based on the most recent UN's SDG (<https://sustainabledevelopment.un.org/sdgs>), SDG goal, target and its corresponding indicators were described. However, it should be noted that not all the indicators are aligned or relevant for carbon project. Therefore, in the following section A.2, proposed indicators for each target will be made.

No	SDGs	Target	UN's SDG indicators ²	Project's SDG indicator
1.	Goal 1. End poverty in all its forms everywhere	1.1 by 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day	1.1.1 Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural).	- The amount of fuel save - Percentage of household noted on money save after using the project technology - Percentage of household noted on time save after using the project technology.
2.	Goal 3. Ensure healthy lives and promote well-being for all at all ages	3.9 by 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination	3.9.1 Mortality rate attributed to household and ambient air pollution.	The number of people who notice less smoke in kitchen after having water filter
3.	Goal 6. Ensure availability and sustainable management of water and sanitation for all	6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services	The number of people served with satisfactory level of safe/potable water
4.	Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	8.5 By 2030 achieve full and productive employment and decent work for all women and men	8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities.	The number of new job created by the project with safe and healthy work environment
5.	Goal 13. Take urgent action to combat climate change and its impacts	13.2 integrate climate change measures into national policies, strategies, and planning	13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national	The total amount of emission reduction per year.

²This indicator is taken from the UN SDG document (<https://sustainabledevelopment.un.org/>) accessed on 26 Mar 2019, some may not be relevant to the project.

			adaptation plan, nationally determined contribution, national communication, biennial update report or other)	
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A.2 Explanation of methodological choices/approaches for estimating the SDG outcome

>> (Explain how the methodological steps in the selected methodology(ies) or proposed approach for calculating baseline and project outcomes are applied. Clearly state which equations will be used in calculating net benefit.)

Except the SDG 13, the selected methodology TPDDTEC Version 1.0 does not provide the approach for calculating the other SDGs outcomes. Below are the proposed approaches for calculating the baseline and project outcomes.

Goal 1 Contribution

The project technology help users to save time spending on fuel collection/purchase and boiling water, and save household expenditure on fuel purchase and expenditure on medicine by reducing the rate of having waterborne disease. The indicator for this SDG1 would be **the amount fuel saves; the percentage of household noted on money save after using the project technology and the percentage of time save after using the project technology** which is relevant to the UN's SDG indicator "1.1.1 Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural).

Estimating baseline outcome:

In the baseline situation, no fuel saves, no percentage of household noted on money save and no percentage of household noted on time save after using the project technology. Therefore, the three baseline outcome benefits are zero.

Estimating project outcome:

In the project situation, the project outcome can be estimated as following:

Project outcome (a) of SDG1 = The amount of fuel saves = $N_{PT,y} * U_{p,y} * WQ_{Passed,y} * B_{save,fuel,y}$ **Equation 1**

Project outcome (b) of SDG1 = % of household noted on money save after using the project technology

Project outcome (c) of SDG1 = % of household noted on time save after using the project technology

Parameters	Description	Source/value
Project outcome (a) of SDG1	Total amount of fuel saves	To be calculated Error! Reference source not found.
$N_{PT,y}$	Cumulative number of sold project technologies (CWP)	Sale database
$U_{p,y}$	Weighted average usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate	Usage survey
$WQ_{Passed,y}$	Water Quality passing rate of water quality standard (WHO standard) per year	Water quality survey test
$B_{save_fuel,y}$	Amount of fuel save per CWP per year (including both wood and wood equivalent converting from charcoal)	To be calculated Equation 2
Project outcome (b) of SDG1	Percentage of house noted on money save after using the project technology	Project survey
Project outcome (c) of SDG1	Percentage of household noted on time save after using the project technology	Project survey

- Calculating $B_{save_fuel,y}$:

$$B_{save_fuel,y} = B_{save_wood,y} + B_{save_charcoal,y} * F_{wood-charcoal}$$

Where:

Parameters	Description	Source/value
$B_{save_wood,y}$	Amount of wood save per CWP per year	To be calculated Equation 3
$B_{save_charcoal,y}$	Amount of charcoal save per CWP per year	To be calculated

Equation 2

Equation 4

$F_{\text{wood-charcoal}}$ Conversion factor from wood to charcoal 6 (AMS II.G)

$$B_{\text{save_wood},y} = B_{b,y,\text{wood}} - B_{p,y,\text{wood}} \quad \text{Equation 3}$$

Parameters	Description	Source/value
$B_{b,y,\text{wood},y}$	Quantity of fuel (wood) consumed in baseline scenario b during year y in tons	Equation 11
$B_{p,y,\text{wood},y}$	Quantity of fuel (wood) consumed in project scenario p during year y, in tons	Equation 16

$$B_{\text{save},y,\text{charcoal}} = B_{b,y,\text{charcoal}} - B_{p,y,\text{charcoal}} \quad \text{Equation 4}$$

Parameters	Description	Source/value
$B_{b,y,\text{charcoal},y}$	Quantity of fuel (charcoal) consumed in baseline scenario b during year y in tons	Equation 13
$B_{p,y,\text{charcoal},y}$	Quantity of fuel (charcoal) consumed in project scenario p during year y, in tons	Equation 18

Estimating net benefit

Net benefit (a) of SDG1 = Project outcome (a) of SDG1 – Baseline outcome (a) of SDG1

Net benefit (b) of SDG1 = Project outcome (b) of SDG1 – Baseline outcome (b) of SDG1

Net benefit (c) of SDG1 = Project outcome (c) of SDG1 – Baseline outcome (c) of SDG1

Goal 3 contribution

The project technology help reducing smoke and dust coming from boiling water with solid biomass. The SDG's indicator of this target is **the number of people who notice less smoke in kitchen after having water filter** which is relevant to the UN's SDG indicator "3.9.1 Mortality rate attributed to household and ambient air pollution".

With the information from the monitoring survey, the Goal 3 will be estimated as following:

Estimating baseline outcome:

In baseline situation, no change in smoke level from boiling water. Therefore, baseline outcome benefit is zero.

Estimating project outcome:

In project situation, the number of people using CWP and note that their kitchen is less smoke could be calculated below:

$$\text{Project outcome of SDG3} = N_{PT,y} * U_{p,y} * WQ_{\text{Passed},y} * N_{p,y} * N_{\text{Less_smoke},y} \quad \text{Equation 5}$$

Parameters	Description	Source/value
Project outcome of SDG3	The number of people who notice less smoke in kitchen after having water filter	To be calculated Equation 5
$N_{PT,y}$	Cumulative number of sold project technologies (CWP)	Sale database
$N_{p,y}$	Number of person.days consuming water supplied by project scenario p through year y	WCFT (Water consumption field Test)
$U_{p,y}$	Weighted average usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate	Usage survey
$WQ_{\text{Passed},y}$	Water Quality passing rate of water quality standard (WHO standard) per year	Water quality survey test
$N_{\text{Less_smoke},y}$	% of households notice that their kitchen is less smoke after using CWP per year	Project survey

Estimating net benefit

The net benefit of SDG3 = Project outcome of SDG3- Baseline outcome of SDG3

Goal 6 contribution

The project technology provides a clean water supply to the users which is contributing to the target 6.1.. The SDG's indicator of this target is **the number of people served with satisfactory level of safe/potable water** which is relevant to the UN's SDG indicator "6.1.1 Proportion of population using safely managed drinking water services"

This indicator is continuously monitored and can be estimated as following:

Estimating baseline outcome:

In baseline situation, no distribution of project technology. Therefore, baseline outcome benefit is zero.

