

## Gold standard for the global goals Monitoring report



June 2017, version 1

|                                                                                      |                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Title of the project</b>                                                          | GS1247 Improved Kitchen Regimes (Multi-Country PoA)<br>VPAs:<br>GS 5339-44 Kasungu Boreholes, Malawi                                                                                               |
| <b>Gold Standard project id</b>                                                      | GS 5339, GS 5340, GS 5341, GS 5342,<br>GS 5343, GS 5344                                                                                                                                            |
| <b>Version number of the monitoring report</b>                                       | 1                                                                                                                                                                                                  |
| <b>Completion date of the monitoring report</b>                                      | 04/12/2018                                                                                                                                                                                         |
| <b>Date of project design certification</b>                                          | 06/11/2017                                                                                                                                                                                         |
| <b>Start date of crediting period</b>                                                | GS 5339 – 11/02/2016<br>GS 5340 – 12/02/2016<br>GS 5341 – 10/07/2016<br>GS 5342 – 03/09/2016<br>GS 5343 – 21/09/2016<br>GS 5344 – 27/09/2016                                                       |
| <b>Duration of this monitoring period</b>                                            | All projects: (01/01/2018) to (31/12/2018)                                                                                                                                                         |
| <b>Duration of previous monitoring period</b>                                        | GS5339: 10/02/2016-31/12/2017<br>GS5340: 11/02/2016-31/12/2017<br>GS5341: 09/07/2016-31/12/2017<br>GS5342: 02/09/2016-31/12/2017<br>GS5343: 20/09/2016-31/12/2017<br>GS5344: 26/09/2016-31/12/2017 |
| <b>Project representative(s)</b>                                                     | Tom Urry                                                                                                                                                                                           |
| <b>Host Country</b>                                                                  | Malawi                                                                                                                                                                                             |
| <b>Certification pathway (activity certification/impact certification)</b>           | Project Certification                                                                                                                                                                              |
| <b>SDG Contributions targeted (as per approved PDD)</b>                              | SDG 3 – Good Health and Well-Being<br>SDG 5 – Gender Equality<br>SDG 6 – Clean Water and Sanitation<br>SDG 13 – Climate Action                                                                     |
| <b>Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)</b> | GSVER                                                                                                                                                                                              |
| <b>Selected methodology(ies)</b>                                                     | Technologies and Practices to Displace Decentralised Thermal Energy Consumption (TPDDTEC) v1                                                                                                       |
| <b>Estimated amount of annual average certified SDG impact (as per approved PDD)</b> | Not supplied in the PDD as the project began prior to transition.                                                                                                                                  |

## Gold Standard<sup>®</sup>

|                                                                                                              |                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period</b> | SDG 3 – 20,192 additional persons with access to safe water<br>SDG 5 - at least 0.5 hours per trip per household time saved<br>SDG 6 – 18,357 additional persons with provision to safe water<br>SDG 13 - 60,000 tCO <sub>2</sub> e per year |
|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## SECTION A. Description of project

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

In Malawi, approximately half the population is without access to clean water and therefore relies on unprotected water sources such as hand dug open wells and rivers for drinking water, which are often contaminated by bacteria and pollutants. One of the key factors influencing water scarcity is the absence of borehole maintenance programs and the high costs of implementation. According to the Rural Water Supply Network over 40% of Malawi's boreholes are non-functioning, thus there is a clear need for improved intervention.

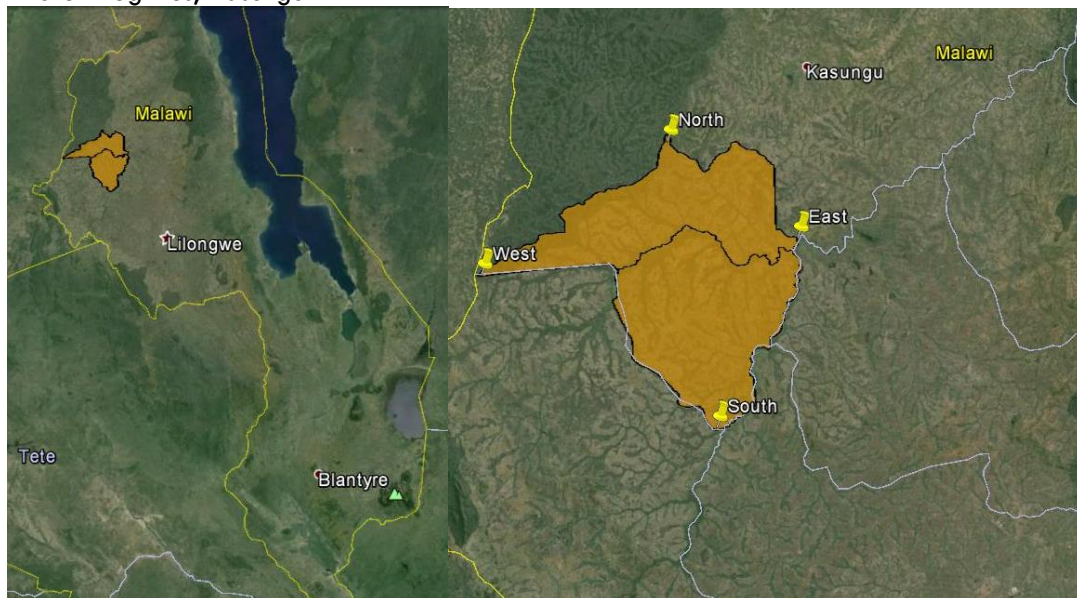
As part of our GS1247 Improved Kitchen Regimes Multi-Country PoA, CO2balance UK Ltd and United Purpose (formerly known as Concern Universal) have developed pure water supply projects in the Republic of Malawi. This project has been registered under the Gold Standard Foundation Programme of Activities (thereafter GS PoA) using the methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption. v1.0" (TPDDTEC).

