# Gold standard for the global goals
# Monitoring report


June 2017, version 1

| | |
|---|---|
| **Title of the project** | **GS1205 Sustainable Energy for Development PoA, VPA 3: Improved Cook Stove Project in Brazzaville** |
| **Gold Standard project id** | GS 2514 |
| **Version number of the monitoring report** | 01 |
| **Completion date of the monitoring report** | 10/11/2019 |
| **Date of project design certification** | 04/01/2011 |
| **Start date of crediting period** | 01/08/2014 |
| **Duration of this monitoring period** | (01/08/2016) to (31/07/2018) |
| **Duration of previous monitoring period** | (01//08/2015) to (31/07/2016) |
| **Project representative(s)** | Initiative Developpement |
| **Host Country** | Republic of Congo |
| **Certification pathway (activity certification/impact certification)** | Impact certification |
| **SDG Contributions targeted (as per approved PDD)** | SDG 3 – Good health and well-being<br>SDG7 – Access to sustainable energy<br>SDG 8 – Decent work and economic growth<br>SDG 13 – Climate Action |
| **Gold Standard statement/product certification sought (GSVER/ADALYs/RECs etc.)** | GS VER |
| **Selected methodology(ies)** | Technologies and Practices to displace Decentralized Thermal Energy Consumption v2.0 |
| **Estimated amount of annual average certified SDG impact (as per approved PDD)** | SDG 13 – 10000 $tCO_2$/year |
| **Total amount of certified SDG impact (as per approved methodology) achieved in this monitoring period** | (01/08/2016) to (31/07/2017) SDG 13 – **2219 $tCO_2$**<br>(01/08/2017) to (31/07/2018) SDG 13 – **1687 $tCO_2$** |

## SECTION A. Description of project

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

*>> (Provide a brief summary of the detailed description given in section B.1 including purpose of the project, brief description of the installed technology and equipment and relevant dates for the project (e.g. construction start/end, commissioning, continued operation periods, etc.)*

The proposed micro-scale VPA aims at creating and organizing a supply and distribution chain for improved cook stoves in Brazzaville, Republic of Congo. The improved cook stoves promoted can be used with both firewood and charcoal since those two fuels are widely used in Brazzaville. The project proponent, Initiative Development (ID), helped firstly the creation of a design adapted to local practices. It then organizes the production and distribution by insuring quality and doing some marketing and advertising for the stoves.

Two improved cookstove model are included into the project. The improved stoves models have been designed as per the local requirements - a big model for restaurants or large families and a smaller model targeting families. ID will distribute itself the stoves during the first year and then rely on a network of reseller for the distribution. The project activity will result in decrease in wood and charcoal consumption in Brazzaville as well as reduction in indoor air pollution during cooking.

The proposed models are identical beside their size. The big size stove has a diameter of 35 cm and a height of 30 cm. The diameter of the combustion chamber is 18 cm. The small size stove has a diameter of 28.5 cm and a height of 28 cm. The diameter of the combustion chamber is 15cm.

Independent artisans, who are not employed by the project but were initially trained to construct, manufacture the appliances and sell these improved stoves in the local market.

This is the 3rd issuance request for 2 consecutive monitoring periods (2017 and 2018).

The 2017 monitoring period is from 01/08/2016 to 31/07/2017, while the crediting year 2018 is from 01/08/2017 to 31/07/2018. ID has chosen the fixed crediting period of 10 years for the project activity.

### A.2. Location of project

The micro-scale VPA is based in the municipality of Brazzaville in the Republic of Congo

### A.3. Reference of applied methodology

Technologies and Practices to displace Decentralized Thermal Energy Consumption v2.0

### A.4. Crediting period of project

01/08/2014 to 31/07/2025

## SECTION B. Implementation of project

### B.1. Description of implemented project

>> (*Provide information on the implementation status of the project during this monitoring period. Specify any deviations / delays compared to information in approved project.)*

In the present monitoring report the emission reductions are taken into account from 1st August 2016 till 31st December 2018 (both the first and last date are inclusive).

| Estimated in registered VPA-DD | | Monitoring report | |
|---|---|---|---|
| *Year* | *Estimated VER's* | Year | VER's claimed |
| *2017* | *10 000 tCO2eq* | *2017* | 2219 tCO2eq |
| *2018* | *10 000 tCO2eq* | *2018* | 1687 tCO2eq |
| *Total* | *20 000 tCO2eq* | | 3906 tCO2eq |

The sales of the improved cook stoves (Congo Mboté) were not as high compared to the sales expected and, therefore the difference in the VER's per vintage year.

### 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

There were no deviations from the certified PoA-DD and the applied methodology.

#### B.2.2. Corrections

No corrections were applied in the monitoring period.

