



**Monitoring report form for CDM programme of activities  
(Version 03.0)**

*Complete this form in accordance with the instructions attached at the end of this form.*

**MONITORING REPORT**

|   |   |  |
|---|---|--|
| <b>Title of the PoA</b>   | Clean Energy Program Supported by Republic of Korea |  |
| <b>UNFCCC reference number of the PoA</b>   | 10415   |  |
| <b>Version numbers of the PoA-DD applicable to this monitoring report</b>   | 2.0   |  |
| <b>Version number of this monitoring report</b>   | 2.0   |  |
| <b>Completion date of this monitoring report</b>  | 29/01/2020  |  |
| <b>Monitoring period number</b>   | Second monitoring period                            |  |
| <b>Duration of this monitoring period</b>   | 12/01/2019 to 12/09/2019 (including both days)      |  |
| <b>Monitoring report number for this monitoring period</b>  | 1   |  |
| <b>Coordinating/managing entity</b>   | ECOYE Co., LTD                                      |  |
| <b>Host Parties</b>   | <b>Host Party of the PoA</b>                        | <b>Is this the host Party of a CPA covered in this monitoring report? (yes/no)</b> |
|   | Myanmar   | Yes  |
| <b>Applied methodologies and standardized baselines</b>   | AMS-II.G, version 08                                |  |
| <b>Sectoral scopes</b>  | Sectoral scope 3 (Energy Demand)                    |  |
| <b>Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period</b>                           | <b>Amount achieved before 1 January 2013</b>        | <b>Amount achieved from 1 January 2013</b>   |
|   | 0 tCO <sub>2</sub> e                                | 205369 tCO <sub>2</sub> e  |
| <b>Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report</b> | 209508 tCO <sub>2</sub> e                           |  |

## PART I Monitoring of programme of activities (PoA)

### SECTION A. Description of PoA

#### A.1. General description of PoA

>>

In Myanmar, commonly used fuel for cooking is fuelwood. As per *The 2014 Myanmar Population and Housing Census* report, as much as 86.2% of the rural households and 25.6% of the urban households use fuelwood for cooking<sup>1</sup>.

This high dependence on solid biomass degrades local environments; demands considerable time in fuel collection and creates indoor air pollution that causes respiratory diseases. Further, the burning of fuelwood adds significantly to GHG emissions. Both in rural and urban areas, millions of households depend upon fuelwood as their primary fuel for cooking.

##### *(a) Policy/ measure or stated goal of the PoA*

The objective of the *Clean Energy Program Supported by Republic of Korea* (hereafter referred to as “the program”) is to promote dissemination of fuelwood burning improved cookstoves (ICS). The implementation of projects under this program will improve access to clean energy, diminish demand for fuelwood, mitigate impact of climate change and contribute in socio-economic development of the beneficiary communities.

##### *(b) Framework for the implementation of the proposed PoA*

ECOYE Co., LTD as a coordinating and managing entity (CME) is implementing the CDM PoA-*Clean Energy Program Supported by Republic of Korea*. ECOYE Co., LTD is a leading carbon offset project developer and trader that assist for-profit and not for profit organizations to implement climate mitigation projects. ECOYE Co., Ltd. provides all implementation costs for the project under this CPA, including total operation & maintenance costs of ICS production and free distribution for CME and CPA implementers to operate the CPA(s) in a financially sustainable condition.

The program targets consumers that use fuelwood as their primary fuel for cooking to replace the existing technologies with ICS. The consumption of fuelwood degrades local environments creates indoor air pollution that causes respiratory diseases and adds significantly to GHGs emissions. The program by replacing inefficient technology/measure such as three stone stove, tripod and traditional cookstoves shall result in clean environment, reduction of GHG emissions and enhanced living standards in user households.

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<sup>1</sup> The 2014 Myanmar Population and Housing Census Highlights of the Main Results Census Report Volume 2 – A, Pg 32 ([http://myanmar.unfpa.org/sites/asiapacific/files/pub-pdf/Census%20Highlights%20Report%20-%20ENGLISH%20\(1\).pdf](http://myanmar.unfpa.org/sites/asiapacific/files/pub-pdf/Census%20Highlights%20Report%20-%20ENGLISH%20(1).pdf))

**A.1.1. Corresponding generic component project activities (CPAs)**

| Title and reference number of the corresponding generic CPA  | Version of the PoA-DD | Sectoral scopes                  | Applied methodologies and standardized baselines |
|--|-----------------------|----------------------------------|--|
| Title-Clean Energy Program Supported by Republic of Korea<br><br>Reference number-CPA MM [XX]<br>Generic CPA MM 01 | 2.0                   | Sectoral scope 3 (Energy Demand) | AMS-II.G., version 08                            |

**A.1.2. CPAs included in the PoA**

| Title and UNFCCC reference number of the CPA                                     | Version of the PoA-DD | Title and reference number of the corresponding generic CPA  | Crediting period type and duration | Covered in this monitoring report? (yes/no) |
|--|-----------------------|--|------------------------------------|---|
| Clean Energy Program Supported by Republic of Korea CPA MM 02 ;10415-P1-0002-CP1 | 2.0                   | Title-Clean Energy Program Supported by Republic of Korea<br><br>Reference number-CPA MM [XX]<br>Generic CPA MM 01 | Fixed<br>(10/01/2019 - 09/01/2029) | Yes   |
| CPA MM 01;<br>10415-P1-0001-CP1  | 2.0                   | Title-Clean Energy Program Supported by Republic of Korea<br><br>Reference number-CPA MM [XX]<br>Generic CPA MM 01 | Fixed<br>(01/07/2018 - 30/06/2028) | No (Excluded on 03/01/2019)                 |

**A.2. Coordinating/managing entity**

&gt;&gt;

ECOEYE Co., LTD 70  
Dusan-ro, Geumcheon-gu, Seoul. South Korea  
#1503, Hyundai Knowledge Industrial Center B  
Seoul Capital Area

Republic of Korea  
Office : +82- 2-6480-7346

**SECTION B. Implementation of PoA****B.1. Description of implemented PoA**

&gt;&gt;

The management system is designed as per the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities, ver 04.0 paragraph 21.