Estimating project outcome:

In the project situation, the number of people served with satisfactory level of safe/potable water can be estimated as following:

$$\text{Project outcome of SDG6} = N_{PT,y} * N_{i,y} * U_{p,y} * WQ_{Passed,y}$$

Equation 6

Where

Parameters	Description	Source/value
Project outcome of SDG6	The number of people served with satisfactory level of safe/potable water	To be calculated Equation 6
$N_{PT,y}$	Cumulative number of sold project technologies (CWP)	Sale database
$N_{i,y}$	Number of person.days consuming water supplied by project scenario p through year y	WCFT (Water consumption field Test)
$U_{p,y}$	Weighted average usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate	Usage survey
$WQ_{Passed,y}$	Water Quality passing rate of water quality standard (WHO standard)	Water quality survey test

Estimating the net benefit

The net benefit of SDG6 = Project outcome of SDG6 – Baseline outcome of SDG6

Goal 8 contribution

Through the project activities, it will create jobs which contribute to the target 8.5 "by 2030 achieve full and productive employment and decent work for all women and men". **The number of new job created by the project with safe and healthy work environment is used as indicator of this SDG8** which is relevant to the UN's SDG indicator "8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities".

Job created by the project activities with records from projects as well as producers/retailers.

Estimating baseline outcome:

In baseline situation, no new job created with safe and healthy work environment. Therefore, baseline outcome benefit is zero.

Estimating project outcome:

In project situation, the number of created jobs with safe and healthy work environment will be recorded by the project implementer as well as producers/retailers:

Project outcome of SDG8 = Number of created jobs with safe and healthy work environment % of worker with salaries paid are at par with wage laws in the host country.*

Goal 13 contribution

According to the selected methodology TPDDTEC Version V1.0, the project will help to save fuel which therefore reduce the GHG emission. **Amount of ER will be calculated according to the selected methodology which is relevant to the UN's SDG indicator SDG13.2.1.** The following section will describe a step by step in estimating ER.

The overall GHG reductions are calculated as follows:

$$ER_y = (BE_{b,y} - PE_{p,y} - LE_{p,y}) * N_{PT,y} * U_{p,y} * WQ_{Passed,y} \quad \text{Equation 7}$$

Where:

Parameters	Description	Source/value
ER _y	Emission reduction	Equation 7
BE _{b,y}	Emissions for baseline scenario b during the year y in tCO ₂ e	Equation 8
PE _{p,y}	Emissions for project scenario p during the year y in tCO ₂ e	Equation 15
LE _{p,y}	Leakage emissions for project scenario p during year y in tCO ₂ e	Monitoring survey
N _{PT,y}	Cumulative number of sold project technologies (CWP)	Sale database
U _{p,y}	Weighted average usage rate for technologies in project scenario p during year y, based on cumulative installation rate and drop off rate	Usage survey
WQ _{Passed,y}	Water Quality passing rate of water quality standard (WHO standard)	Water quality survey test

Baseline Emissions Calculation BE_{b,y}

$$BE_{b,y} = B_{b,wood,y} * ((\int_{NRB,b,y} * EF_{b,wood,CO2}) + EF_{b,wood,nonCO2}) * NCV_{b,wood} + B_{b,charcoal,y} * ((\int_{NRB,b,y} * EF_{b,charcoal,CO2}) + EF_{b,charcoal,nonCO2}) * NCV_{b,charcoal} \quad \text{Equation 8}$$

Where:

Parameters	Description	Source/value
BE _{b,y}	Emissions for baseline scenario b during the year y in tCO ₂ e	Equation 8
B _{b,wood,y}	Quantity of fuel (wood) consumed in baseline scenario b during year y, in tons	To be calculated; Equation 11
B _{b,charcoal,y}	Quantity of fuel (charcoal) consumed in baseline scenario b during year y, in tons	To be calculated; Equation 13
$\int_{NRB,y}$	Fraction of biomass used during year y for the considered scenario that can be established as non-renewable biomass	80% ³
NCV _{b,fuel}	Net calorific value of the fuel that is substituted or reduced	0.015TJ/ton (IPCC default for wood fuel)
EF _{b,wood,CO2}	CO ₂ emissions factor of the fuel (wood) that it substituted or reduced	112 tCO ₂ /TJ (IPCC default value)
EF _{b,charcoal,CO2}	CO ₂ emissions factor of the fuel (charcoal) that it substituted or reduced	112 tCO ₂ /TJ (IPCC default value)
EF _{b,wood,nonCO2}	Non-CO ₂ emissions factor of the fuel that is substituted or reduced	To be calculated; Equation 9
EF _{b,charcoal,nonCO2}	Non-CO ₂ emissions factor of the fuel that is substituted or reduced	To be calculated; Equation 10

- Calculate EF_{b,wood,nonCO2} / EF_{p,wood,nonCO2}

$$EF_{b,wood,nonCO2} / EF_{p,wood,nonCO2} = [\text{Wood Emission CH4 Conversion Factor} * \text{Direct Global Warming Potential Equivalency (CH4 to CO2)}] + [\text{Wood Emission N2O Conversion Factor} * \text{Direct Global Warming Potential Equivalency (N2O to CO2)}] \quad \text{Equation 9}$$

³ See fNRB assessment calculation sheet.

Direct Global Warming Potential Equivalency (N2O to CO2)]

Where

Parameters	Description	Source/value
$EF_{b,wood,nonCO2}$ / $EF_{p,wood,nonCO2}$	Non-CO ₂ emissions factor of wood that is substituted or reduced	Equation 9
	Wood Emission CH4 Conversion Factor	0.30 tCH ₄ /TJ (IPCC default value)
	Direct Global Warming Potential Equivalency (CH4 to CO2)]	25 tCO ₂ /tCH ₄ (IPCC default value)
	Wood Emission N2O Conversion Factor	0.004 tN ₂ O/TJ (IPC default value)
	Direct Global Warming Potential Equivalency (N2O to CO2)]	298 (IPCC default value)

- Calculate $EF_{b,charcoal,nonCO2}$ / $EF_{p,charcoal,nonCO2}$

$$EF_{b,charcoal,nonCO2} / EF_{p,charcoal,nonCO2} = [\text{Charcoal Emission CH4 Conversion Factor} * \text{Direct Global Warming Potential Equivalency (CH4 to CO2)}] + [\text{Charcoal Emission N2O Conversion Factor} * \text{Direct Global Warming Potential Equivalency (N2O to CO2)}] \quad \text{Equation 10}$$

Where

Parameters	Description	Source/value
$EF_{b,charcoal,nonCO2}$ / $EF_{p,charcoal,nonCO2}$	Non-CO ₂ emissions factor of charcoal that is substituted or reduced	Equation 10
	Charcoal Emission CH4 Conversion Factor	0.20 tCH ₄ /TJ (IPCC default value)
	Direct Global Warming Potential Equivalency (CH4 to CO2)]	25 tCO ₂ /tCH ₄ (IPCC default value)
	Charcoal Emission N2O Conversion Factor	0.001 tN ₂ O/TJ (IPC default value)
	Direct Global Warming Potential Equivalency (N2O to CO2)]	298 (IPCC default value)