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

There were no changes to the start date of the crediting period.

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

There were changes in the registered monitoring plan, applied methodology or applied baseline.

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

There were no changes to the project design.

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

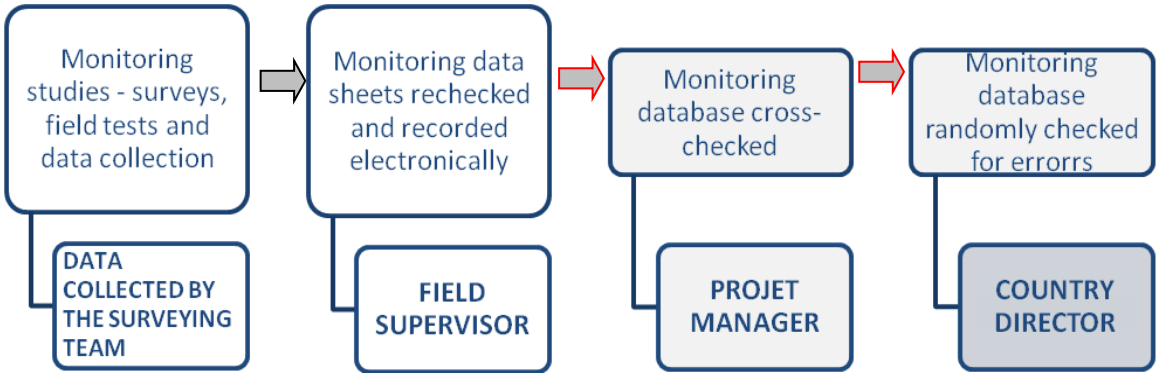
Monitoring methodology and structure of monitoring team

The monitoring surveys were carried out by the ID team based in Brazzaville. Local candidates are recruited and trained to carry out the monitoring surveys. A total of 8 survey members were trained by the ID. The details of the survey team and the training program is as follows –

| Survey team | Role | Monitoring team training |
|---|---|---|
| 1. Mr. DIAFOUKA LOUKOMBO Gauthier | Survey team supervisor | 2nd and 3rd October 2017 |
| 2. Mr. MAMBA-MIKOUNGA Marcel | Surveying team member | |
| 3. Ms. NKOUKA NATOUBA Dophina Ordalie, and | Surveying team member | |
| 4. Mr. NKOUNKOU Valéry | Surveying team member | |
| 5. MAMBA MIKOUNGA Marcel | Surveying team member | |
| 6. MANDANGUI MALOUMBI Brunel | Surveying team member | |
| 7. KOUBEMBA Beltron | Surveying team member | |
| 8. MOON-TALI Chris Yoram | Collect, analyze and fill the survey data in excel sheets. | |

The training programs were organized at the ID head office in Brazzaville and the training was animated by the then appointed Project Manager – Mr. Julien Petitjean.

The survey sheets were first checked by the field supervisor for any incomplete data or errors. If any data was missing or had errors, the survey member was requested to revisit the family if possible. The data was rechecked again by the project manager and finally rechecked by the country director of ID. The following image shows the 'cross-check procedure', carried out by the ID team for each monitoring.




The monitoring was comprised of three different surveys looking with increased precision at the energy usage of the improved cook-stove (Congo Mbote) users:

- The usage surveys were addressed to the largest sample and aimed at establishing the usage rate and the overall satisfaction of the Congo Mbote customers. This survey included people who stopped using their stove.
- The monitoring surveys focused on people who were using their stove and investigated their energy use patterns and the other benefits arising from the usage of the Congo Mbote.
- The Project Field Performance Test is a multiday survey performed on a sub sample of the previous survey during which fuel consumption is measured so that emission may be quantified.

The present report synthesizes the results from the above-mentioned surveys and from the baseline surveys to give the reader an understanding of the actual climate and socio-economic impact of the project.

| **The survey dates are as follows –** | |
|---|---|
| Monitoring Survey and Usage survey 2016 | 6th October to 15th November 2016 |
| Project field performance tests (KPT) 2017 | 6th November to 2nd December 2017 |
| Monitoring Survey and Usage survey 2017 | 7th November to 2nd December 2017 |

**Continuous monitoring approach of total sales records and project databases**

The ID team in Brazzaville has established a detailed sales record database. Each improved cook-stove has been allocated a unique identification number to avoid double counting. In accordance with the methodology monitoring requirements the sales record database is maintained and continuously updated with the relevant information such: sale date, place, name of customer, stove serial number, receipt number, size of the stove sold, intended usage (domestic/commercial).