In this project co2balance and United Purpose have provided safe drinking water to communities and reduced the need to boil water as a means of purification through the repair of damaged boreholes and the drilling of additional new boreholes. By providing safe water, the project ensures that households consume less firewood during the process of water purification and as a result there has been a reduction of greenhouse gas emissions from the combustion process. The carbon credits earned through the reduction of emissions have been used, in part, to fund and create a self-sustaining maintenance program.

In total 76 boreholes were drilled or rehabilitated across VPAs in Kasungu between the 10th February 2016 and 2nd October 2016.

### A.2. Location of project

The location of the project activity is within the administrative boundary of Kasungu District in the central region of Malawi. Below is the geographic reference to allow unique identification of the VPA Improved Kitchen Regimes, Kasungu.



|       | Latitude    | Longitude  |
|-------|-------------|------------|
| North | -13.206318° | 33.702993° |
| South | -13.716648° | 33.578534° |
| East  | -13.505547° | 33.825191° |
| West  | -13.480841° | 33.409259° |

## **A.3. Reference of applied methodology**

Technologies and Practices to Displace Decentralised Thermal Energy Consumption v1

## **A.4. Crediting period of project**

Each VPA has a crediting period of 7 years, twice renewable. The crediting period start date for each VPA is:

GS 5339 – 11/02/2016

GS 5340 – 12/02/2016

GS 5341 – 10/07/2016

GS 5342 – 03/09/2016

GS 5343 – 21/09/2016

GS 5344 – 27/09/2016

## **SECTION B. Implementation of project**

### **B.1. Description of implemented project**

The projects are now in their second monitoring period. Relationships with the project partners is strong and usage of the project technology remains at 100%, offering benefits to all stakeholders. No delays or deviations to the projects have occurred.

### **B.2. Post-registration changes**

#### **B.2.1. Temporary deviations from Certified Key Project Information, Project Design Document, Monitoring & Reporting Plan, applied methodology or applied standardized baseline**

No temporary deviations have been made.

#### **B.2.2. Corrections**

No corrections have been applied.

#### **B.2.3. Changes to start date of crediting period**

No changes have been made to the start date of the crediting periods.

#### **B.2.4. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline**

No permanent changes have been made.

#### **B.2.5. Changes to project design of approved project**

No changes have been made to the project design.

## SECTION C. Description of monitoring system applied by the project

All surveys are administered by trained CO2balance staff and partner United Purpose that are local to the area and conversant in the local dialects to ensure that the responses are consistent and not biased by any regional language barriers. Each participant is provided with a briefing on the purpose of the survey and is assured that no individual names are used in the analysis.

The results of the surveys are collated in excel spreadsheets and stored on a central server in an electronic format which is sent to the UK head office for data analysis. The documentation procedure that co2balance has devised ensures a minimum chance of original data being lost – all original copies of our project documentation are retained in the United Purpose Malawi office and are available scanned upon request of the UK team.

In accordance with the Gold Standard methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, the survey samples are randomly selected from the borehole user record. Using an online research randomizer, each borehole user, selected from the total user list for all VPAs, is assigned a unique random number which is then sorted in order from lowest to highest. The first n number of HHs are selected for the survey.

The size of the random sample is dependent on the methodological requirements and variance of the parameter being monitored to ensure the parameters measured satisfy 90/10 precision (90% confidence interval and 10% margin of error). The random sample is reselected for every monitoring period to ensure the selection remains random.