- Calculate $B_{b,y,wood}$

$$B_{b,y,wood} = (1 - C_i) * N_{i,y} * (W_{b,y,WEIGHTED,wood}) * (Q_{i,y} + Q_{i,rawboil,y}) \quad \text{Equation 11}$$

Where

Parameters	Description	Source/value
$B_{b,y,wood}$	Quantity of wood consumed in baseline scenario p during the year y (tons)	Equation 11
$N_{i,y}$	Number of person.days consuming water supplied by project scenario p through year y	WCFT (Water consumption field Test)
C_i	Portion(%) of users of the project technology j who in the baseline were already consuming safe water without boiling it	30.83% (Calculated ⁴)
$W_{b,y,WEIGHTED,wood}$	Weighted Average of wood quantity in kg required to treat 1 litre of water using technologies representative of baseline scenario b during project year y, as per Baseline Water Boiling Test	To be calculated Equation 12
$Q_{i,y}$	Quantity of clean water boiled in the project scenario p per person per day	WCFT
$Q_{i,rawboil,y}$	Quantity of raw or unsafe water boiled in the baseline scenario b per person per day	WCFT

▪ Calculate $W_{b,y,WEIGHTED,wood}$

$$W_{b,y,WEIGHTED,wood} = (W_{b,y,TRIPOD,wood} * \% \text{ of Tripod Stove Users with wood in the baseline}) + (W_{b,y,TRAD,wood} * \% \text{ of Traditional Stove Users with wood in the baseline}) + (W_{b,y,IMP,wood} * \% \text{ of Improved Stove Users with wood in the baseline}) \quad \text{Equation 12}$$

Where

Parameters	Description	Source/value
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⁴ See ER spread sheet named TC_MP3(2018)_ER_Cals_20181001; Tab: Core Data; Cell F53

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$W_{b,y,WEIGHTED,wood}$	Weighted Average of wood quantity in kg required to treat 1 litre of water using technologies representative of baseline scenario b during project year y, as per Baseline Water Boiling Test	Calculated; Equation 12
$W_{b,y,TRIPOD,wood}$	Quantity of wood in kg required to treat 1 litre of water using Tripod stove in baseline scenario b during project year y,	BWBT (Baseline Water Boiling Test)
$W_{b,y,TRAD,wood}$	Quantity of wood in kg required to treat 1 litre of water using Traditional cookstove in baseline scenario b during project year y	BWBT
$W_{b,y,IMP,wood}$	Quantity of wood in kg required to treat 1 litre of water using Improve cookstove in baseline scenario b during project year y	BWBT

○ **Calculate $B_{b,y,charcoal}$**

$$B_{b,y,charcoal} = (1 - C_j) * N_{i,y} * (W_{b,y,charcoal}) * (Q_{i,y} + Q_{i,rawboil,y}) \quad \text{Equation 13}$$

Where

Parameters	Description	Source/value
$B_{b,y,charcoal}$	Quantity of charcoal consumed in baseline scenario b during the year y (tons)	Equation 13
C_j	Portion(%) of users of the project technology j who in the baseline were already consuming safe water without boiling it	30.83% (Calculated)
$N_{i,y}$	Number of person.days consuming water supplied by baseline scenario b through year y	WCFT
$W_{b,y,WEIGHTED,charcoal}$	Average weighted quantity of charcoal in kg required to treat 1 litre of water using technologies representative of baseline scenario b during project year y,	To be calculated Equation 14
$Q_{i,y}$	Quantity of clean water boiled in the project scenario p per person per day	WCFT
$Q_{i,rawboil,y}$	Quantity of raw or unsafe water boiled in the baseline scenario b per person per day	WCFT

▪ **Calculate $W_{b,y,WEIGHTED,charcoal}$**

$$W_{b,y,WEIGHTED,charcoal} = (W_{b,y,TRIPOD,charcoal} * \% \text{ of Tripod Stove Users with charcoal in the baseline}) + (W_{b,y,TRAD,charcoal} * \% \text{ of Traditional Stove Users with charcoal in the baseline}) + (W_{b,y,IMP,charcoal} * \% \text{ of Improved Stove Users with charcoal in the baseline}) \quad \text{Equation 14}$$

Where

Parameters	Description	Source/value
$W_{b,y,WEIGHTED,charcoal}$	Weighted Average of charcoal quantity in kg required to treat 1 litre of water using technologies representative of baseline scenario b during project year y	Equation 14
$W_{b,y,TRIPOD,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Tripod stove in baseline scenario b during project year y,	BWBT
$W_{b,y,TRAD,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Traditional cookstove in baseline scenario b during project year y	BWBT
$W_{b,y,IMP,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Improve cookstove in baseline scenario b during project year y	BWBT

Emissions for project scenario p during the year y $PE_{p,y}$ (tCO₂e)

$$PE_{p,y} = B_{p,y,wood} * ((\int_{NRB,p,y} * EF_{p,wood,CO2}) + EF_{p,wood,nonCO2}) * NCV_{p,fuel} + B_{p,y,charcoal} * ((\int_{NRB,p,y} * EF_{p,charcoal,CO2}) + EF_{p,charcoal,nonCO2}) * NCV_{p,fuel} \quad \text{Equation 15}$$

Where

Parameters	Description	Source/value
$PE_{p,y}$	Emissions for project scenario p during the year y in tCO ₂ e	Equation 15
$B_{p,y,wood}$	Quantity of fuel (wood) consumed in project scenario p during year y, in tons	To be calculated Equation 16
$B_{p,y,charcoal}$	Quantity of fuel (charcoal) consumed in project scenario p during year y, in tons	Equation 18

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$f_{NRB,y}$	Fraction of biomass used during year y for the considered scenario that can be established as non-renewable biomass	80% ⁵
$EF_{p,wood,CO2}$	CO ₂ emissions factor of the project fuel (wood) This is equal to the baseline fuel EF in projects which use the same fuel,	112 tCO ₂ /TJ (IPCC default value)
$EF_{p,charcoal,CO2}$	CO ₂ emissions factor of the project fuel (charcoal) This is equal to the baseline fuel EF in projects which use the same fuel,	112 tCO ₂ /TJ (IPCC default value)
$EF_{p,wood,nonCO2}$	Non-CO ₂ emissions factor of the project fuel (wood) This is equal to the baseline wood EF in projects which use the same fuel.	To be calculated; Equation 9
$EF_{p,charcoal,nonCO2}$	Non-CO ₂ emissions factor of the project fuel (charcoal) This is equal to the baseline wood EF in projects which use the same fuel.	To be calculated; Equation 10
$NCV_{p,fuel}$	Net calorific value of the project fuel	0.015 TJ/ton, (IPCC default)

○ Calculate $B_{p,y,wood}$

$$B_{p,y,wood} = (1 - C_j) * N_{j,y} * (W_{p,y,WEIGHTED,wood}) * (Q_{p,rawboil,y} + Q_{p,cleanboil,y}) \quad \text{Equation 16}$$