The project database is continuously updated with each new sale of the improved cookstove. The database is cross-checked by the ID Country manager to assure that no stove is double counted. The sales receipt with incomplete are not considered in the emission reduction calculations. The project database is available in the project supporting documentation.

| **Monitoring year** | Total ICS sold during the year and registered in project database | **Total Number of ICS[1] per year** | |
|---|---|---|---|
| **2015** | 717 | 717 | |
| **2016** | 589 | 538 | |
| **2017** | 367 | 1570 | From 1st Jan 2015 till 31st Dec 2017 |
| **2018** | 166 | 1018 | From 1st Jan 2016 till 31st Dec 2018 |

The ICS's which were recorded incorrectly have not been considered. Considering the age of the each improved cookstove sold to be more than 2 years, the ICS's which were disseminated in the year 2015 & 2016 were also included in the year 2017. And for the 2016, the ICS's sold in the year 2016 and 2017 were also taken into account.

Therefore, after considering the usage rate, for the year 2017 a total of 1,466 ICS's were considered for emission reduction calculations. For the year 2018, a total of 959 ICS's were taken into account for the emission reduction calculations.

[1] **ICS** – Improved Cook-stove

However, the improved stoves were not all sold before the start of each of the monitoring years. For each stove, we calculated the number of days they have been used and aggregated that in a number of full year stove equivalent. The stove without unique identification numbers were excluded from the VER's calculations.

**Usage rate of the stove and customer satisfaction**
Usage rate information was acquired for stoves based on their age (date of sale) with a granularity of three month. The graph here under show how the usage rate evolve depending the on the age of the stove. The bar represents the number of stove surveyed for each age category. They are representative of the relative weight of each age category in the project database.

The weighted usage rate adopted for the monitoring year 2017 is **$U_1$=. 96 %**
The weighted usage rate adopted for the monitoring year 2018 is **$U_1$=. 96 %**

**As a conservative approach, the usage rate of 2017 has been taken into account for the emission reduction calculation for each of the vintage year**

## SECTION D. Data and parameters

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

*(Copy this table for each piece of data and parameter)*

| | |
|---|---|
| **Relevant SDG Indicator** | SDG 13 |
| **Data/parameter:** | **$EF_{b,CO_2}$** |
| Unit | $tCO_2/TJ$ or $tCO_2/t\_fuel$ |
| Description | CO2emission factor arising from use of fuels in baseline scenario |
| Source of data | IPCC 2006 Vol2 Chap1 Table 1.4 |
| Value(s) applied) | $EF_{firewood,CO_2}$= 112 $tCO_2/TJ$ ;<br>$EF_{coal, CO_2}$= 94.6 $tCO_2/TJ$ ;<br>$EF_{charcoal}$ = 487.2 $tCO_2/TJ$ |
| Choice of data or measurement methods and procedures | For firewood and coal, the IPCC 2006 (Vol 2, Chap 1, Table 1.4) data have been applied.<br>For charcoal, in accordance with the methodology, the value has been estimated by multiplying the firewood Emission Factor a default charcoal to firewood ratio of 4.35 kg of firewood/kg of charcoal (derived from FOA data). Whenever possible a firewood/charcoal ration from a local credible source should be used instead of this default value. |
| Purpose of data | Emission reduction calculations |
| Additional comments | If EF is in units of $tCO_2/t\_fuel$, remove NCV term from emission calculations.<br>Term can include a combination of emission factors from fuel production, transport, and use. |

| | |
|---|---|
| **Relevant SDG Indicator** | SDG 13 |
| **Data/parameter:** | **$EF_{b,nonCO_2}$** |
| Unit | $tCO_2/TJ$ or $tCO_2/t\_fuel$ |

| | |
|---|---|
| Description | Non-$CO_2$ emission factor arising from use of fuels in baseline scenario |
| Source of data | IPCC 2006 Vol2 Chap 2 Table 2.9 and latest GWP of $CH_4$ and $N_2O$ |
| Value(s) applied) | $EF_{fw,nonCO_2}$= 34.0 $tCO_2/TJ$ ;<br>$EF_{coal,nonCO_2}$= 36.5 $tCO_2/TJ$<br>$EF_{charcoal,nonCO_2}$ = 147.7 $tCO_2/TJ$ |
| Choice of data or measurement methods and procedures | For firewood and coal, the IPCC 2006 (Vol 2, Chap 2, Table 2.9) data have been applied and multiplied by latest GWP data (GWP$CH_4$= 25 and GWP $N_2O$= 298)<br><br>For charcoal, in accordance with the methodology, the value has been estimated by multiplying the firewood Emission Factor a default charcoal to firewood ratio of 4.35 kg of firewood/kg of charcoal (derived from FOA data). Whenever possible a firewood/charcoal ration from a local credible source should be used instead of this default value. |
| Purpose of data | Emission reduction calculations |
| Additional comments | If EF is in units of $tCO_2$/t_fuel, remove NCV term from emission calculations.<br>Term can include a combination of emission factors from fuel production, transport, and use. |