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante or at renewal of crediting period

|                                                      |                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Relevant SDG Indicator                               | SDG 3 (Good Health and Wellbeing)<br>SDG 6 (Clean Water and Sanitation)                                                                                                                                                                                                                                                                                            |
| Data/parameter:                                      | Py                                                                                                                                                                                                                                                                                                                                                                 |
| Unit                                                 | Number                                                                                                                                                                                                                                                                                                                                                             |
| Description                                          | Number of persons consuming safe water                                                                                                                                                                                                                                                                                                                             |
| Source of data                                       | Baseline survey                                                                                                                                                                                                                                                                                                                                                    |
| Value(s) applied)                                    | GS5339: 3463<br>GS5340: 3448<br>GS5341: 3443<br>GS5342: 3273<br>GS5343: 3326<br>GS5344: 3239                                                                                                                                                                                                                                                                       |
| Choice of data or measurement methods and procedures | Sum of the total number of people using each borehole in the project. The total number of households using each borehole will be established through lists supplied by the water resource committee and/or community group and/or district officer responsible for that borehole. Using this method, the total number of people using each borehole will be known. |
| Purpose of data                                      | Determination of number of persons using safe water                                                                                                                                                                                                                                                                                                                |
| Additional comments                                  |                                                                                                                                                                                                                                                                                                                                                                    |

|                                                             |                                                                                                                                     |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                               | SDG 3 (Good Health and Wellbeing)<br>SDG 6 (Clean Water and Sanitation)                                                             |
| <b>Data/parameter:</b>                                      | $C_i$                                                                                                                               |
| <b>Unit</b>                                                 | Percentage                                                                                                                          |
| <b>Description</b>                                          | Portion of users of project safe water supply who were already in baseline using a non-boiling safe water supply                    |
| <b>Source of data</b>                                       | Baseline project survey                                                                                                             |
| <b>Value(s) applied</b>                                     | 0.09091                                                                                                                             |
| <b>Choice of data or measurement methods and procedures</b> | Established through questions in the baseline on a representative sample of the end users                                           |
| <b>Purpose of data</b>                                      | To calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario |
| <b>Additional comments</b>                                  |                                                                                                                                     |

|                                                             |                                                                                                                                                       |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                               | SDG 3 (Good Health and Wellbeing)                                                                                                                     |
| <b>Data/parameter:</b>                                      | $P_{b, \text{boil}}$                                                                                                                                  |
| <b>Unit</b>                                                 | Percentage                                                                                                                                            |
| <b>Description</b>                                          | Percentage of persons boiling water in the baseline                                                                                                   |
| <b>Source of data</b>                                       | Baseline survey                                                                                                                                       |
| <b>Value(s) applied</b>                                     | 0.0385                                                                                                                                                |
| <b>Choice of data or measurement methods and procedures</b> | The percentage of people stating that they used to boil their water for purification in the baseline scenario, evaluated through the baseline survey. |
| <b>Purpose of data</b>                                      | Determination of number of persons boiling water in the baseline                                                                                      |
| <b>Additional comments</b>                                  |                                                                                                                                                       |

|                                                             |                                                                                                                             |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                               | SDG 13                                                                                                                      |
| <b>Data/parameter:</b>                                      | $EF_{\text{fuel}}$                                                                                                          |
| <b>Unit</b>                                                 | tCO <sub>2</sub> /TJ                                                                                                        |
| <b>Description</b>                                          | CO <sub>2</sub> emission factor arising from use of wood-fuel in baseline scenario (includes production, transport and use) |
| <b>Source of data</b>                                       | Calculated from IPCC defaults                                                                                               |
| <b>Value(s) applied</b>                                     | 112                                                                                                                         |
| <b>Choice of data or measurement methods and procedures</b> | IPCC defaults                                                                                                               |
| <b>Purpose of data</b>                                      | $EF_{\text{fuel}}$ was used in accordance with the methodology as a methodology default value                               |
| <b>Additional comments</b>                                  |                                                                                                                             |

|                                                      |                                                                                                                                                                                                                                                             |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                        | SDG 13                                                                                                                                                                                                                                                      |
| <b>Data/parameter:</b>                               | EF <sub>fuel</sub> (non-CO <sub>2</sub> )                                                                                                                                                                                                                   |
| Unit                                                 | tCO <sub>2</sub> /TJ                                                                                                                                                                                                                                        |
| Description                                          | Non-CO <sub>2</sub> emission factor arising from use of wood-fuel in baseline scenario (includes production, transport and use)                                                                                                                             |
| Source of data                                       | Calculated from IPCC defaults<br><a href="http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14">http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html#table-2-14</a>                                                |
| Value(s) applied)                                    | 8.692                                                                                                                                                                                                                                                       |
| Choice of data or measurement methods and procedures | IPCC defaults                                                                                                                                                                                                                                               |
| Purpose of data                                      | EF <sub>fuel</sub> was used in accordance with the methodology as a methodology default value. For project activities starting from 01/01/2013, the most update figure of 8.692 is used for this parameter as per guidance from the GS TAC and GS Guidance. |
| Additional comments                                  |                                                                                                                                                                                                                                                             |