Where

Parameters	Description	Source/value
$B_{p,y,wood}$	Quantity of fuel consumed in project scenario p during the year y (tons)	Equation 16
$N_{j,y}$	Number of person.days consuming water supplied by project scenario p through year y	WCFT
C_j	Portion(%) of users of the project technology j who in the baseline were already consuming safe water without boiling it	30.83% (Calculated)
$W_{p,y,WEIGHTED,wood}$	Weighted Average of wood quantity in kg required to treat 1 litre of water using technologies representative of project scenario p during project year y	To be calculated Equation 17
$Q_{p,rawboil,y}$	Quantity of raw or unsafe water boiled in the project scenario p per person per day	WCFT
$Q_{p,clean,y}$	Quantity of safe water boiled in the project scenario p per person per day	WCFT

▪ Calculate $W_{p,y,wood}$

$$W_{p,y,WEIGHTED,wood} = (W_{p,y,TRIPOD,wood} * \% \text{ of Tripod Stove Users with wood in the baseline}) + (W_{p,y,TRAD,wood} * \% \text{ of Traditional Stove Users with wood in the baseline}) + (W_{p,y,IMP,wood} * \% \text{ of Improved Stove Users with wood in the baseline}) \quad \text{Equation 17}$$

Where

Parameters	Description	Source/value
$W_{p,y,WEIGHTED,wood}$	Weighted Average of wood quantity in kg required to treat 1 litre of water using technologies representative of project scenario p during project year y, as per Baseline Water Boiling Test	Equation 17
$W_{p,y,TRIPOD,wood}$	Quantity of wood in kg required to treat 1 litre of water using Tripod stove in project scenario p during project year y,	BWBT
$W_{p,y,TRAD,wood}$	Quantity of wood in kg required to treat 1 litre of water using Traditional cookstove in project scenario p during project year y	BWBT
$W_{p,y,IMP,wood}$	Quantity of wood in kg required to treat 1 litre of water using Improve cookstove in project scenario p during project year y	BWBT
	% of Tripod Stove Users with wood in the baseline	Baseline study
	% of Traditional Stove Users with wood in the baseline	Baseline study
	% of Improved Stove Users with wood in the baseline	Baseline study

○ Calculate $B_{p,y,charcoal}$

$$B_{p,y,charcoal} = (1 - C_j) * N_{j,y} * (W_{p,y,charcoal}) * (Q_{p,rawboil,y} + Q_{p,cleanboil,y}) \quad \text{Equation 18}$$

Where

Parameters	Description	Source/value
$B_{p,y,charcoal}$	Quantity of charcoal consumed in project scenario p during the year y (tons)	Equation 18

⁵ See fNRB assessment Calculation sheet.

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C_i	Portion(%) of users of the project technology j who in the baseline were already consuming safe water without boiling it	30.83% (Calculated)
$N_{i,y}$	Number of person.days consuming water supplied by project scenario p through year y	WCFT
$W_{p,y,WEIGHTED,charcoal}$	Average weighted quantity of charcoal in kg required to treat 1 litre of water using technologies representative of project scenario p during project year y ,	To be calculated Equation 19
$W_{p,y,TRIPOD,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Tripod stove in project scenario p during project year y ,	BWBT
$W_{p,y,TRAD,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using traditional cookstove in project scenario p during project year y ,	BWBT
$W_{p,y,IMP,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Improved cookstove in project scenario p during project year y ,	BWBT

▪ **Calculate $W_{p,y,WEIGHTED,charcoal}$**

$$W_{p,y,WEIGHTED,charcoal} = (W_{p,y,TRIPOD,charcoal} * \% \text{ of Tripod Stove Users with charcoal in the project}) + (W_{p,y,TRAD,charcoal} * \% \text{ of Traditional Stove Users with charcoal in the project}) + (W_{p,y,IMP,charcoal} * \% \text{ of Improved Stove Users with charcoal in the project}) \quad \text{Equation 19}$$

Where

Parameters	Description	Source/value
$W_{b,y,WEIGHTED,charcoal}$	Weighted Average of charcoal quantity in kg required to treat 1 litre of water using technologies representative of project scenario b during project year y , as per Baseline Water Boiling Test	Calculated Equation 19
$W_{b,y,TRIPOD,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Tripod stove in project scenario p during project year y ,	BWBT
$W_{b,y,TRAD,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Traditional cookstove in project scenario p during project year y	BWBT
$W_{b,y,IMP,charcoal}$	Quantity of charcoal in kg required to treat 1 litre of water using Improve cookstove in project scenario p during project year y	BWBT

Net benefit of SDG13 = Amount of ER

A.3 Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

(Include a compilation of information on the data and parameters that are not monitored during the crediting period but are determined before the design certification and remain fixed throughout the crediting period like IPCC defaults and other methodology defaults. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator	SDG13.2.1
Data/parameter	EF _{b,wood,CO2} / EF _{p,wood,CO2}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor arising from use of fuels in baseline/project scenario
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 2, Stationary Combustion, Table 2.5
Value(s) applied	112
Choice of data or Measurement methods and procedures	Determined as per IPCC default figures
Purpose of data	Calculation of baseline and project emissions
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	EF _{b,wood,nonCO2} / EF _{p,wood,nonCO2}
Unit	tCO _{2e} /TJ
Description	Non-CO ₂ emission factor arising from use of fuels in baseline/project scenario

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Source of data	IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 2, Stationary Combustion, Table 2.5
Value(s) applied	8.69 ((CH ₄ =0.3*GWP 25) + (N ₂ O=0.004*GWP 298))
Choice of data or Measurement methods and procedures	Determined as per IPCC default figures
Purpose of data	Calculation of baseline and project emissions
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	EF _{b,charcoal,CO2} / EF _{p,charcoal,CO2}
Unit	tCO ₂ /TJ
Description	CO ₂ emission factor arising from use of fuels in baseline scenario
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 2, Stationary Combustion, Table 2.5
Value(s) applied	112
Choice of data or Measurement methods and procedures	Determined as per IPCC default figures
Purpose of data	Calculation of baseline and project emissions
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	EF _{b,charcoal,non-CO2} / EF _{p,charcoal,non-CO2}
Unit	tCO _{2e} /TJ
Description	Non-CO ₂ emission factor arising from use of fuels in baseline scenario
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 2, Stationary Combustion, Table 2.5
Value(s) applied	5.30 ((CH ₄ =0.2*GWP 25) + (N ₂ O=0.001*GWP 298))
Choice of data or Measurement methods and procedures	Determined as per IPCC default figures
Purpose of data	Calculation of baseline and project emissions
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	NCV _{b,wood} / NCV _{p,wood}
Unit	TJ/ton
Description	Net calorific value of the fuels used in baseline/ project scenario
Source of data	IPCC (2006) "IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 1, Introduction, Table 1.2, p 1.19
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	Determined as per IPCC default figures
Purpose of data	Calculation of baseline and project emissions