| | |
|---|---|
| **Relevant SDG Indicator** | SDG 13 |
| **Data/parameter:** | **$EF_{p,CO_2}$** |
| Unit | $tCO_2/TJ$ or $tCO_2/t\_fuel$ |
| Description | $CO_2$ emission factor arising from use of fuels in project scenario |
| Source of data | IPCC 2006 Vol2 Chap1 Table 1.4 |
| Value(s) applied) | $EF_{firewood,CO_2}$= 112 $tCO_2/TJ$ ;<br>$EF_{coal,CO_2}$= 94.6 $tCO_2/TJ$ ;<br>$EF_{charcoal}$ = 501 $tCO_2/TJ$ |
| Choice of data or measurement methods and procedures | For firewood and coal, the IPCC 2006 (Vol 2, Chap 1, Table 1.4) data have been applied.<br>For charcoal, in accordance with the methodology, the value has been estimated by multiplying the firewood Emission Factor a default charcoal to firewood ratio of 4.48 kg of firewood/kg of charcoal (derived from FOA data). Whenever possible a firewood/charcoal ration from a local credible source should be used instead of this default value. |
| Purpose of data | Emission reduction calculations |
| Additional comments | If EF is in units of $tCO_2/t\_fuel$, remove NCV term from emission calculations.<br>Term can include a combination of emission factors from fuel production, transport, and use. |

| | |
|---|---|
| **Relevant SDG Indicator** | SDG 13 |
| **Data/parameter:** | **$EF_{p,\ nonCO2}$** |
| Unit | $tCO_2/TJ$ or $tCO_2/t\_fuel$ |
| Description | Non-$CO_2$ emission factor arising from use of fuels in project scenario |
| Source of data | IPCC 2006 Vol2 Chap 2 Table 2.9 and latest GWP of $CH_4$ and $N_2O$ (WGI AR5 2013 Table 8A.1 p.8-88) |

| | |
|---|---|
| Value(s) applied) | EFfw,non$CO_2$= 37 t$CO_2$/TJ ;<br>EFcoal,non$CO_2$= 41 t$CO_2$/TJ<br>EFcharcoal,non$CO_2$ = 162.1 t$CO_2$/TJ |
| Choice of data or measurement methods and procedures | For firewood and coal, the IPCC 2006 (Vol 2, Chap 2, Table 2.9) data have been applied and multiplied by latest GWP data (GWP$CH_4$= 28 and GWP $N_2O$= 265)<br><br>For charcoal, in accordance with the methodology, the value has been estimated by multiplying the firewood Emission Factor a default charcoal to firewood ratio of 4.35 kg of firewood/kg of charcoal (derived from FOA data). Whenever possible a firewood/charcoal ration from a local credible source should be used instead of this default value. |
| Purpose of data | Emission reduction calculations |
| Additional comments | Term can include a combination of emission factors from fuel production, transport, and use. |

| | |
|---|---|
| **Relevant SDG Indicator** | SDG 13 |
| **Data/parameter:** | **$NCV_b$** |
| Unit | TJ/ton |
| Description | Net calorific value of the fuels used in the baseline |
| Source of data | IPCC 2006 Vol 2, Chap 1, Table 1.2 |
| Value(s) applied) | NCVfw = 0.0156 TJ/ton ;<br>NCVcoal = 0.0267 TJ/ton ;<br>NCVcharcoal = 0.039.5 TJ/ton |
| Choice of data or measurement methods and procedures | These values are taken from IPCC Guidelines 2006 Vol 2, Chap 1, Table 1.2 |
| Purpose of data | Emission reduction calculations |
| Additional comments | If EF is in units of t$CO_2$/t_fuel, remove NCV term from emission calculations. |

| | |
|---|---|
| **Relevant SDG Indicator** | SDG 13 |
| **Data/parameter:** | **$NCV_p$** |
| Unit | TJ/ton |
| Description | Net calorific value of the fuels used in the project |
| Source of data | IPCC 2006 Vol 2, Chap 1, Table 1.2 |
| Value(s) applied) | $NCV_{fw}$ = 0.0156 TJ/ton ;<br>$NCV_{coal}$ = 0.0267 TJ/ton ;<br>$NCV_{charcoal}$ = 0.039.5 TJ/ton |
| Choice of data or measurement methods and procedures | These values are taken from IPCC Guidelines 2006 Vol 2, Chap 1, Table 1.2 |
| Purpose of data | Emission reduction calculations |
| Additional comments | If EF is in units of t$CO_2$/t_fuel, remove NCV term from emission calculations. |