- a) **A clear definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies:**

Table 1: Role and Responsibility

| Entity         | Role and Responsibility   | Competencies  |
|----------------|---|---|
| ECOYE Co., LTD | <p>As a CME, ECOYE Co., LTD is responsible:</p> <ul style="list-style-type: none"> <li>To sign agreements with CPA implementers;</li> <li>To sign agreements with DOE for inclusion and verification services;</li> <li>To communicate with the CDMEB, including on matters related to the distribution of Certified Emission Reductions (CERs);</li> <li>To review and assist in the selection and preparation of CPAs, ensuring that all CPAs fulfils the eligibility criteria and neither registered as an individual CDM project activity nor included in another registered PoA ;</li> <li>To ensure that ICS under the PoA meets minimum thermal efficiency requirement of twenty percent and satisfy the condition to qualify as a 'microscale CDM unit<sup>2</sup>;</li> <li>To ensure that the same approved baseline and monitoring methodology is applied to all the CPAs;</li> <li>To establish CER ownership agreements with the CPA implementers;</li> <li>To train and supervise CPA implementer in data collection and archiving;</li> <li>To ensure that the CPA implementers maintain and provide monitoring data for calculating CERs;</li> <li>To plan and manage validation and verification process;</li> <li>To establish and manage the database for calculating CERs based on data received from the CPA implementers</li> </ul> | <p>ECOYE Co., LTD is a leading CDM project developer and trader that assist for-profit and not for profit organizations to implement climate mitigation projects. With over fifteen years of experience, the CME has a team of experienced professionals who are highly skilled in CDM project identification and development, renewable energy technologies, rural markets and sampling techniques. Over the past fifteen years, CME has developed many carbon offset projects particularly ICS PoA and managing them successfully</p> |
| CPA            | The role of CPA implementers is   | CPA implementer and CME are same entity.  |

<sup>2</sup>Methodological tool Demonstration of additionality of microscale project activities Version 08.0. Paragraph 8 (c,i), 9 (b,i) and 10 (b,i)

|              |   |  |
|--------------|---|--|
| implementers | detailed below: <ul style="list-style-type: none"> <li>• To disseminate ICS;</li> <li>• To institute adequate data collection and archiving systems;</li> <li>• To establish quality control procedures for all monitoring parameters;</li> <li>• To monitor and record the data</li> </ul> | CME has developed many carbon offset projects particularly ICS PoA and managing them successfully. It has a team of experienced professionals who are highly skilled in CDM project management |
|--------------|---|--|

**b) Records of arrangements for training and capacity development for personnel:**

The CME provides capacity building and training to CPA implementer's team to enhance:

- ICS marketing and distribution; and
- Data collection and archiving capability;
- The CME keeps records of capacity building and training activities.

**c) A procedure for technical review of inclusion of CPAs:**

- The CME collects all documents/information necessary to check compliance of CPA with the eligibility criteria of the PoA;
- Checking whether the CPA and included technology fulfills eligibility criteria of the PoA or not;
- The CME reviews monitoring plan of the CPA to ensure that it is in line with the monitoring plan mentioned in section B.7.2 of the PoA DD.

**d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or included as a CPA in another registered CDM PoA):**

- Every new CPA is compared to the already existing database and the list of similar project activities that are under validation or registered at the UNFCCC or any other mechanism to avail climate change mitigation benefits;
- CPA implementers in the PoA are made aware of the double counting principle i.e. CPA should neither a CDM project and/or as a part of any other CDM PoA and/or any other mechanism to avail climate change mitigation benefits;
- To avoid-double counting of ICS, all ICS under the PoA bears the CME logo and 12 digit unique serial number. The unique serial number is a combination of numbers representing ICS's country of manufacturing, country of destination and manufacturing date. There are two types of ICS models: S 26-13 and S 32-13 and each has different combination of numbers representing different parameters. In any case, both have 12 digit numbers.

Unique serial number and user location details identify the project devices individually and separate them from other programs, if any in the present or in the future. The unique serial number can be verified with the product database.

Each ICS distributed is entered into the PD with a unique serial number and user details that clearly and unmistakably keep track of the ICS in each CPA. Therefore it is not possible for a particular ICS to be counted in two different CPAs.

**B.2. Post-registration changes to PoA****B.2.1. Corrections**

&gt;&gt;

Corrections to the registered PoA-DD were approved on 17/12/2018 (effective approval date) under reference number PRC-10415-001.

**B.2.2. Inclusion of monitoring plan**

&gt;&gt;Not applicable.

**B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents**

&gt;&gt;

Corrections to the registered PoA-DD were approved on 17/12/2018 (effective approval date) under reference number PRC-10415-001.

**B.2.4. Changes to programme design**

&gt;&gt;No change in the programme design.

**B.2.5. Changes specific to afforestation or reforestation activities**

&gt;&gt;Not applicable.

**PART II Monitoring of CPAs**

&gt;&gt;

**SECTION C. Implementation of CPAs****C.1. Description of implemented CPAs**

&gt;&gt;

The proposed Clean Energy Program Supported by Republic of Korea CPA MM 02 is a small scale type II project activity under "Clean Energy Program Supported by Republic of Korea" PoA.

The purpose of the CPA is to disseminate fuelwood burning improved cookstoves [ICS] to households that are using fuelwood as cooking fuel. ECOEYE Co., Ltd. provides all implementation costs for the project under this CPA including total operation & maintenance costs of ICS production and free distribution for CME and CPA implementers to operate the CPA(s) in a financially sustainable condition.

*Technology*

This CPA includes distribution of ICS models S 26-13 and S 32-13. These are fuel efficient fuelwood burning stoves. An ICS has an enclosure for the fire to reduce the loss of radiant heat and protect it against the wind. It increases heat transfer to the cooking pot by guiding upward flow of the flue gases. ICS burns fuel more cleanly and efficiently reducing fuel consumption and GHG emissions, easing pressure on forest resources and reducing indoor air pollution. The annual energy savings of ICS S 26-13 (366-730), S 26-13 (1-365) and ICS S 32-13 (1-365) for this monitoring period is only 11.60 MWhth, 11.55 MWhth and 12.94 MWhth

respectively<sup>3</sup> which is less than 1% of the small-scale CDM thresholds i.e. 1800 MWhth<sup>4</sup> and also satisfies the condition i.e. annual energy savings of no more than 20 GWh/year to qualify as a microscale CDM unit<sup>5</sup>.