Additional comment	
Relevant SDG Indicator	SDG13.2.1
Data/parameter	$NCV_{b,charcoal}$ / $NCV_{p,charcoal}$
Unit	TJ/ton
Description	Net calorific value of the fuels used in baseline/ project scenario
Source of data	IPCC (2006) "IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy, Chapter 1, Introduction, Table 1.2, p 1.19
Value(s) applied	0.0295
Choice of data or Measurement methods and procedures	Determined as per IPCC default figures
Purpose of data	Calculation of baseline and project emissions
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	C_i
Unit	Percentage (%)
Description	Portion of users of project safe water supply who were in the baseline using a non-boiling safe water supply
Source of data	<p>C_i is the portion (%) of users of the project technology who in the baseline were already consuming safe water and without boiling it, so it could be calculated as below:</p> <p>$C_i = (\% \text{ HHs access to improved source}) * (\% \text{ HHs access to improved source and NOT boiling water})$</p> <p>Please find the detail calculation in tab "Core Data", Cell F49 of the ER spreadsheet. Inputs for calculation are sources from the Lao Social Indicator Survey (available at http://countryoffice.unfpa.org/lao/drive/LSISReportEnglish2011-2012.pdf).</p>
Value(s) applied	30.83%
Choice of data or Measurement methods and procedures	See the additional comment below.
Purpose of data	Calculation of baseline and project emissions

Additional comment	<p>In the registered PDD, the unit of this parameter is “fraction”, however to be consistent with the applied methodology TPDDTEC version 1, page 36, the unit has been changed to percentage (%).</p> <p>Also, in registered PDD, the applied C_i is 10.2%, however during the GS registration review, there was a FAR: “The parameter C_i will be updated at the time of first issuance following the TAC decision in this regard”.</p> <p>In April 2015, TAC clarified the interpretation of C_i parameter for TPDDTEC methodology. The TAC is of the opinion that the PP shall demonstrate that improved water sources are not safe water sources to exclude them from C_i. The water quality of the improved water sources should be established as unsafe through testing over a representative period of time or relevant third-party studies for project area.</p> <p>Following the guidance from TAC, the PP has updated C_i according to the Lao Social Indicator Survey (available at http://countryoffice.unfpa.org/lao/drive/LSISReportEnglish2011-2012.pdf). This survey was carried out in 2011-2012 by the Ministry of Health (MoH) and Lao Statistics Bureau (LSB) in collaboration with line ministries, therefore it is defined as “relevant third-party studies for the project area”.</p> <p>According to this report, the percentage of households (HHs) using improved source is 69.9%.</p> <p>Besides, among the households could access to improved source, the rate of HHs boiling water is 55.9%, so the rate of HHs does not boil water is $100\% - 55.9\% = 44.1\%$</p> <p>C_i is the portion (%) of users of the project technology who in the baseline were already consuming safe water and without boiling it, so it could be calculated as below:</p> <p>$C_i = (\% \text{ HHs access to improved source}) * (\% \text{ HHs access to improved source and NOT boiling water})$</p> <p>Or $C_i = 69.9\% * 44.1\% = 30.8\%$</p> <p>The applied C_i therefore conservative comparing to the value in the registered PDD.</p>
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Relevant SDG Indicator	SDG13.2.1
Data/parameter	$f_{NRB,b,y}$
Unit	Fraction
Description	Non-renewability of woody biomass fuel in year y in baseline scenario
Source of data	fNRB Assessment Calculations
Value(s) applied	0.80
Choice of data or Measurement methods and procedures	NA
Purpose of data	Baseline/ Project emission calculations
Additional comment	The $f_{NRB,i,y}$ value is updated in the first monitoring period and same is used in the second monitoring period. The detail calculation of this figure can be found in the fNRB report named “TC_fNRB_updated 20150808”.

Relevant SDG Indicator	SDG13.2.1
Data/parameter	$W_{b,y, \text{WEIGHTED,wood}} / W_{p,y, \text{WEIGHTED,wood}}$
Unit	Kg/litre
Description	Quantity of wood fuel or fossil fuel required to boil 1 litre of water using technologies representative of the baseline/project scenario p during project year y
Source of data	Baseline water boiling test and baseline survey report
Value(s) applied	0.251

Choice of data or Measurement methods and procedures	$W_{b,y,WEIGHTED,wood} = (W_{b,y,TRIPOD,wood} * \% \text{ of Tripod Stove Users with wood in the baseline})$ $+ (W_{b,y,TRAD,wood} * \% \text{ of Trad Stove Users with wood in the baseline})$ $+ (W_{b,y,IMP,wood} * \% \text{ of Impro Stove Users with wood in the baseline})$ $= (0.280 * 78\% + 0.214 * 9\% + 0.220 * 6.0\%)$
Purpose of data	Baseline/Project emission
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	$W_{b,y,WEIGHTED,Charcoal} / W_{p,y,WEIGHTED,Charcoal}$
Unit	Kg/litre
Description	Quantity of charcoal required to boil 1 litre of water using technologies representative of the baseline/project scenario p during project year y
Source of data	Baseline Water Boiling Test report and Baseline Survey report
Value(s) applied	0.007
Choice of data or Measurement methods and procedures	$W_{b,y,WEIGHTED,charcoal} = (W_{b,y,TRIPOD,charcoal} * \% \text{ of Tripod Stove Users with charcoal in the baseline})$ $+ (W_{b,y,TRAD,charcoal} * \% \text{ of Trad Stove Users with charcoal in the baseline})$ $+ (W_{b,y,IMP,charcoal} * \% \text{ of Impro Stove Users with charcoal in the baseline})$ $= (0 + 0.105 * 0.06 + 0.102 * 0.01)$
Purpose of data	Baseline/Project emission
Additional comment	

Relevant SDG Indicator	SDG1.1.1, SDG13.2.1
Data/parameter	$F_{wood-charcoal}$
Unit	Kg/litre
Description	Wood to charcoal conversion factor of 6 kg of firewood (wet basis) per kg of charcoal (dry basis).
Source of data	AMS II.G "Energy efficiency measures in thermal applications of non-renewable biomass"
Value(s) applied	6 (default factor)
Choice of data or Measurement methods and procedures	N/A
Purpose of data	Baseline/Project emission and the above associated SDG contribution
Additional comment	

SECTION B Safeguarding Principles Assessment

B.1 Analysis of social, economic and environmental impacts

>> (Refer the GS4GG Safeguarding Principles and Requirements document for detailed guidance on carrying out this assessment. The assessment of following Safeguarding Principles Assessment is required to be carried out by GS Version 2.0, 2.1 and 2.2 projects. GS v1.0 projects will carry out assessment of all the safeguarding principles discussed in the GS4GG Safeguarding Principles and Requirements document.)

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
3.2 Gender Equality and Women's Rights	<p>1. The Project shall complete the following gender assessment questions to inform Requirements 3-2, below:</p> <p>a) Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits?</p> <p>b) Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?</p> <p>c) Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?</p> <p>d) Does the Project take into account gender roles and the abilities of women or men to benefit</p>	NO	<p>1. The gender assessment are below:</p> <p>a) The Project does not reduce or put at risk women's access to or control of resources, entitlements and benefits as it would bring benefits on time and resources saving as well as health benefit to women who are mainly using cookstove for boiling water.</p> <p>b) Project does not adversely affect men and women in marginalised or vulnerable communities</p> <p>c) Project has taken into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities by welcoming all comments/feedback from users and stakeholders. Anyone could contact the project via the publicable telephone number or email address whenever is suitable for them.</p>	