## D.2. Data and parameters monitored

*(Copy this table for each piece of data and parameter)*

| **Relevant SDG Indicator** | **SDG 13 -** total $CO_2$ emission reductions |
|---|---|
| **Data/parameter:** | **$P_{p,y}$** |
| Unit | kg/person-meal |
| Description | Quantity of fuel that is consumed in project scenario p during year y |
| Measured/calculated/default | Calculated |
| Source of data | Project FT, project FT updates |
| Value(s) of monitored parameter | $P_{1,1,kerosene}$= 0.006<br>$P_{1,1,firewood}$= 0.036<br>$P_{1,1,charcoal}$= 0.162<br>$P_{1,1,LPG}$ = 0.029 |
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Updated every two years |
| Calculation method (if applicable): | Fuel consumption will be measured with a Kitchen Performance Test and will be expressed in kg/person-meal |
| QA/QC procedures: | Systematic outlier identification procedures<br>90/30 precision check procedure |
| Purpose of data: | Emission reduction calculations |
| Additional comments: | Refer – VER calculation sheet – 'VER Synthesis' , from cells C6 to F6. |

| **Relevant SDG Indicator** | **SDG 13 -** total $CO_2$ emission reductions |
|---|---|
| **Data/parameter:** | **$U_{p,y}$** |
| Unit | Percentage |
| Description | Usage rate in project scenario p during year y |
| Measured/calculated/default | Calculated |
| Source of data | Annual usage survey |
| Value(s) of monitored parameter | 96.5 % |
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Annual |
| Calculation method (if applicable): | Usage rate will be weighted to make sure each age group of the stove are adequately represented. |
| QA/QC procedures: | Transparent data analysis and reporting |
| Purpose of data: | Emission reduction calculations |
| Additional comments: | A single usage parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario. |

| **Relevant SDG Indicator** | **SDG 13 -** total $CO_2$ emission reductions |
|---|---|
| **Data/parameter:** | $\mathbf{N_{p,b,y}}$ |
| Unit | Project technologies credited (units*day) |
| Description | Cumulative number of project technology-days included in the project database for project scenario p against baseline scenario b in year y |
| Measured/calculated/default | Calculated |
| Source of data | Total sales record |
| Value(s) of monitored parameter | For the vintage year 2017 –<br>$N_{\text{baseline charcoal, project charcoal,1}} = 224334.34$<br>$N_{\text{baseline fossil fuel, project charcoal,1}} = 15139.13$<br>$N_{\text{baseline firewood, project charcoal,1}} = 2752.57$<br>$N_{\text{baseline firewood, project firewood,1}} = 8257.71$<br>$N_{\text{baseline charcoal, project firewood,1}} = 2752.57$<br>$N_{\text{baseline other, project other,1}} = 0$<br><br>For the vintage year 2018 –<br>$N_{\text{baseline charcoal, project charcoal,1}} = 168728.99$<br>$N_{\text{baseline fossil fuel, project charcoal,1}} = 11386.62$<br>$N_{\text{baseline firewood, project charcoal,1}} = 2070.29$<br>$N_{\text{baseline firewood, project firewood,1}} = 6210.88$<br>$N_{\text{baseline charcoal, project firewood,1}} = 2070.29$<br>$N_{\text{baseline other, project other,1}} = 0$ |
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Continuous |
| Calculation method (if applicable): | This value is based on the sale date of each individual stove. Stove that were sold after the beginning of the crediting period are discounted proportionally to the time they were used during the crediting year. |
| QA/QC procedures: | Transparent data analysis and reporting |
| Purpose of data: | Emission reduction calculations |
| Additional comments: | The total sales record is divided based on project scenario to create the project database |

| **Relevant SDG Indicator** | **SDG 13 -** total $CO_2$ emission reductions |
|---|---|
| **Data/parameter:** | $\mathbf{\alpha_y}$ |
| Unit | fraction |
| Description | Discount factor for VER if sample size is too small |
| Measured/calculated/default | Calculated |
| Source of data | Baseline and monitoring Kitchen Performance Test |
| Value(s) of monitored parameter | 0 |
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Every two years |

| | |
|---|---|
| Calculation method (if applicable): | This parameter is derived from the statistical analysis of the result. If the sample size is enough to meet the precision requirement of the methodology, then α=0, otherwise this parameter will allow the calculation of the ER based on the lower bound of 90% one-sided interval. |
| QA/QC procedures: | Transparent data analysis and reporting |
| Purpose of data: | Emission reduction calculations |
| Additional comments: | |