Technical description of the ICS under the CPA- S 26-13 and S 32-13 is given below:



Figure 1 ICS S 26-13

Figure 2 ICS S 32-13

Table 2: Technical Description of the ICS S 26-13 and S 32-13<sup>6</sup>

| S.No | Parameter                 | S 26-13  | S 32-13   |
|------|---------------------------|--|---|
| 1    | Specific Fuel Consumption | 0.035 MJ/min/L <sup>7</sup>  | 0.039 MJ/min/L <sup>8</sup>   |
| 2    | Design Thermal Efficiency | 28.9%  | 38.7%   |
| 3    | Dimensions                | 325*270*268 mm   | 320*320*267 mm  |
| 4    | Material                  | Stove body: 0.5mm stainless steel, Grade 201<br>Chamber: 1mm stainless steel, Grade 201<br>Stovetop: cast iron | Stove body: 0.5mm cold roll sheet<br>Chamber: 1mm stainless steel, Grade 201<br>Stovetop: cast iron |
| 5    | Lifespan                  | 5 years  | 5 years   |
| 6    | Design Thermal            | 3.8 kW   | 4 kW  |

<sup>3</sup>Please refer ER calculation sheet

<sup>4</sup>CDM project standard for programmes of activities version 02.0. Paragraph 122

<sup>5</sup>Methodological tool Demonstration of additionality of microscale project activities Version 09.0. Paragraph 12

<sup>6</sup>Manufacturer specification

<sup>7</sup>S 26-13 WBT certificate

<sup>8</sup>S 32-13 WBT certificate

|  |       |  |
|--|-------|--|
|  | Power |  |
|--|-------|--|

Table 3: CPA Details

|   |  |
|---|--|
| CPA title   | Clean Energy Program Supported by<br>Republic of Korea CPA MM 02 |
| CPA reference number  | 10415-P1-0002-CP1  |
| CPA crediting period start date                                   | 10/01/2019   |
| Distribution date of first ICS included in this monitoring period | 30/09/2017   |
| Distribution date of last ICS included in this monitoring period  | 03/09/2019   |

## C.2. Location of CPAs

>>

Physical/ Geographical boundary of the CPA is The Republic of The Union of Myanmar,

Latitude: 19° 04' 24.47" N

Longitude: 96° 40' 15.74" E

Source: <http://latitude.to/map/mm/myanmar>



Figure 3 Geographic Boundary of the CPA: The Republic of the Union of Myanmar

## C.3. Post-registration changes to CPAs

### C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies, standardized baselines or other methodological regulatory documents

>>Not applicable



**C.3.2. Corrections**

&gt;&gt;Not applicable

**C.3.3. Changes to the start of the crediting period**

&gt;&gt;Not applicable

**C.3.4. Inclusion of monitoring plan**

&gt;&gt;Not applicable

**C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents**

&gt;&gt;Not applicable

**C.3.6. Changes to project design**

&gt;&gt;Not applicable

**C.3.7. Changes specific to afforestation or reforestation CPA**

&gt;&gt;Not applicable

**SECTION D. Description of monitoring system of CPAs**

>>The CME has trained field staff in project implementation, particularly in data collection and archiving. All ICS under the PoA bear the CME logo and 12 digits unique serial number. The unique serial number is a combination of numbers representing the country of ICS manufacturing, country of destination and manufacturing date. Unique serial number and user location details identify the project devices individually and separate them from other programs, if any in the present or in the future. The unique serial number can be verified with the product database. To establish the date of commissioning of ICS, the CME has used the actual date of distribution of ICS as commissioning date of each ICS and not opted to group the devices in "batches". However, next day after the date of distribution of ICS has been considered as the start date of ICS operation.

*Step 1: Data collection*

ICS were distributed in a social gathering organized in some village school or community hall. Relevant customer data such as name, address, signature, ICS type, unique serial number, and distribution date were recorded by the field personnel using paper-based means.

*Step 2: Data Archiving*

The CME maintains a record-keeping system- Project Database (PD). The total number of ICS by type and age group deployed during the crediting period can be tracked in the PD, which is updated regularly. All distributed ICS has been recorded for the distribution date and user details. The date on which household receives ICS is recorded in the project database and next day has been considered as the start date of ICS operation. This information allows the CME/CPA implementers to track particular ICS and/or user.

The CME has a monitoring manager responsible for field staff training, QA/QC of the data, analysis and reporting into the monitoring report. The CME has a database manager who manages the process of collecting the information of installed ICS from the stove distributors and entering the data into the project

database. For the monitoring survey, a monitoring team was organized by the CME consisting of survey coordinator, survey supervisor and trained monitoring staff, who conducted the surveys and the WBTs.

Table 4: Data Collection Team Organization Structure

|                                 |  |          |  |          |                                  |
|---------------------------------|--|----------|--|----------|----------------------------------|
| Information flow<br>▲<br>▲<br>▲ | Monitoring Team  |          |  |          | Flow of project device<br>▼<br>▼ |
|                                 | The CME (monitoring manager: overall planning and execution)     |          |  |          |                                  |
|                                 | The CME (database manager: end user data checking and archiving) |          |  |          |                                  |
|                                 | Distributor's Field Staff (end user data collection)             |          | Distributor's Field Staff (end user data collection) |          |                                  |
|                                 | End User   | End User | End User   | End User |                                  |

#### Survey Team

The sample survey was conducted by the CME. Survey team was supervised and trained by the CME. Survey team was consists of one survey coordinator and three supervisors and eight surveyors.

#### Survey coordinator's Responsibilities

Overall planning and execution of the survey.

#### Supervisor's Responsibilities

- To explain survey objectives and procedure to the survey team;
- Ensure availability of all materials for the team to complete its assigned survey;
- Assignment of work to each surveyor;
- Check all completed survey forms to make sure that all the data fields have been accurately filled in, any discrepancy shall be corrected;
- Takes responsibility for the safe collection, storage, and transport of the completed survey forms.

#### Surveyor's Responsibilities

- To study instructions and follow them precisely;
- To know the substance of the survey form and the method for filling it out;
- To conduct interviews of respondents efficiently and with high quality and give the completed survey forms to the supervisor.