	<p>from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?</p> <p>e) Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?</p> <p>f) Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?</p> <p>g) Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?</p> <p>h) Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?</p> <p>2. The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women. Specifically, this shall include (not exhaustive):</p> <p>a) Sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking.</p> <p>b) Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls.</p>		<p>d) The Project has taken into account gender roles and the abilities of women or men to benefit from the Project's activities. Anyone could use project's technology (CWP) by purchasing it.</p> <p>e) Project design contribute to a decrease in women's workload by reducing time from collecting fuel as well as water boiling time. Then it allow them to engaging in other activities which could generate an extra income.</p> <p>f) The Project does not reproduce or further deepen discrimination against women based on gender. In fact, the project technology brings more benefits to women who are mostly boiling water with their baseline stove for drinking.</p> <p>g) The Project does not limit women's ability to use, develop and protect natural resources as it would help women to use natural resources (fuel wood and other type of fuel) effectively. They would drink water directly from the filter instead of boiling it. This would contribute to the natural resource conservation.</p> <p>h) The proposed Project does not expose women and girls to further risks or hazards. The project technology brings more benefits to women and girls who are mostly using stoves for daily boiling water.</p> <p>2. The Project does not directly or indirectly lead to/contribute to adverse impacts on gender</p>	
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	<p>c) Restriction of women’s rights or access to resources (natural or economic).</p> <p>d) Recognise women’s ownership rights regardless of marital status – adopt project measures where possible to support to women’s access to inherit and own land, homes, and other assets or natural resources.</p> <p>3. Projects shall apply the principles of non-discrimination, equal treatment, and equal pay for equal work, specifically:</p> <p>a) Where appropriate for the implementation of a Project, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities.</p> <p>b) Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status.</p> <p>c) Ensure that these conditions do not limit the access of women or men, as the case may be, to Project participation and benefits.</p> <p>4. The Project shall refer to the country’s national gender strategy or equivalent national commitment to aid in assessing gender risks.</p>		<p>equality and/or the situation of women including:</p> <p>a) Sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking.</p> <p>b) Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls.</p> <p>c) Restriction of women’s rights or access to resources (natural or economic).</p> <p>d) Recognise women’s ownership rights regardless of marital status – adopt project measures where possible to support to women’s access to inherit and own land, homes, and other assets or natural resources.</p> <p>3. In 1974, Lao PDR ratified the UN ‘International Convention on the Elimination of All Forms of Racial Discrimination’⁶. Lao PDR has also ratified the ILO Convention C100 (Equal Remuneration Convention, 1951) and C111 (Discrimination Employment and Occupation) Conventions, 1958)⁷. The Lao constitution (article 8) declares that ‘the State pursues the policy of promoting unity and equality among all ethnic groups’⁸. Article 46 of the Lao PDR Labor Law (2006) states, “The government is entitled to determine the minimum level of salary or wages in each period for each area of work”</p>	
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⁶ <http://www1.umn.edu/humanrts/research/ratification-laos.html>

⁷ <http://www.ilo.org/public/english/standards/relm/gb/docs/gb282/pdf/lils-7.pdf>

⁸ http://www.na.gov.la/index.php?option=com_content&view=article&id=27%3Achapter-i-the-political-regime&catid=35%3Aconstitution-of-lao-pdr&Itemid=51&lang=en

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			<p>Projects has been applying the principles of non-discrimination, equal treatment, and equal pay for equal work, specifically:</p> <ul style="list-style-type: none"> a) Where appropriate for the implementation of a Project, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities. b) Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. c) Ensure that these conditions do not limit the access of women or men, as the case may be, to Project participation and benefits. <p>4. Articles 22 and 24 in the constitution affirm the equal rights for women and men. It states that ‘Lao citizens of both sexes shall enjoy equal rights in political, economic, cultural, social and family affairs.’ Article 22 embodies the principle of equality between women and men in all the legal documents and regulations. The Constitution gives the mandate of women’s advancement to the Lao Women’s Union (Article 7) ⁹. With its Staff Employment Policies and Guideline, TerraClear has committed to respect the worker rights and gender associated laws.</p>	
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⁹ <http://siteresources.worldbank.org/INTLAOPRD/Resources/Lao-Gender-Report-2005.pdf>

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<p>3.4.3 Land Tenure and Other Rights</p>	<p>1. Does the Project require any change to land tenure arrangements and/or other rights?</p> <p>2. For Projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership?</p> <p>Examples include, but are not limited to water access rights, community-based property rights and customary rights.</p>	<p>No</p>	<p>1. Article 16 and 17 in the Lao PDR constitution declares that the State protects and promotes all forms of property rights, such as the rights of possession, use, and disposition¹⁰. The proposed project does not violate this principle.</p> <p>Water Purifier will be installed directly at the user households on a voluntary basis and does not require any change to land tenure arrangements and/ or other rights.</p> <p>2. The project does not lead to a change in settlement in any way. No one will need to move/change their living conditions/situations by using the project technology. The project does not involve and is not complicit with involuntary settlements.</p>	
<p>3.6.2 Negative Economic Consequences</p>	<p>Requirement</p> <p>1. The Project Developer shall demonstrate the financial sustainability of the Projects implemented, also including those that will occur beyond the Project Certification period.</p> <p>2. The Projects shall consider economic impacts and demonstrate a consideration of potential risks to the local economy and how these have been taken into account in Project design, implementation, operation and after the Project. Particular focus shall be given to vulnerable and marginalised social groups in targeted communities and that benefits are socially-inclusive and sustainable.</p>		<p>1. The project is running on a commercial base. With the current market demand (annual sale of 12,000 CWP) and the exiting sale network, it is expected that the project will continue to operate beyond the project certification period.</p> <p>2. Project creates jobs for local people in various positions ranging from office staffs, sales and CWP manufacturing workers. In average about 70 staffs were employed by the project. To avoid any potential risks to the local economy, the project is committed to fully comply with the Lao's Labour law as mentioned in its Staff Employment Policies and Guideline.</p>	

¹⁰http://www.na.gov.la/index.php?option=com_content&view=article&id=28%3Achapter-ii-the-socio-economic-system&catid=35%3Aconstitution-of-lao-pdr&Itemid=52&lang=en

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4.1.1 Emissions	Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	The project technology help to save fuel by encouraging people to drinking water from the filter directly without boiling it. Therefore, reduce the GHG emission compare to the baseline scenario. Please refer to the above Section A.2.	
4.1.2 Energy Supply	Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project technolgy do not use local grid or power supply that provide to other local users. The project user same type but less amount of fuel resource as in the baseline situation.	
4.2.1 Impact on natural water patterns and flow	Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	The project technology doesn't not involve or affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity.	
4.2.1 Erosion and/or water body stability	1. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? If 'Yes' or 'Potentially' proceed to question 2. 2. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	No	1. Project does not directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion	
4.3.1 Landscape modification and soil	Does the Project involve the use of land and soil for production of crops or other products?	Yes	Under the Environmental Protection Law of Lao (2013), TerraClear project is required to comply with environmental regulations. The project has followed and fulfilled the national environmental requirements as proven by its Environmental Compliance Certificate (ECC) obtained and renewal every year since 2016 ¹¹ .	