| | |
|---|---|
| **Relevant SDG Indicator** | **SDG 3 –** Ensure healthy lives and promote well-being for all at all ages<br>3.9.1 Mortality rate attributed to household and ambient air pollution |
| **Data/parameter:** | Reduction in household air pollution |
| Unit | Number |
| Description | The project activity will provide the proportion of the project households using the improved cookstoves and therefore benefiting from a clean indoor environment while cooking and reduction in fire related accidents while cooking. |
| Measured/calculated/default | Calculated |
| Source of data | Project database |
| Value(s) of monitored parameter | 2017 – 1570<br>2018 – 1018 |
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Annual |
| Calculation method (if applicable): | The data related to the above parameter is based on the responses received from each household participating in the annual monitoring surveys. This indicator was assessed by asking each project beneficiary if they have less respiratory and other health problems due to the use the improved cookstoves |
| QA/QC procedures: | The monitoring data will be cross-checked by the project manager to assure that there are data errors while recording the beneficiary responses. |
| Purpose of data: | SDG net benefits |
| Additional comments: | The project database is continuously updated with each new sale of the improved cookstove. |

| | |
|---|---|
| **Relevant SDG Indicator** | **SDG 7 –** Ensure access to affordable, reliable, sustainable and modern energy for all<br>7.1.2 Proportion of population with primary reliance on clean fuels and technology (improved cookstoves). |
| **Data/parameter:** | Number of households |
| Unit | Number |
| Description | The project activity will provide the proportion of the project households using the improved cookstoves and therefore having access to the improved cookstoves technology. |
| Measured/calculated/default | Calculated |
| Source of data | Project database |
| Value(s) of monitored parameter | 2017 – 1570<br>2018 – 1018 |

| | |
|---|---|
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Annual |
| Calculation method (if applicable): | The ID team has established a detailed sales record database. Each improved cook-stove has been allocated a unique identification number to avoid double counting. In accordance with the methodology monitoring requirements the sales record database is maintained and continuously updated with the relevant information such : sale date, place, name of customer, stove serial number, receipt number, size of the stove sold, intended usage (domestic/commercial). |
| QA/QC procedures: | The database is cross-checked by the ID Country manager to assure that no stove is double counted. The sales receipt with incomplete are not taken into account in the emission reduction calculations |
| Purpose of data: | SDG net benefits |
| Additional comments: | The project database is continuously updated with each new sale of the improved cookstove. |

| | |
|---|---|
| **Relevant SDG Indicator** | **SDG 8 – Decent work and economic growth**<br>8.3.1 Proportion of informal employment in non-agriculture employment |
| **Data/parameter:** | Total number of employment created by the project activity |
| Unit | Number |
| Description | The project activity has provided local jobs, both the full time staff and part-time staff required for the project surveys |
| Measured/calculated/default | Measured |
| Source of data | Employment contracts |
| Value(s) of monitored parameter | 2017 – 15<br>2018 – 15 |
| Monitoring equipment | - |
| Measuring/reading/recording frequency: | Annual |
| Calculation method (if applicable): | Work contracts, project database etc |
| QA/QC procedures: | The ID team has established a detailed database, with details like the total number of people employed due to the project activity. |
| Purpose of data: | SDG net benefits |
| Additional comments: | The project database is continuously updated each year. |

### D.3. Implementation of sampling plan

*>> (If data and parameters monitored described in section D.2 above are determined by a sampling approach, provide a description on how project participants implemented the sampling plan and surveys for those data and parameters according to the approved PDD.)*

The monitoring was comprised of three different surveys looking with increased precision at the energy usage of the improved cook-stove (Congo Mbote) users:

- The usage surveys were addressed to the largest sample and aimed at establishing the usage rate and the overall satisfaction of the Congo Mbote customers. This survey included people who stopped using their stove.

- The monitoring surveys focused on people who were using their stove and investigated their energy use patterns and the other benefits arising from the usage of the Congo Mbote.
- The Project Field Performance Test is a multiday survey performed on a sub sample of the previous survey during which fuel consumption is measured so that emission may be quantified.

The present report synthesizes the results from the above-mentioned surveys and from the baseline surveys to give the reader an understanding of the actual climate and socio-economic impact of the project.

The ID team in Brazzaville has established a detailed sales record database. Each improved cook-stove has been allocated a unique identification number to avoid double counting. In accordance with the methodology monitoring requirements the sales record database is maintained and continuously updated with the relevant information such: sale date, place, name of customer, stove serial number, receipt number, size of the stove sold, intended usage (domestic/commercial).
The project database is continuously updated with each new sale of the improved cookstove. The database is cross-checked by the ID Country manager to assure that no stove is double counted. The sales receipt with incomplete are not considered in the emission reduction calculations.

**Usage survey sampling methodology:**
The GS guidelines on usage were followed. As per the minimum sample required, more than 30 households were randomly selected and surveyed. Each survey member was provided training (the details are provided in the section C above).
The households participating in the survey were provided small gift as recognition of active participation in the monitoring surveys.