#### Assistant's Responsibilities

Assistants provided by the distributor helped surveyors in locating households selected for the survey

Table 5: Survey Team Organization Structure

| Personnel          |           |           |           |            |           |           |           | Entity      |
|--------------------|-----------|-----------|-----------|------------|-----------|-----------|-----------|-------------|
| Survey Coordinator |           |           |           |            |           |           |           | CME         |
| Supervisor         |           |           |           | Supervisor |           |           |           | CME         |
| Surveyor           | Surveyor  | Surveyor  | Surveyor  | Surveyor   | Surveyor  | Surveyor  | Surveyor  | CME         |
| Assistant          | Assistant | Assistant | Assistant | Assistant  | Assistant | Assistant | Assistant | Distributor |

## SECTION E. Data and parameters

## E.1. Data and parameters fixed ex ante

|  |  |
|--|--|
| Data / Parameter                                     | $f_{NRB}$  |
| Unit   | Fraction   |
| Description  | Fraction of woody biomass saved by the project activity during year $y$ that can be established as non-renewable biomass   |
| Source of data                                       | <p>fNRB calculation sheet</p> <ul style="list-style-type: none"> <li>SSC WG 35th meeting Report, Annex 20, Eq 3</li> <li>FAO Forest Resource Assessment (FRA) 2015</li> <li>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 4, Table 4.9</li> <li><a href="http://www.fao.org/docrep/004/Y1997E/y1997e21.htm">http://www.fao.org/docrep/004/Y1997E/y1997e21.htm</a></li> </ul>   |
| Value(s) applied                                     | 0.8832   |
| Choice of data or measurement methods and procedures | <p><u>Choice of Data</u></p> <p>Option A, paragraph 43 of the applied methodology AMS-II.G. version 08</p> <p><i>"To determine the value of the fraction of non-renewable biomass (<math>f_{NRB}</math>) to be applied in a Component Project Activity (CPA) of a POA, use one of the two options as follows: (a) Conduct local studies to determine the local <math>f_{NRB}</math> value (sub national values); or (b) Use default national values approved by the Board (see footnote 3). The choice of which option to use shall be made ex ante. However, a switch from a national value of <math>f_{NRB}</math> (i.e. option (b)) to sub-national values (i.e. option (a)) is permitted, under the condition that the selected approach is consistently applied to all CPAs"</i></p> <p><u>Measurement methods and procedure</u></p> <p>The measurement procedure is based on Equation 11 of the AMS-II.G. version 08 and approach mentioned in Annex 20 of the SSC WG 35<sup>th</sup> meeting report</p> |
| Purpose of data/parameter                            | Calculation of baseline emissions  |
| Additional comments                                  | Parameter is fixed ex ante at CPA level  |

|  |  |
|--|--|
| Data / Parameter                                     | $NCV_{biomass}$  |
| Unit   | TJ/tonne   |
| Description  | Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in project devices.  |
| Source of data                                       | AMS-II.G, ver 08- Pg 17. Data/parameter table 12   |
| Value(s) applied                                     | 0.015  |
| Choice of data or measurement methods and procedures | IPCC default for wood fuel, 0.015 TJ/tonne, based on the gross weight of the wood that is 'air-dried' may be used if fuel used in project device is also woody biomass |

|                           |                                   |
|---------------------------|-----------------------------------|
| Purpose of data/parameter | Calculation of baseline emissions |
| Additional comments       | Fixed ex ante at PoA level        |

|  |  |
|--|--|
| <b>Data / Parameter</b>                              | $\eta_{old}$   |
| Unit   | Fraction   |
| Description  | Efficiency of pre - project device, which is a three stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; for other types of devices, a default value of 0.2 may be optionally used. Weighted average values will be used (taking the amount of woody biomass consumed by each device as the weighting factor) if more than one type of device is being replaced |
| Source of data                                       | AMS.II-G ver 08.0. Data/parameter table 17   |
| Value(s) applied                                     | 0.1  |
| Choice of data or measurement methods and procedures | Default value suggested in AMS.II-G ver 08.0   |
| Purpose of data/parameter                            | Calculation of baseline emissions  |
| Additional comments                                  | The parameter value is fixed ex ante at CPA level.   |

|  |  |
|--|--|
| <b>Data / Parameter</b>                              | $EF_{projected\_fossilfuel}$   |
| Unit   | tCO <sub>2</sub> e/t   |
| Description  | Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers |
| Source of data                                       | AMS-II.G ver 08- page 5  |
| Value(s) applied                                     | 81.6   |
| Choice of data or measurement methods and procedures | Default value suggested in AMS.II-G ver 08.0   |
| Purpose of data/parameter                            | Calculation of baseline emissions  |
| Additional comments                                  | The parameter value is fixed ex ante at PoA level  |

|                         |                                |
|-------------------------|--------------------------------|
| <b>Data / Parameter</b> | $LF_y$                         |
| Unit                    | Fraction                       |
| Description             | Leakage adjustment factor      |
| Source of data          | AMS II.G version 08. Para 42 c |
| Value(s) applied        | 0.95                           |

|  |  |
|--|--|
| Choice of data or measurement methods and procedures | As per the methodology AMS II.G ver 08.0:<br><br>Gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required |
| Purpose of data/parameter                            | Calculation of leakage emissions   |
| Additional comments                                  | The parameter value is fixed ex ante at PoA level  |

|  |   |
|--|---|
| <b>Data / Parameter</b>                              | Life Span   |
| Unit   | Number of years   |
| Description  | Operating life time of S 26-13 and S 32-13  |
| Source of data                                       | Manufacturer specification  |
| Value(s) applied                                     | 5   |
| Choice of data or measurement methods and procedures | Fixed and recorded at the time of commissioning/distribution  |
| Purpose of data/parameter                            | Calculation of baseline emissions   |
| Additional comments                                  | Project devices will be removed after completing life span and no emission reductions will be claimed |

|  |  |
|--|--|
| <b>Data / Parameter</b>                              | $B_{old,HH}$   |
| Unit   | tonnes/household/year  |
| Description  | Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices  |
| Source of data                                       | UN Database<br>( <a href="http://data.un.org/Data.aspx?d=EDATA&amp;f=cmID%3AFW%3BtrID%3A1231">http://data.un.org/Data.aspx?d=EDATA&amp;f=cmID%3AFW%3BtrID%3A1231</a> ) year 2016<br><br>The 2014 Myanmar Population and Housing Census The Union Report Census Report Volume 2, 2015 Table 13<br>( <a href="https://myanmar.unfpa.org/en/publications/union-report-volume-2-main-census-report">https://myanmar.unfpa.org/en/publications/union-report-volume-2-main-census-report</a> ) |
| Value(s) applied                                     | 4.18   |
| Choice of data or measurement methods and procedures | Historical data  |
| Purpose of data/parameter                            | Calculation of baseline emissions  |
| Any comments   | Decided at CPA level   |

|                         |  |
|-------------------------|--|
| <b>Data / Parameter</b> | $B_{old,i,j}$  |
| Unit                    | tonnes/year  |
| Description             | Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type <i>i</i> and batch <i>j</i> |

|  |   |
|--|---|
| Source of data                                       | Calculated parameter to be fixed ex-ante  |
| Value(s) applied                                     | 4.18  |
| Choice of data or measurement methods and procedures | AMS.II-G ver 08.0 Equation 9<br>$B_{old,HH}$ divided by $N_{d,HH}$ (number of project device/household)                               |
| Purpose of data/parameter                            | Calculation of baseline emissions   |
| Any comments   | CME has distributed only one improved stove per household. Therefore $N_{d,HH}$ is equal to one and $B_{old,i,j}$ equals $B_{old,HH}$ |