|                                                      |                                                                                                 |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                        | SDG 13                                                                                          |
| <b>Data/parameter:</b>                               | NCV <sub>fuel</sub>                                                                             |
| Unit                                                 | TJ/ton                                                                                          |
| Description                                          | Net calorific value of the fuels used in the baseline.                                          |
| Source of data                                       | IPCC defaults                                                                                   |
| Value(s) applied)                                    | 0.0156                                                                                          |
| Choice of data or measurement methods and procedures | IPCC defaults                                                                                   |
| Purpose of data                                      | NCV <sub>fuel</sub> was used in accordance with the methodology as a methodology default value. |
| Additional comments                                  |                                                                                                 |

|                                                      |                                                                                                                                                           |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                        | SDG 13                                                                                                                                                    |
| <b>Data/parameter:</b>                               | fNRB                                                                                                                                                      |
| Unit                                                 | Non-Renewability Fraction                                                                                                                                 |
| Description                                          | Non-renewability status of woody biomass fuel in scenario i during year y                                                                                 |
| Source of data                                       | The NRB assessment has been carried out by an independent consultant in accordance with the methodology.                                                  |
| Value(s) applied)                                    | 0.92                                                                                                                                                      |
| Choice of data or measurement methods and procedures | NRB assessment                                                                                                                                            |
| Purpose of data                                      | Quantitative NRB assessment was used in accordance with the methodology. NRB is fixed for the project unless reassessed in future as per PP requirements. |
| Additional comments                                  |                                                                                                                                                           |



|                                                             |                                                                       |
|-------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                               | SDG 13                                                                |
| <b>Data/parameter:</b>                                      | Wb,y                                                                  |
| <b>Unit</b>                                                 | T/L                                                                   |
| <b>Description</b>                                          | Mass of woody biomass combusted in the baseline per household per day |
| <b>Source of data</b>                                       | Kitchen Performance Tests                                             |
| <b>Value(s) applied</b>                                     | 0.000900352                                                           |
| <b>Choice of data or measurement methods and procedures</b> | Measured by baseline KPT                                              |
| <b>Purpose of data</b>                                      | To measure wood saved as a result of the project                      |
| <b>Additional comments</b>                                  |                                                                       |

## D.2. Data and parameters monitored

|                                               |                                                                                                                                                                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>                 | SDG 3 (Good Health and Wellbeing)                                                                                                                                                            |
| <b>Data/parameter:</b>                        | P <sub>safe</sub>                                                                                                                                                                            |
| <b>Unit</b>                                   | Number                                                                                                                                                                                       |
| <b>Description</b>                            | Number of additional persons having access to safe water in the project activity compared to the baseline scenario.                                                                          |
| <b>Measured/calculated/default</b>            | Calculated                                                                                                                                                                                   |
| <b>Source of data</b>                         | Household lists; Usage Survey                                                                                                                                                                |
| <b>Value(s) of monitored parameter</b>        | GS5339: 3027<br>GS5340: 3014<br>GS5341: 3010<br>GS5342: 2861<br>GS5343: 2907<br>GS5344: 2831                                                                                                 |
| <b>Monitoring equipment</b>                   | N/A                                                                                                                                                                                          |
| <b>Measuring/reading/recording frequency:</b> | Annually                                                                                                                                                                                     |
| <b>Calculation method (if applicable):</b>    | Review the number of people using the borehole according to the household lists for each VPA and multiply by the usage rate to calculate the number of people now using a safe water source. |
| <b>QA/QC procedures:</b>                      | Guidance provided to projects team by senior project staff                                                                                                                                   |
| <b>Purpose of data:</b>                       | To calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario                                                          |
| <b>Additional comments:</b>                   |                                                                                                                                                                                              |

|                                        |                                                                                                                                                  |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>          | SDG 5                                                                                                                                            |
| <b>Data/parameter:</b>                 | TR <sub>y</sub>                                                                                                                                  |
| Unit                                   | Percentage                                                                                                                                       |
| Description                            | Total reduction time spent collecting water for project activity in year y (%)                                                                   |
| Measured/calculated/default            | Calculated                                                                                                                                       |
| Source of data                         | Project Survey                                                                                                                                   |
| Value(s) of monitored parameter        | 0.51                                                                                                                                             |
| Monitoring equipment                   | N/A                                                                                                                                              |
| Measuring/reading/recording frequency: | Annually                                                                                                                                         |
| Calculation method (if applicable):    | Calculate the average amount of time spent collecting water in the project scenario and compare to the pre-project scenario                      |
| QA/QC procedures:                      | Guidance provided to projects team by senior project staff                                                                                       |
| Purpose of data:                       | To quantify whether the project has contributed to a reduction in the amount of time spent collecting water compared to the pre-project scenario |
| Additional comments:                   |                                                                                                                                                  |