## SECTION E. Calculation of SDG outcomes

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

>> (*Provide details of equations and approaches used to calculate/estimate baseline values.)*

The Ex-ante calculation of the emission reductions are based on the baseline studies (baseline survey and the baseline field tests). The field surveys and tests have been carried out as the guidelines mentioned in the applied methodology. The baseline studies were carried out to identify the typical baseline fuel consumption patterns among the targeted population of Moundou and its surrounding zones for adopting the proposed ICS of the project activity. The sample questionnaire used during the baseline survey has been attached in the baseline study report.

**As per the VPA-DD, the baseline situation for the SDG 13, was estimated as follows:-**
Because of the high number of baseline and project scenario, some conservative simplifications were made. This allowed us to reduce the fieldwork to something more manageable given the small size of the project.

| | Baseline | Project |
|---|---|---|
| Domestic Charcoal | KPT | KPT |
| Domestic Firewood | KPT | Excluded from project (no emission reduction)*** |

| | | |
|---|---|---|
| Domestic Fossil Fuel | Assumed to be zero* | N/A |
| Restaurant Charcoal | Assumed to be same a Domestic Charcoal** | |
| Restaurant Firewood | Assumed to be same Domestic Firewood** | |

* Baseline fossil fuel: because of the small number of people using only fossil fuel and the limited emission from this category it was not deemed worthwhile to do a full fledge KPT for this scenario. We deemed this category has no emission, this is conservative.

** The restaurant have a much more intensive usage of the stove and their fuel consumption is a lot higher than domestic households. So considering that one restaurant achieve the same amount of emission reduction as household is very conservative.

Baseline emission calculations:

$$BE_{b,y} = B_{b,y} * ((f_{NRB,\,y} * EF_{b,fuel,\,CO2}) + EF_{b,fuel,\,nonCO2}) * NCV_{b,\,fuel}$$

*Where:*

| | |
|---|---|
| $BE_{b,y}$ | *Emissions for baseline scenario b during the year y in tCO2e* |
| $B_{b,y}$ | *Quantity of fuel consumed in baseline scenario b during year y, in tons* |
| $f_{NRB,,\,y}$ | *Fraction of biomass the non-renewable biomass* |
| $NCV_{b,fuel}$ | *Net calorific value of the fuel that is substituted or reduced* |
| $EF_{b,fuel,CO2}$ | *$CO_2$ emission factor of the fuel that is substituted or reduced.* |
| $EF_{b,fuel,nonCO2}$ | *Non---$CO_2$ emission factor of the fuel that is substituted or reduced* |

$$B_{b,y} = N_{p,y} * P_{b,y}$$

*Where:*

| | |
|---|---|
| $N_{p,y}$ | *Project technology-days in the project database for project scenario* |
| $P_{b,y}$ | *Specific fuel consumption for an individual technology in baseline scenario* |

**Please refer the VPA-DD for the details on the baseline estimation, on page 18 to 20**

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

>> (*Provide details of equations and approaches used to calculate/estimate project values.)*

Project emission calculations:

$$PE_{p,y} = B_{p,y} * ((f_{NRB,\,y} * EF_{p,fuel,\,CO2}) + EF_{p,fuel,\,nonCO2}) * NCV_{p,\,fuel}$$

*Where :*

| | |
|---|---|
| $PE_{p,y}$ | *Emissions for project scenario p during year y in $tCO_2e$* |
| $B_{p,y}$ | *Quantity of fuel consumed in project scenario p during year y, in tons,* |
| $f_{NRB,\,y}$ | *Fraction of the non-renewable biomass* |
| $NCV_{p,fuel}$ | *Net calorific value of the project fuel* |
| $EF_{p,fuel,CO2}$ | *$CO_2$ emission factor of the project fuel.* |
| $EF_{p,fuel,nonCO2}$ | *Non---$CO_2$ emission factor of the project fuel.* |

$$B_{p,y} = N_{p,y} * ((P_{p,y} * U_{p,y}) + (P_{b,y} * (1 - U_{p,y})))$$

*Where:*

| | |
|---|---|
| $N_{p,y}$ | *Project technology-days in the project database for project scenario* |
| $P_{b,y}$ | *Specific fuel consumption for an individual technology in baseline scenario* |
| $U_{p,y}$ | *Cumulative usage rate for technologies in project scenario* |

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

>>As per the PoADD, the following equation is used to calculate the ER:

$$ER_y = \sum_{b,p} N_{p,y} * U_{p,y} * (f\,NRB_{,b,y} * ER_{b,p,y,CO_2} + ER_{b,p,y,non\text{-}CO_2}) - LE_{p,y}$$

Where :

$\sum_{b,p}$ = Sum over all relevant (baseline b/project p) couples

$N_{p,y}$ = Cumulative number of project technology-days included in the project database for project scenario p against baseline scenario b in year y