## E.2. Data and parameters monitored

|                                       |   |
|---------------------------------------|---|
| Data/Parameter                        | $N_{y,i,j}$   |
| Unit                                  | Number of units   |
| Description                           | Number of project devices of type $i$ and batch $j$ operating during year $y$   |
| Measured/calculated/default           | Calculated  |
| Source of data                        | Project database and monitoring survey  |
| Value(s) of monitored parameter       | 164373  |
| Monitoring equipment                  | Not Applicable  |
| Measuring/reading/recording frequency | At least once in every two years (biennial)   |
| Calculation method (if applicable)    | <p>All distributed ICS were recorded in the project database for the distribution date and the recipient's location. The total number of ICS by type and age group deployed during the selected monitoring period can be tracked in the project database of the CPA.</p> <p>The number of ICS operating under the CPA was determined by conducting a sampling survey. The exact number of ICS operating under the CPA is based on fraction of ICS of type (S 32-13 and S 26-13) and age group (1-365 days and 366-730 days) found operational in the sampling survey multiplied by total number of ICS of type (S 32-13 and S 26-13) and age group (1-365 days and 366-730) in the project database.</p> <p>Sampling survey was carried out according to the sampling plan mentioned in section B.7.2 of the PoA-DD</p> |
| QA/QC procedures                      | A 95 per cent confidence interval and a 10 per cent margin has been applied for the sampling parameter  |
| Purpose of data/parameter             | Calculation of baseline emissions   |
| Additional comments                   | <p>During the ex-post monitoring survey presence of additional ICS was cross-checked on sampling basis and total ICS population has been discounted by the fraction of sampled household found using more than one project ICS.</p> <p>Electronic copy of data sources will be archived for two years</p>   |

|                  |   |
|------------------|---|
| Data / Parameter | $\eta_{new,i,j}$  |
| Unit             | Fraction  |
| Description      | Efficiency of the project device of each type $i$ and batch $j$ |

| Measured/calculated/default           | Calculated   |                  |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
|---------------------------------------|--|------------------|-----------------------------------|------------------|-----------------------------------|-----------|-----------------------------|--------|------------|------------|--------|---------------------|---------|------------|------------|--------|------------------------|------|------------|------------|--------|
| Source of data                        | Water Boiling Test Results   |                  |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Value(s) applied                      | <table border="1"> <tr> <td>ICS Model</td><td>Age (Days)</td><td><math>\eta_{new,i,j}</math></td></tr> <tr> <td rowspan="2">S 26-13</td><td>366-730</td><td>0.2989</td></tr> <tr> <td>1-365</td><td>0.2962</td></tr> <tr> <td>S 32-13</td><td>1-365</td><td>0.3879</td></tr> </table>  | ICS Model        | Age (Days)                        | $\eta_{new,i,j}$ | S 26-13                           | 366-730   | 0.2989                      | 1-365  | 0.2962     | S 32-13    | 1-365  | 0.3879              |         |            |            |        |                        |      |            |            |        |
| ICS Model                             | Age (Days)   | $\eta_{new,i,j}$ |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| S 26-13                               | 366-730  | 0.2989           |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
|                                       | 1-365  | 0.2962           |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| S 32-13                               | 1-365  | 0.3879           |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Monitoring equipment                  | <table border="1"> <tr> <th>Equipment</th><th>Accuracy</th><th>Calibration Date</th><th>Recommended Next Calibration Date</th><th>Frequency</th></tr> <tr> <td>Electronic weighing machine</td><td>1 gram</td><td>18/01/2019</td><td>17/01/2020</td><td>Annual</td></tr> <tr> <td>Digital Thermometer</td><td>0.1 C</td><td>17/09/2019</td><td>16/09/2020</td><td>Annual</td></tr> <tr> <td>Digital Moisture meter</td><td>0.1%</td><td>25/09/2019</td><td>24/09/2020</td><td>Annual</td></tr> </table>  | Equipment        | Accuracy                          | Calibration Date | Recommended Next Calibration Date | Frequency | Electronic weighing machine | 1 gram | 18/01/2019 | 17/01/2020 | Annual | Digital Thermometer | 0.1 C   | 17/09/2019 | 16/09/2020 | Annual | Digital Moisture meter | 0.1% | 25/09/2019 | 24/09/2020 | Annual |
| Equipment                             | Accuracy   | Calibration Date | Recommended Next Calibration Date | Frequency        |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Electronic weighing machine           | 1 gram   | 18/01/2019       | 17/01/2020                        | Annual           |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Digital Thermometer                   | 0.1 C  | 17/09/2019       | 16/09/2020                        | Annual           |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Digital Moisture meter                | 0.1%   | 25/09/2019       | 24/09/2020                        | Annual           |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Measuring/reading/recording frequency | Adjusted for the loss of efficiency as per paragraph 25 (d) of the AMSII.G ver 08  |                  |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Calculation method (if applicable)    | <p>As per the registered CPA-DD page 22 and 23, nine stoves: 3 units of S26-13 (more than 1 year old) 3 units of S26-13 (less than 1 year old) and 3 units of S32-13 (less than 1 year old), with three tests conducted for each stove therefore, total twenty-seven tests were conducted</p> <p>The standard deviation of the twenty-seven test results is narrow and 90/10 precision requirement is met</p> <table border="1"> <tr> <th>ICS Model</th><th>Age (Days)</th><th>SD</th><th>Margin of Error</th></tr> <tr> <td rowspan="2">S 26-13</td><td>366-730</td><td>0.0098</td><td>1.79%</td></tr> <tr> <td>1-365</td><td>0.0231</td><td>4.28%</td></tr> <tr> <td>S 32-13</td><td>1-365</td><td>0.0088</td><td>1.25%</td></tr> </table> | ICS Model        | Age (Days)                        | SD               | Margin of Error                   | S 26-13   | 366-730                     | 0.0098 | 1.79%      | 1-365      | 0.0231 | 4.28%               | S 32-13 | 1-365      | 0.0088     | 1.25%  |                        |      |            |            |        |
| ICS Model                             | Age (Days)   | SD               | Margin of Error                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| S 26-13                               | 366-730  | 0.0098           | 1.79%                             |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
|                                       | 1-365  | 0.0231           | 4.28%                             |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| S 32-13                               | 1-365  | 0.0088           | 1.25%                             |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| QA/QC procedures                      | Based on WBT protocol 4.2.3  |                  |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Purpose of data                       | Calculation of baseline emissions  |                  |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |
| Additional comments                   | For the subsequent monitoring of the same CPA, the previously monitored value of thermal efficiency shall be used for ex-ante purposes. If thermal efficiency of the project devices falls below 20 percent no emission reductions will be claimed   |                  |                                   |                  |                                   |           |                             |        |            |            |        |                     |         |            |            |        |                        |      |            |            |        |