|                                        |                                                                                                                                                                                                                                                            |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Relevant SDG Indicator</b>          | SDG 5                                                                                                                                                                                                                                                      |
| <b>Data/parameter:</b>                 | Usage of time saved on water collection                                                                                                                                                                                                                    |
| Unit                                   | Percentage                                                                                                                                                                                                                                                 |
| Description                            | Uses of time saved which was previously spent on water collection                                                                                                                                                                                          |
| Measured/calculated/default            | Measured                                                                                                                                                                                                                                                   |
| Source of data                         | Project Survey                                                                                                                                                                                                                                             |
| Value(s) of monitored parameter        | 1. (Unpaid) Domestic work (including cooking and caring for family members): 69%<br>2. Income generating activities: 13%<br>3. Religious activities: 7%<br>4. Social and leisure activities: 8%<br>5. Education and training: 1%<br>6. Other (Specify): 0% |
| Monitoring equipment                   | N/A                                                                                                                                                                                                                                                        |
| Measuring/reading/recording frequency: | Annually                                                                                                                                                                                                                                                   |
| Calculation method (if applicable):    | Ask users how time saved on water collection in the project scenario, as opposed to the baseline scenario, is now being used                                                                                                                               |
| QA/QC procedures:                      | Guidance provided to projects team by senior project staff                                                                                                                                                                                                 |
| Purpose of data:                       | To quantify how time which was previously spent on water collection is now being used.                                                                                                                                                                     |
| Additional comments:                   |                                                                                                                                                                                                                                                            |

|                                        |                                                                                                                                                                                              |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Relevant SDG Indicator                 | SDG 6                                                                                                                                                                                        |
| Data/parameter:                        | P <sub>access</sub>                                                                                                                                                                          |
| Unit                                   | Number                                                                                                                                                                                       |
| Description                            | Number of additional persons having access to safe water in the project activity compared to the baseline scenario.                                                                          |
| Measured/calculated/default            | Calculated                                                                                                                                                                                   |
| Source of data                         | Household lists; Usage Survey                                                                                                                                                                |
| Value(s) of monitored parameter        | GS5339: 3148<br>GS5340: 3135<br>GS5341: 3130<br>GS5342: 2975<br>GS5343: 3024<br>GS5344: 2945                                                                                                 |
| Monitoring equipment                   | N/A                                                                                                                                                                                          |
| Measuring/reading/recording frequency: | Annually                                                                                                                                                                                     |
| Calculation method (if applicable):    | Review the number of people using the borehole according to the household lists for each VPA and multiply by the usage rate to calculate the number of people now using a safe water source. |
| QA/QC procedures:                      | Guidance provided to projects team by senior project staff                                                                                                                                   |
| Purpose of data:                       | To calculate the additional number of persons having access to safe water in the project activity compared to the baseline scenario                                                          |
| Additional comments:                   |                                                                                                                                                                                              |

### D.3. Implementation of sampling plan

The project proponent has elected to cross-sample technologies across all its homogenous borehole VPAs located within the districts of Dowa and Kasungu. In this monitoring period, cross-sampling was conducted across VPAs 91-104 and 112-116. The sample number of boreholes randomly monitored from the borehole list is in accordance with a 90/30 confidence/precision. The number of households randomly sampled from the user lists of the selected boreholes, is in accordance with the minimum sample size requirements in the Gold Standard methodology for each individual survey and test. Water Quality tests are conducted for each verification as supporting documentation to confirm that each borehole is functioning. Cross sampling is applied to the following surveys;

- Project surveys – Completed annually
- Usage Surveys – Completed annually
- Water Consumption Field Tests – Completed biennially

The surveys have been conducted to ensure that they are within the end date of the respective monitoring periods for each VPA and they satisfy the sampling requirements in the methodology. As required for the WCFT, sampling complies with 90/10 precision (90% confidence interval and 10% margin of error), and the sample group is reselected for every monitoring period using an online research randomizer to ensure random selection.

### E.1. Calculation of baseline value or estimation of baseline situation of each SDG outcome

#### SDG 3 - Good Health and Wellbeing

Number of persons having access to safe water in the baseline scenario = 0.

#### SDG 5 - Gender Equality

Baseline time spent collecting firewood per household per day (hours) =  $T_{b,y} = 0.81$

#### SDG 6 (Clean Water and Sanitation)

The number of persons having access to safe water in the baseline scenario = 0.