$U_{p,y}$ = Cumulative usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate (fraction)

$ER_{b,p,y,CO_2}$ = Specific $CO_2$ emission savings for an individual technology of project p against an individual technology of baseline b in year y, in $tCO_2$/day, and as derived from the statistical analysis of the data collected from the field tests

$ER_{b,p,y,non\text{-}CO_2}$ = Specific non-$CO_2$ emission savings for an individual technology of project j against an individual technology of baseline b in year y, converted in $tCO_2$/day, and as derived from the statistical analysis of the data collected from the field tests

$f_{NRB,b,y}$ = Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass (drop this term from the equation when using a fossil fuel baseline scenario

$LE_{p,y}$ = Leakage for project scenario p in year y ($tCO_{2e}$/yr)

$$ER_{b,p,y,CO2} = PM_{p,y} * \sum_{fuel} (P_{b,fuel} - P_{p,y,fuel}) * NCV_{fuel} * EF_{fuel,CO2}$$

Where:

PMp,y: average number of people meal for scenario *p* in year *y*

Pb,y,fuel: average fuel consumption of fuel in baseline scenario b in kg/people-meal

Pp,y,fuel: average fuel consumption of fuel in project scenario p in kg/people-meal

NVCfuel Net Calorific Value of fuel in TJ/kg

$EF_{fuel,CO2:}$ Emission Factor of fuel in $tCO_2$/TJ

$$ER_{b,p,y,nonCO2} = PM_{p,y} * \sum_{fuel,b}(P_{b,fuel} - P_{p,y,fuel}) * NCV_{fuel} * \left[\sum_{gas} EF_{fuel,gas} * GWP_{gas}\right]$$

Where:

$EF_{fuel,gas}$ : emission factor in tons of *gas* per TJ. The considered gas in this project are $CH_4$ and N20.

$GWP_{gas}$ : Global Warming Potential of gas expressed in 100 years $CO_2$ equivalent.

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

**For the monitoring year 2017, the values are as follows:**

| Item | Baseline estimate | Project estimate | Net benefit |
|---|---|---|---|
| SDG 13 | Firewood – 0,730 (kg/person-meal)<br>Charcoal - 0,285 (kg/person-meal) | Firewood – 0,036 (kg/person-meal)<br>Charcoal - 0,162 (kg/person-meal) | Firewood – 0,694 (kg/person-meal)<br>Charcoal - 0,123 (kg/person-meal) |
| SDG 3 | 2017 – 0 improved cookstoves | 2017 – 1570 | 2017 – 1570 |
| SDG 7 | 2017 – 0 improved cookstoves | 2017 – 1570 | 2017 – 1570 |
| SDG 8 | 2017 – 0 employment | 2017 - 15 | 2017 – 15 |

**For the monitoring year 2018, the values are as follows :**

| Item | Baseline estimate | Project estimate | Net benefit |
|---|---|---|---|
| SDG 13 | Firewood – 0,730 (kg/person-meal)<br>Charcoal - 0,285 (kg/person-meal) | Firewood – 0,036 (kg/person-meal)<br>Charcoal - 0,162 (kg/person-meal) | Firewood - 0,694 (kg/person-meal)<br>Charcoal - 0,123 (kg/person-meal) |
| SDG 3 | 2018 – 0 (ICS's) | 2018 - 1018 | 2018 – 1018 |
| SDG 7 | 2018 – 0 (ICS's) | 2018 - 1018 | 2018 – 1018 |
| SDG 8 | 2018 – 0 employment | 2018 - 15 | 2018 - 15 |

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

| Item | Values estimated in ex ante calculation of approved PDD | Actual values achieved during this monitoring period |
|---|---|---|
| SDG 13 | 2017 – 10 000 $tCO_2eq$<br>2018 – 10 000 $tCO_2eq$ | 2017 – 2219 $tCO_2eq$<br>2018 – 1687 $tCO_2eq$ |
| SDG 3 | 5000 | 2017 – 1570<br>2018 – 1018 |
| SDG 7 | 5000 | 2017 – 1570<br>2018 – 1018 |
| SDG 8 | 30 | 2017 – 15<br>2018 – 15 |

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

The values estimated for the SDG 13 in the PDD were 10 000 $tCO_2$ per year, where as per the presenting monitoring years 2017 & 2018, the project has reduced 2219 $tCO_2$ & 1687 $tCO_2$

respectively. The difference is due to the less number of improved stoves sold during both the years, which has resulted in less emission reductions compared to the estimated value in the PDD. The project database with the details on the total number of improved cookstoves diffused has been provided. Please refer the ER calculation sheet 'project database sheet'.

## 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**

>> *None*

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

>> *None*

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

*None*