|                  |  |
|------------------|--|
| Data / Parameter | Date of commissioning of project device i          |
| Unit             | Date   |
| Description      | Actual date of commissioning of the project device |

|                                       |  |
|---------------------------------------|--|
| Measured/calculated/default           | Measured   |
| Source of data                        | Project database   |
| Value(s) applied                      | Refer project database   |
| Monitoring equipment                  | Not applicable   |
| Measuring/reading/recording frequency | Recorded at the time of distribution of project devices to the end user  |
| Calculation method (if applicable)    | The distribution is referred to the date on which end user has received project device   |
| QA/QC procedures                      | If it was found that ICS is no longer in use during monitoring survey and spot checks, it was accounted as not in use over the entire monitoring period.                   |
| Purpose of data                       | Calculation of baseline emissions  |
| Additional comments                   | The CME has considered next day after the date of distribution of ICS as the start date of crediting period of ICS. Electronic copy of record will be archived for 2 years |

|                                       |   |
|---------------------------------------|---|
| <b>Data / Parameter</b>               | Date of commissioning of batch <i>j</i>   |
| Unit                                  | Date  |
| Description                           | To establish the date of commissioning, the Project Participant may opt to group the devices in “batches” and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch |
| Measured/calculated/default           | Each sale will be recorded in Project database along with the name of recipient, contact details, location of household (village, district etc)   |
| Source of data                        | Project database  |
| Value(s) applied                      | Not applicable  |
| Monitoring equipment                  | Not applicable  |
| Measuring/reading/recording frequency | Fixed and recorded at the time of commissioning/distribution of the last project device in the batch  |
| Calculation method (if applicable)    | Not applicable  |
| QA/QC procedures                      | Not applicable  |
| Purpose of data                       | Calculation of baseline emissions   |



|                     |   |
|---------------------|---|
| Additional comments | To establish the date of commissioning project device, the Project Participant has not opted to group the devices in “batches” and the actual date of distribution of each project device has been used. Therefore reporting of this parameter is not applicable. |
|---------------------|---|

|                                       |   |
|---------------------------------------|---|
| <b>Data / Parameter</b>               | $\mu_y$   |
| Unit                                  | Fraction  |
| Description                           | Adjustment to account for any continued use of pre-project devices during the year $y$  |
| Measured/calculated/default           | Calculated  |
| Source of data                        | Monitoring survey   |
| Values applied                        | 0.8440  |
| Monitoring equipment                  | Not applicable  |
| Measuring/reading/recording frequency | At least once in every two years (biennial)   |
| Calculation method (if applicable)    | Household survey was conducted. The survey captured the cooking habits and ICS usage of households in the project area, including quantification of use of baseline devices, by formulating questions to determine the frequency of usage of both, the project devices and baseline devices.<br>Sampling survey was carried out according to the sampling plan mentioned in section B.7.2 of the PoA-DD |
| QA/QC procedures                      | A 95 per cent confidence interval and a 10 per cent margin of error has been selected   |
| Purpose of data                       | Calculation of baseline emissions   |
| Additional comments                   | All data sources will be archived for two years   |

| <b>Data / Parameter</b>               | $N_{d,HH}$  |          |            |         |   |         |   |
|---------------------------------------|---|----------|------------|---------|---|---------|---|
| Unit                                  | Number  |          |            |         |   |         |   |
| Description                           | Number of project devices distributed per household   |          |            |         |   |         |   |
| Measured/calculated/default           | Measured  |          |            |         |   |         |   |
| Source of data                        | Project database  |          |            |         |   |         |   |
| Value(s) applied                      | <table border="1"> <tr> <th>ICS Type</th><th><math>N_{d,HH}</math></th></tr> <tr> <td>S 26-13</td><td>1</td></tr> <tr> <td>S 32-13</td><td>1</td></tr> </table> | ICS Type | $N_{d,HH}$ | S 26-13 | 1 | S 32-13 | 1 |
| ICS Type                              | $N_{d,HH}$  |          |            |         |   |         |   |
| S 26-13                               | 1   |          |            |         |   |         |   |
| S 32-13                               | 1   |          |            |         |   |         |   |
| Monitoring equipment                  | Not applicable  |          |            |         |   |         |   |
| Measuring/reading/recording frequency | Recorded at the time of distribution of project devices   |          |            |         |   |         |   |

|                                       |  |
|---------------------------------------|--|
| Calculation method<br>(if applicable) | Recorded at the time of distribution of project devices and it was crosschecked with user details having number of ICS   |
| QA/QC procedures                      | CME has distributed only one improved stove per household. Therefore $N_{d,HH}$ is equal to one. Project database was checked and households that have received more than one ICS were identified and additional ICS(s) were removed from the project database and emission reduction calculation. |
| Purpose of data                       | Calculation of baseline emissions  |
| Additional comments                   | All data sources will be archived for two years  |

### E.3. Implementation of sampling plan

>>

As of now only one CPA i.e. CPA MM 02 is active under the PoA. The number of ICS distributed under the CPA are as follows:

Table 6: ICS Distributed under the CPA

| CPA Monitoring Period |         |         |            |         |         | 12/01/2019 to 12/09/2019 |         |         |         |               |
|-----------------------|---------|---------|------------|---------|---------|--------------------------|---------|---------|---------|---------------|
| Region                | Yangon  |         | Ayeyarwady |         |         | Bago                     |         | Sagaing | Shan    | CPA MM02 MP02 |
| ICS Model             | S 26-13 |         |            |         | S 32-13 | S 26-13                  |         |         |         | ICS           |
| Age (Days)            | 1-365   | 366-730 | 1-365      | 366-730 | 1-365   | 1-365                    | 366-730 | 366-730 | 366-730 | MP 02         |
| Total                 | 14      | 728     | 2,566      | 1,438   | 168,018 | 56                       | 297     | 1,379   | 519     | 175,015       |

#### Sampling Plan

The CPA involves distribution of ICS throughout the project area thereby replacing traditional cookstoves. The population is heterogeneous in nature i.e. common technology with similar operating characteristics but dispersed i.e. distribution of ICS is spread across many provinces. The population consists of sub-populations which are homogeneous called Strata. The characteristics of the population (for example quantity of biomass consumed) are more similar within the stratum (ICS of same type, age group and provinces in which they are operating) than across the strata. Therefore, Stratified Sampling technique was adopted to conduct sampling survey.

To ensure representativeness of the population, dissimilarity (such as ICS type, age group and provinces in which they are operating) within the included CPA has been taken into account in the sample size calculation. The ICS of same type, age group and province in which they are operating were grouped in the same strata.

#### (a) Procedure of Stratified Sampling

In stratified sampling, the population elements i.e. ICS shall be grouped into mutually exclusive, non-overlapping groups of sample units called strata. Every ICS can be assigned to only one stratum in such a way that no ICS will be excluded.

- 1) Segregating total number of ICS operating under the CPA into sub-groups or strata based on ICS type, age group and province where they are located;

- 2) Calculating total sample size and then sample size for each strata;
- 3) Drawing sample from each stratum according to the sample size through simple random sampling method using random number generator.

(b) *Target population*

The target population includes all ICS using Households (HHs) in the project database (PD), which are end-users of the project technology. This represented total 166,663 HHs.

(c) *Sample Frame*

Total number of ICS operating under the PoA were separated into sub-groups or strata based on ICS type (S 26-13 and S 32-13), age group (1 to 365 days and 366 to 730) and Region where they are located:

Table 7: Sample Frame

| CPA Monitoring Period |         |         |            |         |         | 12/01/2019 to 12/09/2019 |         |         |         |
|-----------------------|---------|---------|------------|---------|---------|--------------------------|---------|---------|---------|
| Region                | Yangon  |         | Ayeyarwady |         |         | Bago                     |         | Sagaing | Shan    |
| ICS Model             | S 26-13 |         |            |         | S 32-13 | S 26-13                  |         |         |         |
| Age (Days)            | 1-365   | 366-730 | 1-365      | 366-730 | 1-365   | 1-365                    | 366-730 | 366-730 | 366-730 |
| Sample Frame          | 14      | 728     | 2,566      | 1,438   | 168,018 | 56                       | 297     | 1,379   | 519     |

(d) *Sample Selection*

A stratified sampling method has been used to select the sample for PS. Excel's built-in random number generator was used to generate random numbers. Sample size was calculated as per the formula described in the registered PoA DD. The expected values of parameters (mean, standard deviation and proportion) have been determined by using the CME's knowledge and experience<sup>9</sup>.

Table 8: Sample Size

| CPA Monitoring Period         |                |  |         |            |         | 12/01/2019 to 12/09/2019 |         |         |         |         |
|-------------------------------|----------------|--|---------|------------|---------|--------------------------|---------|---------|---------|---------|
| Region                        |                | Yangon   |         | Ayeyarwady |         | Bago                     |         | Sagaing | Shan    |         |
| ICS Model                     |                | S 26-13  |         |            |         | S 32-13                  | S 26-13 |         |         |         |
| Age (Days)                    |                | 1-365  | 366-730 | 1-365      | 366-730 | 1-365                    | 1-365   | 366-730 | 366-730 | 366-730 |
| Sample Frame                  |                | 14   | 728     | 2,566      | 1,438   | 168,018                  | 56      | 297     | 1,379   | 519     |
| Sample Size                   |                | 1  | 1       | 2          | 1       | 93                       | 1       | 1       | 1       | 1       |
| $N_{y,i,j}^{10}$              | Calcu<br>lated |  |         |            |         |                          |         |         |         |         |
| $\mu_y^{11}$                  | Calcu<br>lated | 1  | 1       | 2          | 1       | 106                      | 1       | 1       | 1       | 1       |
| Oversample Size <sup>12</sup> |                | 3  | 3       | 3          | 3       | 116                      | 3       | 3       | 3       | 3       |
| $\eta_{new,i,j}$              |                | As per the registered CPA DD page 22 and 23, nine stoves: 3 units of S26-13 (more than 1 year old) 3 units of S26-13 (less than 1 year old) and 3 units of S32-13 (less than |         |            |         |                          |         |         |         |         |

<sup>9</sup>Sampling and surveys for CDM project activities and programmes of activities, version 07.0, para 12 (b) and 12 (c)

<sup>10</sup>Expected Result-0.80, Confidence Interval 95%, Margin of Error 10%

<sup>11</sup>Expected Result-0.75, Standard Deviation 0.4, Confidence Interval 95%, Margin of Error 10%

<sup>12</sup>It is a good practice to employ **oversampling** at the design stage, not only to compensate for any attrition, outliers or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved and additional sampling efforts would be required. This would then be expensive, time-consuming and inconvenient.

|  |   |
|--|---|
|  | 1 year old), with three tests conducted on each stove therefore total twenty seven tests were conducted |
|--|---|

Table 9: Survey Results

| Parameter   | Data Type  | Expected Results         | Precision Level     |                 | Actual Results                      | Precision Level Achieved |
|-------------|------------|--------------------------|---------------------|-----------------|-------------------------------------|--------------------------|
|             |            |                          | Confidence Interval | Margin of Error |                                     | Margin of Error          |
| $N_{y,i,j}$ | Proportion | 0.80                     | 95 %                | 10 %            | 0.9392                              | 4.45%                    |
| $\mu_y$     | Mean       | 0.75 (Mean),<br>0.4 (SD) | 95 %                | 10 %            | 0.8440<br>(Mean),<br>0.0183<br>(SD) | 4..25%                   |