### E.2. Calculation of project value or estimation of project situation of each SDG outcome

#### SDG 3 - Good Health and Wellbeing

The outcome for SDG 3 is quantified as the additional number of persons consuming safe water and sanitation education in the project activity, compared to the baseline scenario ( $P_{safe}$ ).

$$P_{safe} = P_y * (1 - C_j) * (1 - P_{b,boil})$$

Where:

|              |                                                                                                                                                       |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| $P_{safe}$   | Number of additional persons having access to safe water in the project activity compared to the baseline scenario.                                   |
| $P_y$        | Number of persons having access to safe water in the project activity.                                                                                |
| $C_j$        | Expressed as a percentage, the portion of users of the project technology j who in the baseline were already consuming safe water without boiling it. |
| $P_{b,boil}$ | Percentage of persons boiling water for purification in the baseline scenario.                                                                        |

#### SDG 5 - Gender Equality

The outcome for SDG 5 is quantified as the overall reduction in time spent collecting water by the project activity, compared to the baseline scenario ( $TR_y$ ).

$$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$$

Where:

|           |                                                                                |
|-----------|--------------------------------------------------------------------------------|
| $TR_y$    | Total reduction time spent collecting water for project activity in year y (%) |
| $T_{b,y}$ | Time spent collecting water per household per day prior to project (hours)     |
| $T_{p,y}$ | Time spent collecting water per household per day in project (hours)           |

## SDG 6 (Clean Water and Sanitation)

The outcome for SDG 6 is quantified as the additional number of persons having access to safe water in the project activity compared to the baseline scenario ( $P_{\text{access}}$ ).

$$P_{\text{access}} = P_y * (1 - C_j) * U_{p,y}$$

Where:

- $P_{\text{access}}$  Number of additional persons having access to safe water in the project activity compared to the baseline scenario.
- $P_y$  Number of persons having access to safe water in the project activity.
- $C_j$  Expressed as a percentage, the portion of users of the project technology  $j$  who in the baseline were already consuming safe water without boiling it.
- $U_{p,y}$  Usage rate in project scenario  $p$  during year  $y$

## SDG 13 (Climate Action)

The outcome for SDG 6 is quantified as the total CO<sub>2</sub>-e emissions reduced by the project and are the indicator to demonstrate that the project has raised capacity for effective climate change-related planning and management. See fixed parameters in section D.1.

### E.3. Calculation of net benefits as difference of baseline and project values or direct calculation for each SDG outcome

#### SDG 3 - Good Health and Wellbeing

$$P_{\text{safe}} = P_y * (1 - C_j) * (1 - P_{b,\text{boil}})$$

$$\text{GS5339: } 3463 * (1 - 0.09) * (1 - 0.0385) = 3027$$

$$\text{GS5340: } 3448 * (1 - 0.09) * (1 - 0.0385) = 3014$$

$$\text{GS5341: } 3443 * (1 - 0.09) * (1 - 0.0385) = 3010$$

$$\text{GS5342: } 3273 * (1 - 0.09) * (1 - 0.0385) = 2861$$

$$\text{GS5343: } 3326 * (1 - 0.09) * (1 - 0.0385) = 2907$$

$$\text{GS5344: } 3239 * (1 - 0.09) * (1 - 0.0385) = 2831$$

#### SDG 5 - Gender Equality

$$TR_y = (T_{b,y} - T_{p,y}) / T_{b,y}$$

$$\text{All VPAs: } (0.81 - 0.4) / 0.81 = 0.51$$

## SDG 6 (Clean Water and Sanitation)

$$P_{\text{access}} = P_y * (1 - C_j) * U_{p,y}$$

$$\text{GS5339: } 3463 * (1 - 0.09) * 1 = 3148$$

$$\text{GS5340: } 3448 * (1 - 0.09) * 1 = 3135$$

$$\text{GS5341: } 3443 * (1 - 0.09) * 1 = 3130$$

$$\text{GS5342: } 3273 * (1 - 0.09) * 1 = 2975$$

$$\text{GS5343: } 3326 * (1 - 0.09) * 1 = 3024$$

$$\text{GS5344: } 3239 * (1 - 0.09) * 1 = 2945$$

Emission Reductions Calculations per VPA:

| GS5339                                |                              |          |                      |
|---------------------------------------|------------------------------|----------|----------------------|
| NRB                                   | NRB                          | 0.92000  | Fraction             |
| Emissions factor fuel (co2)           | EF <sub>b,fuel,co2</sub>     | 112      | tCO <sub>2</sub> /TJ |
| Emissions factor fuel (non-co2)       | EF <sub>b,fuel,non-co2</sub> | 8.692    | TCO <sub>2</sub> /TJ |
| Net calorific value of fuel           | NCV <sub>b,fuel</sub>        | 0.0156   | TJ/T                 |
| Quantity of fuel consumed at baseline | B <sub>b,y</sub>             | 7,759.37 | T                    |
| Baseline emissions per year           | BE <sub>b,y</sub>            | 13,525   | tCO <sub>2</sub> /y  |
| Project emissions per year            | PE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Usage rate                            | U <sub>p,y</sub>             | 1        | Fraction             |
| Leakage                               | LE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Percentage of suppressed demand users |                              | 96.15%   |                      |
| Overall ERs                           |                              | 13,005   | tCO <sub>2</sub> -e  |
| Overall ERs (capped)                  |                              | 10,000   | tCO <sub>2</sub> -e  |