¹¹ TC_ECC_Approval(2016)_EN, TC_ECC_Approval(2017)_EN, TC_ECC_Approval(2018)_EN

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			<p>Project involve the use of land and soil (clay) for production of ceramic water filter pot. The Department of Planning and Investment monitors the activities of TerraClear Production and submits activities to the various departments according to jurisdiction. TerraClear reports to each department throughout the year; no less than once per year each department is part of an onsite inspection and to review current and new activities. The DPI has reviewed the use of clay and consulted with the Department of Mining and Energy and determined that TerraClear's limited use of low-value resource is not under regulation.</p> <p>In addition, the Department of Land Usage and Department of Natural Resources and Environment are two monitoring bodies that review TerraClear's clay usage annually. These departments must approve of the clay dig site and resource usage as it impacts local environment, society and natural resources in order for the reviewal of business licensing each year. There is no separate approval outside of the all-department authorization and their comments/technical notes.</p>	
4.3.2 Vulnerability to Natural Disaster	Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No		
4.3.3 Genetic Resources	Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development)?	No		

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4.3.4 Release of pollutants	Could the Project potentially result in the release of pollutants to the environment?	No		
4.3.5 Hazardous and Non-hazardous Waste	Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	Potentially	<p>The project may involve in the application of silver colloid and limited quantity of testing reagents in the production of water filter.</p> <p>The Department of Natural Resources and Environment along with a minor role from the Department of Science and Technology monitor all chemicals/materials used in the production of water filters. They require safe disposal of any laboratory chemicals or production chemicals according to the Material Safety Data Sheet (MSDs) which is kept on site.</p> <p>TerraClear has followed and fulfilled the national environmental requirements as proven by its Environmental Compliance Certificate (ECC) obtained and renewal every year since 2016¹².</p>	<p>Per requirement of department of Natural Resource and Environment, TerraClear monitors chemicals include colloidal silver infused into the ceramic filters and limited quantity of testing reagents.</p> <p>The silver colloid has no waste by product on site or otherwise as it is fully applied and permanently adhered to the ceramic filter body.</p>
4.3.6 Pesticides and fertilizers	Will the Project involve the application of pesticides and/or fertilisers?	No		
4.3.7 Harvesting of forests	Will the Project involve the harvesting of forests?	No		
4.3.8 Food	Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No		
4.3.9 Animal Husbandry	Will the Project involve animal husbandry?	No		

¹² TC_ECC_Approval(2016)_EN, TC_ECC_Approval(2017)_EN, TC_ECC_Approval(2018)_EN

SECTION C Monitoring plan

C.1 Data and parameters to be monitored

(Include specific information on how the data and parameters that need to be monitored in the selected methodology(ies) or proposed approaches or as per mitigation measures from safeguarding principles assessment or as per feedback from stakeholder consultations would actually be collected during monitoring. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1
Data / Parameter	Net benefit (a) of SDG1
Unit	tons
Description	Amount of fuel save
Source of data	Calculated
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Please refer to section A2 for the detail calculation method
Monitoring frequency	Annual
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate SDG1 contribution
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1, SDG3.9.1, SDG6.1.1, SDG13.2.1
Data / Parameter	Np,y
Unit	Number
Description	Cumulative number of sold project technologies (CWP)
Source of data	Sale database
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	The sale is recorded in spreadsheet with the number of CWPs sold and its corresponding invoice number.
Monitoring frequency	Continue
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate the above associated SDGs contribution
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1, SDG3.9.1, SDG6.1.1, SDG13.2.1
Data / Parameter	Up,y
Unit	%
Description	Usage rate of CWP in operation (weight average)
Source of data	Annual usage survey
Value(s) applied	Will be reported for each monitoring period

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Measurement methods and procedures	Usage survey will be conducted in line with the TPDDTEC V1.0
Monitoring frequency	Annual
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate the above associated SDGs contribution
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1, SDG3.9.1, SDG6.1.1, SDG13.2.1
Data / Parameter	$WQ_{passed,y}$
Unit	%
Description	Average water quality passing rate of water quality standard (WHO standard)
Source of data	Water quality survey test
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	
Monitoring frequency	Quarterly
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate the above associated SDGs contribution
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1, SDG13.2.1
Data / Parameter	$B_{save_fuel,y}$
Unit	Tonne/CWP/year
Description	Average fuel saves per CWP per year
Source of data	Calculated
Value(s) applied	Will be estimated for each monitoring period
Measurement methods and procedures	Please refer to section A2 for the detail calculation method
Monitoring frequency	Annual
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate the above associated SDGs contribution
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1
Data / Parameter	Net benefit (b) of SDG1
Unit	%
Description	Percentage of household noted on money save after using the project technology
Source of data	Project survey
Value(s) applied	Will be reported for each monitoring period

Measurement methods and procedures	Project survey will be conducted in line with the TPDDTEC V1.0		
Monitoring frequency	Annual		
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.		
Purpose of data	To estimate SDG1 contribution		
Additional comment	Question and analytical method will be added to the project survey to capture this parameter.		
	Does water filter save you money?	# HH	Percentage
	Yes		
	No		
	Total Responses		

Relevant SDG Indicator/Safeguarding Principle	SDG1.1.1		
Data / Parameter	Net benefit (c) of SDG 1		
Unit	%		
Description	Percentage of household noted on time save after using the project technology		
Source of data	Project survey		
Value(s) applied	Will be reported for each monitoring period		
Measurement methods and procedures	Project survey will be conducted in line with the TPDDTEC V1.0		
Monitoring frequency	Annual		
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.		
Purpose of data	To estimate SDG1 contribution		
Additional comment	Questions and analytical method will be added to the project survey to capture this parameter.		
	Are you saving time collecting or purchasing fuel (With Filter)?	# HH	Percentage
	Yes		
	No		
	Total Responses		
	Are you saving time not boiling water (With Filter)	# HH	Percentage
	Yes		
	No		
	Total Responses		

Relevant SDG Indicator /Safeguarding Principle	SDG3.9.1		
Data/parameter	Net benefit of SDG3		
Unit	-		
Description	Number of people who notice less smoke in their kitchen after using CWP.		
Source of data	Project (monitoring) survey result		
Value(s) applied	Will be reported for each monitoring period		
Monitoring frequency	Annual		

QA/QC procedures	The result will be cross-checked by the record of total distributed CWPs and the average number of people per household.																				
Choice of data or Measurement methods and procedures	Project (monitoring) survey to be conducted according to the monitoring plan Please see the above Section A.2 for the detail calculation																				
Purpose of data	To demonstrate contribution to SDG3																				
Additional comment	Two questions were added to the monitoring survey questionnaire to capture this parameter:																				
	<table border="1"> <thead> <tr> <th>Question 1. Since purchasing the Filter, do you still boil water for drinking?</th> <th># HH</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Yes, Boil More Water</td> <td></td> <td></td> </tr> <tr> <td>Yes, Boil the same amount</td> <td></td> <td></td> </tr> <tr> <td>Yes, Boil Less Water</td> <td></td> <td></td> </tr> <tr> <td>No, Do not boil anymore</td> <td></td> <td></td> </tr> <tr> <td>Total response</td> <td></td> <td></td> </tr> </tbody> </table>			Question 1. Since purchasing the Filter, do you still boil water for drinking?	# HH	Percentage	Yes, Boil More Water			Yes, Boil the same amount			Yes, Boil Less Water			No, Do not boil anymore			Total response		
Question 1. Since purchasing the Filter, do you still boil water for drinking?	# HH	Percentage																			
Yes, Boil More Water																					
Yes, Boil the same amount																					
Yes, Boil Less Water																					
No, Do not boil anymore																					
Total response																					
	<table border="1"> <thead> <tr> <th>Question 2. Has the reduction in boiling affected the amount of smoke in the cooking area?</th> <th># HH</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>More smoke</td> <td></td> <td></td> </tr> <tr> <td>Less smoke</td> <td></td> <td></td> </tr> <tr> <td>No change</td> <td></td> <td></td> </tr> <tr> <td>Total response</td> <td></td> <td></td> </tr> </tbody> </table>			Question 2. Has the reduction in boiling affected the amount of smoke in the cooking area?	# HH	Percentage	More smoke			Less smoke			No change			Total response					
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More smoke																					
Less smoke																					
No change																					
Total response																					