| GS5340                                |                              |          |                      |
|---------------------------------------|------------------------------|----------|----------------------|
| NRB                                   | NRB                          | 0.92000  | Fraction             |
| Emissions factor fuel (co2)           | EF <sub>b,fuel,co2</sub>     | 112      | tCO <sub>2</sub> /TJ |
| Emissions factor fuel (non-co2)       | EF <sub>b,fuel,non-co2</sub> | 8.692    | TCO <sub>2</sub> /TJ |
| Net calorific value of fuel           | NCV <sub>b,fuel</sub>        | 0.0156   | TJ/T                 |
| Quantity of fuel consumed at baseline | B <sub>b,y</sub>             | 7,725.76 | T                    |
| Baseline emissions per year           | BE <sub>b,y</sub>            | 13,466   | tCO <sub>2</sub> /y  |
| Project emissions per year            | PE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Usage rate                            | U <sub>p,y</sub>             | 1        | Fraction             |
| Leakage                               | LE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Percentage of suppressed demand users |                              | 96.15%   |                      |
| Overall ERs                           |                              | 12,948   | tCO <sub>2</sub> -e  |
| Overall ERs (capped)                  |                              | 10,000   | tCO <sub>2</sub> -e  |

| GS5341                                |                              |          |                      |
|---------------------------------------|------------------------------|----------|----------------------|
| NRB                                   | NRB                          | 0.92000  | Fraction             |
| Emissions factor fuel (co2)           | EF <sub>b,fuel,co2</sub>     | 112      | tCO <sub>2</sub> /TJ |
| Emissions factor fuel (non-co2)       | EF <sub>b,fuel,non-co2</sub> | 8.692    | TCO <sub>2</sub> /TJ |
| Net calorific value of fuel           | NCV <sub>b,fuel</sub>        | 0.0156   | TJ/T                 |
| Quantity of fuel consumed at baseline | B <sub>b,y</sub>             | 7,714.55 | T                    |
| Baseline emissions per year           | BE <sub>b,y</sub>            | 13,447   | tCO <sub>2</sub> /y  |
| Project emissions per year            | PE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Usage rate                            | U <sub>p,y</sub>             | 1        | Fraction             |
| Leakage                               | LE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Percentage of suppressed demand users |                              | 96.15%   |                      |
| Overall ERs                           |                              | 12,929   | tCO <sub>2</sub> -e  |
| Overall ERs (capped)                  |                              | 10,000   | tCO <sub>2</sub> -e  |

| GS5342                                |                              |          |                      |
|---------------------------------------|------------------------------|----------|----------------------|
| NRB                                   | NRB                          | 0.92000  | Fraction             |
| Emissions factor fuel (co2)           | EF <sub>b,fuel,co2</sub>     | 112      | tCO <sub>2</sub> /TJ |
| Emissions factor fuel (non-co2)       | EF <sub>b,fuel,non-co2</sub> | 8.692    | Tco <sub>2</sub> /TJ |
| Net calorific value of fuel           | NCV <sub>b,fuel</sub>        | 0.0156   | TJ/T                 |
| Quantity of fuel consumed at baseline | B <sub>b,y</sub>             | 7,333.64 | T                    |
| Baseline emissions per year           | BE <sub>b,y</sub>            | 12,783   | tCO <sub>2</sub> /y  |
| Project emissions per year            | PE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Usage rate                            | U <sub>p,y</sub>             | 1        | Fraction             |
| Leakage                               | LE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Percentage of suppressed demand users |                              | 96.15%   |                      |
| Overall ERs                           |                              | 12,291   | tCO <sub>2</sub> -e  |
| Overall ERs (capped)                  |                              | 10,000   | tCO <sub>2</sub> -e  |

| GS5343                                |                              |             |                      |
|---------------------------------------|------------------------------|-------------|----------------------|
| NRB                                   | NRB                          | 0.92000     | Fraction             |
| Emissions factor fuel (co2)           | EF <sub>b,fuel,co2</sub>     | 112         | tCO <sub>2</sub> /TJ |
| Emissions factor fuel (non-co2)       | EF <sub>b,fuel,non-co2</sub> | 8.692       | Tco <sub>2</sub> /TJ |
| Net calorific value of fuel           | NCV <sub>b,fuel</sub>        | 0.0156      | TJ/T                 |
| Quantity of fuel consumed at baseline | B <sub>b,y</sub>             | 7452.396441 | T                    |
| Baseline emissions per year           | BE <sub>b,y</sub>            | 12,990      | tCO <sub>2</sub> /y  |
| Project emissions per year            | PE <sub>p,y</sub>            | 0           | tCO <sub>2</sub> /y  |
| Usage rate                            | U <sub>p,y</sub>             | 1           | Fraction             |
| Leakage                               | LE <sub>p,y</sub>            | 0           | tCO <sub>2</sub> /y  |
| Percentage of suppressed demand users |                              | 96.15%      |                      |
| Overall ERs                           |                              | 12,490      | tCO <sub>2</sub> -e  |
| Overall ERs (capped)                  |                              | 10,000      | tCO <sub>2</sub> -e  |