Relevant SDG Indicator/Safeguarding Principle	SDG3.9.1, SDG6.1.1, SDG13.2.1
Data / Parameter	$N_{p,y}$
Unit	Person.days
Description	Number of person.days consuming water supplied by project scenario p through year y
Source of data	Water consumption field test (WCFT)
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Water consumption field test will be conducted in line with the registered methodology TPDDTEC V1.0.
Monitoring frequency	Every two year
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate the above associated SDGs contribution
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG3.9.1
Data / Parameter	$N_{Less_smoke,y}$
Unit	%
Description	Percentage of households notice that their kitchen is less smoke after using CWP per year
Source of data	Project survey

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Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Project survey will be conducted in line with the TPDDTEC V1.0
Monitoring frequency	Annual
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To estimate SDG3 contribution
Additional comment	

Relevant SDG Indicator /Safeguarding Principle	SDG6.1.1
Data/parameter	Net benefit of SDG6
Unit	-
Description	Number of people served with satisfactory level of safe/potable
Source of data	Sale database record
Value(s) applied	Will be reported for each monitoring period
Monitoring frequency	Annual
QA/QC procedures	The result will be cross-checked by the record of total distributed CWPs.
Choice of data or Measurement methods and procedures	Sale database will be recorded and maintained according to the monitoring plan. Please see the above Section A.2 for the detail calculation.
Purpose of data	To demonstrate contribution to SDG6
Additional comment	

Relevant SDG Indicator /Safeguarding Principle	SDG8.5.1
Data/parameter	Net benefit of SDG8
Unit	-
Description	Number of people employed by project activity with safe and healthy working environment
Source of data	Project (monitoring) survey/Staff or employment report from monitoring report
Value(s) applied	Will be reported for each monitoring period
Monitoring frequency	Annual
QA/QC procedures	The result will be cross-checked by the record of from project participant as well as producers/retailers. It will be monitored to ensure that the salaries paid are in line with Laos minimum wage.
Choice of data or Measurement methods and procedures	<ul style="list-style-type: none"> - Project (monitoring) survey/ Staff or employment report from project to be conducted according to the monitoring plan. Please see the above Section A.2 for the detail calculation - The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments. The project shall develop, implement, monitor and review safe work systems on an ongoing basis. - The project complies with environmental regulations: The project shall implement, monitor and review regulatory compliance on an ongoing basis.
Purpose of data	To demonstrate contribution to SDG8
Additional comment	

Relevant SDG Indicator	SDG13.2.1
Data/parameter	Net benefit of SDG 13
Unit	tCO ₂
Description	Total emission reduction from project devices
Source of data	Calculated
Value(s) applied	38,624 GS VERs/year (Original data from PDD)
Monitoring frequency	Annual
QA/QC procedures	The result will be cross-checked by the record of project implementers and monitoring survey
Choice of data or Measurement methods and procedures	Amount of ER will be calculated according to the selected methodology. Please see the above Section A.2 for the detail calculation.
Purpose of data	To demonstrate contribution to SDG13
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG13.2.1
Data / Parameter	LE _{p,y}
Unit	%
Description	Leakage emissions for project scenario p during year y in tCO ₂ e
Source of data	Record of energy use at the production site
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Energy consumption is recorded in spreadsheet Please see the above Section A.2 for the detail calculation.
Monitoring frequency	Every monitoring period
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To demonstrate contribution to SDG13
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG13.2.1
Data / Parameter	Q _{p,y}
Unit	Litres per person per day
Description	Quantity of safe water in litres consumed in the project scenario p and supplied by project technology through year y.
Source of data	Water consumption field test
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Water consumption field test will be conducted in line with the registered methodology TPDDTEC V1.0.
Monitoring frequency	Every two year
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.

Purpose of data	To demonstrate contribution to SDG13
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG13.2.1
Data / Parameter	Qp,rawboil,y
Unit	Litre per person per day
Description	Quantity of raw water that is still boiled after installation of the water treatment technology
Source of data	Water consumption field test (WCFT)
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Water consumption field test will be conducted in line with the registered methodology TPDDTEC V1.0.
Monitoring frequency	Every two year
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To demonstrate contribution to SDG13
Additional comment	

Relevant SDG Indicator/Safeguarding Principle	SDG13.2.1
Data / Parameter	Qp,cleanboil,y
Unit	Litre per person per day
Description	Quantity of safe water (treated, or from safe supply) water boiled in the that is still boiled after installation of the water treatment technology
Source of data	Water consumption field test (WCFT)
Value(s) applied	Will be reported for each monitoring period
Measurement methods and procedures	Water consumption field test will be conducted in line with the registered methodology TPDDTEC V1.0.
Monitoring frequency	Every two year
QA/QC procedures	Transparent data analysis and reporting. The data will be analysed in the monitoring report and raw data will be available on request to the VVB.
Purpose of data	To demonstrate contribution to SDG13
Additional comment	

C.1.1 Other elements of monitoring plan (if applicable)

>>

SECTION D Duration and crediting period

D.1 Duration of project

D.1.1 Start date of project

>> (Specify start date of the project, in the format of DD/MM/YYYY)

06/06/2012

D.1.2 Expected operational lifetime of project

>> (Specify in years)

D.2 GS Crediting period of the project/activity

D.2.1 Start date of the ongoing GS crediting period

>> *(Specify in dd/mm/yyyy)*

16/07/2012

D.2.3 End date of the ongoing GS crediting period

>> *(Specify in dd/mm/yyyy)*

15/07/2019

D.2.3 Total length of the GS crediting periods

>> *(Specify the total length of crediting period in years in line with GS4GG Principles & Requirements or relevant activity requirements)*

The crediting period is 7 years twice renewable. This is the first crediting period. (16/07/2012 to 15/07/2019 (first crediting period); 16/07/2019 to 15/07/2026 (second crediting period); 16/07/2026 to 15/07/2033 (third crediting period)).

SECTION E Stacking of new assets

>> *(If project is looking to stack new assets over GSVERs the required information to demonstrate compliance to the relevant methodology, product specification and additionality shall be presented in the new PDD template launched with GS4GG)*

Appendix 1. Contact information of project participants

Organization name	TerraClear
Registration number with relevant authority	
Street/P.O. Box	Kuwahlavong Road, Lak 2
Building	
City	Viengxai, Tha Kaek
State/Region	Khammouen
Postcode	
Country	Lao PDR
Telephone	+856 51-251-302
Fax	+856 51-251-318
E-mail	ncole@laowater.com
Website	http://www.laowater.com
Contact person	Nathan Cole
Title	Mr.
Salutation	
Last name	Cole
Middle name	
First name	Nathan
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	