| GS5344                                |                              |          |                      |
|---------------------------------------|------------------------------|----------|----------------------|
| NRB                                   | NRB                          | 0.92000  | Fraction             |
| Emissions factor fuel (co2)           | EF <sub>b,fuel,co2</sub>     | 112      | tCO <sub>2</sub> /TJ |
| Emissions factor fuel (non-co2)       | EF <sub>b,fuel,non-co2</sub> | 8.692    | Tco <sub>2</sub> /TJ |
| Net calorific value of fuel           | NCV <sub>b,fuel</sub>        | 0.0156   | TJ/T                 |
| Quantity of fuel consumed at baseline | B <sub>b,y</sub>             | 7,257.46 | T                    |
| Baseline emissions per year           | BE <sub>b,y</sub>            | 12,650   | tCO <sub>2</sub> /y  |
| Project emissions per year            | PE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Usage rate                            | U <sub>p,y</sub>             | 1        | Fraction             |
| Leakage                               | LE <sub>p,y</sub>            | 0        | tCO <sub>2</sub> /y  |
| Percentage of suppressed demand users |                              | 96.15%   |                      |
| Overall ERs                           |                              | 12,163   | tCO <sub>2</sub> -e  |
| Overall ERs (capped)                  |                              | 10,000   | tCO <sub>2</sub> -e  |

## E.4. Summary of ex-post values of each SDG outcome for the current monitoring period

| Item          | Baseline estimate                                                                                                                            | Project estimate                                                                                                                  | Net benefit                                                                                                                                  |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SDG 3</b>  | 0 people consuming safe water                                                                                                                | People consuming safe water:<br>GS5339: 3463<br>GS5340: 3448<br>GS5341: 3443<br>GS5342: 3273<br>GS5343: 3326<br>GS5344: 3239      | Additional people consuming safe water:<br>GS5339: 3463<br>GS5340: 3448<br>GS5341: 3443<br>GS5342: 3273<br>GS5343: 3326<br>GS5344: 3239      |
| <b>SDG 5</b>  | 0.81 hours spent collecting firewood per HH per day                                                                                          | 0.4 hours spent collecting firewood per HH per day                                                                                | 51.6% reduction in time spent collecting firewood                                                                                            |
| <b>SDG 6</b>  | 0 people with access to safe water                                                                                                           | People with access to safe water:<br>GS5339: 3148<br>GS5340: 3135<br>GS5341: 3130<br>GS5342: 2975<br>GS5343: 3024<br>GS5344: 2945 | Additional people with access to safe water:<br>GS5339: 3148<br>GS5340: 3135<br>GS5341: 3130<br>GS5342: 2975<br>GS5343: 3024<br>GS5344: 2945 |
| <b>SDG 13</b> | GS5339: 10,000 tCO2e<br>GS5340: 10,000 tCO2e<br>GS5341: 10,000 tCO2e<br>GS5342: 10,000 tCO2e<br>GS5343: 10,000 tCO2e<br>GS5344: 10,000 tCO2e | GS5339: 0 tCO2e<br>GS5340: 0 tCO2e<br>GS5341: 0 tCO2e<br>GS5342: 0 tCO2e<br>GS5343: 0 tCO2e<br>GS5344: 0 tCO2e                    | GS5339: 10,000 ERs<br>GS5340: 10,000 ERs<br>GS5341: 10,000 ERs<br>GS5342: 10,000 ERs<br>GS5343: 10,000 ERs<br>GS5344: 10,000 ERs             |



## E.5. Comparison of actual value of outcomes with estimates in approved PDD

Estimates not given in PDD as the project began prior to transition.

| Item  | Values estimated in ex ante calculation of approved PDD | Actual values achieved during this monitoring period |
|-------|---------------------------------------------------------|------------------------------------------------------|
| SDG A | n/a                                                     | n/a                                                  |
| SDG B | n/a                                                     | n/a                                                  |
| SDG C | n/a                                                     | n/a                                                  |

## E.6. Remarks on difference from estimated value in approved PDD

As above, estimates not stated in PDD as the project began prior to transition.

## SECTION F. Stakeholder inputs and legal disputes

### F.1. List all inputs/grievances which have been received for the project during the monitoring period together with their respective answers/actions

>> No input or grievances were received in this monitoring period.

### F.2. List all inputs/grievances from previous monitoring period where follow up action is to be verified in this monitoring period

>> No input or grievances were received in previous monitoring periods.

### F.3. Provide details of any legal contest or dispute that has arisen with the project during the monitoring period

No legal contests or disputes have arisen during the monitoring period.