## Result-Thermal Efficiency

| ICS Model | Age (Days) | Confidence Interval | Margin of Error | $\eta_{new,i,j}$ | SD     | Margin of Error |
|-----------|------------|---------------------|-----------------|------------------|--------|-----------------|
| S 26-13   | 366-730    | 90                  | 10              | 0.2989           | 0.0098 | 1.79%           |
|           | 1-365      | 90                  | 10              | 0.2962           | 0.0231 | 4.28%           |
| S 32-13   | 1-365      | 90                  | 10              | 0.3879           | 0.0088 | 1.25%           |

## (e) Survey

Data for  $N_{y,i,j}$  and  $\mu_y$  was collected through questionnaire form method and for  $\eta_{new,i,j}$  by conducting the WBT. On-site survey was conducted to determine  $N_{y,i,j}$ ,  $\mu_y$  by checking usage of ICS by the households. End user were interviewed to verify that ICS is still in use or not.

**SECTION F. Calculation of emission reductions or net anthropogenic removals****F.1. Calculation of baseline emissions or baseline net removals**

&gt;&gt;

As per applicable methodology, AMS-II.G. version 08.0 ; formula to calculate emission reductions (ERs) is:

$$ER_y = \sum_i \sum_j ER_{y,i,j} - LE_y \quad \text{Equation (1)}$$

Where

- $i$  = Indices for the situation where more than one type of project device is introduced to replace the pre-project devices<sup>13</sup>
- $j$  = Indices for the situation where there is more than one batch of project device
- $ER_y$  = Emission reductions during year  $y$  in t CO<sub>2</sub>e
- $ER_{y,i,j}$  = Emission reductions by project device of type  $i$  and batch  $j$  during year  $y$  in t CO<sub>2</sub>e
- $LE_y$  = Leakage emissions in the year  $y$

Where

<sup>13</sup> For example, in some instances, full replacement of the pre-project device would require the implementation of more than one project device (e.g. one stove suitable for cooking and the other stove suitable for cooking/boiling water)

$$ER_{y,i,j} = B_{y,savings,i,j} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel}$$

Equation (2)

Where

|                              |   |   |
|------------------------------|---|---|
| $B_{y,savings,i,j}$          | = | Quantity of woody biomass that is saved in tonnes per cook stove device of type $i$ and batch $j$ during year $y$   |
| $f_{NRB,y}$                  | = | Fraction of woody biomass that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website |
| $NCV_{biomass}$              | = | Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, based on the gross weight of the wood that is 'air-dried')  |
| $EF_{projected\_fossilfuel}$ | = | Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 t CO <sub>2</sub> /TJ <sup>14</sup>   |
| $N_{y,i,j}$                  | = | Number of project devices of type $i$ and batch $j$ operating during year $y$   |
| $\mu_y$                      | = | Adjustment to account for any continued use of pre-project devices during the year $y$ when applying equations 6 and 8 (fraction). Use 1.0 in other cases   |

To calculate  $B_{y,savings,i,j}$  CPAs will use equation 6 of option 3 of the AMS-II.Gver 08

$$B_{y,savings,i,j} = B_{old,i,j} \times \left(1 - \frac{\eta_{old,i,j}}{\eta_{new,i,j}}\right) \quad \text{Equation (6)}$$

Where

|                          |     |   |
|--------------------------|-----|---|
| $B_{old,i,j}$            | =   | Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type $i$ and batch $j$                  |
| $B_{y=1,new,i,j,survey}$ | =   | Quantity of woody biomass used by project devices in tonnes per device of type $i$ and batch $j$  |
| $\eta_{new,i,j}$         | =   | Efficiency of the device of each type $i$ and batch $j$ implemented as part of the project activity   |
|                          | (f) |   |
| $\eta_{old,i,j}$         | =   | Efficiency of pre - project device, which is a three stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney; |

$$B_{old,i,j} = (B_{old,HH}/N_{d,HH}) \quad \text{Equation (9)}$$

Where

$B_{old,HH}$  = Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices

<sup>14</sup> This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices) and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50 per cent weight is assigned to coal as the alternative solid fossil fuel (96 t CO<sub>2</sub>/TJ) and a 25 per cent weight is assigned to both liquid and gaseous fuels (71.5 t CO<sub>2</sub>/TJ for kerosene and 63.0 t CO<sub>2</sub>/TJ for liquefied petroleum gas (LPG))

$N_{d,HH}$  = Number of project device per household

Table 10: ER Calculation Parameters

| S No | Description  | Parameter                            | Unit                 | Value  | Comment  |
|------|--|--------------------------------------|----------------------|--|--|
| 1    | Efficiency of pre - project device, which is a three stone fire using firewood (not charcoal), or a conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney | $\eta_{old,i,j}$                     | Fraction             | 0.10   | Default value fixed ex ante at CPA level                           |
| 2    | Efficiency of the device of each type $i$ and batch $j$ implemented as part of the project activity  | $\eta_{new,i,j,S26-13}$<br>(366-730) | Fraction             | 0.2989   | Monitored at CPA level   |
|      |  | $\eta_{new,i,j,S26-13}$<br>(1-365)   |                      | 0.2962   |  |
|      |  | $\eta_{new,i,j,S32-13}$<br>(i-365)   |                      | 0.3879   |  |
| 3    | Adjustment to account for any continued use of pre-project devices during the year $y$ when applying equations 6 and 8 (fraction). Use 1.0 in other cases  | $\mu_y$                              | Fraction             | 0.8440   | Monitored at CPA level   |
| 4    | Fraction of non-renewable biomass  | $f_{NRB}$                            | Fraction             | 0.8832   | Fixed ex ante at CPA level   |
| 5    | Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne, based on the gross weight of the wood that is 'air-dried')   | $NCV_{biomass}$                      | TJ/tonne             | 0.015  | Default value fixed ex ante at PoA level                           |
| 6    | Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 t CO <sub>2</sub> /TJ  | $EF_{projected\_fossilfuel}$         | tCO <sub>2</sub> e/t | 81.6   | Default value fixed ex ante at PoA level                           |
| 7    | Leakage Factor   | $LF$                                 | Factor               | Net to gross adjustment factor of 0.95. Fixed Ex ante at PoA level | Net to gross adjustment factor of 0.95. Fixed Ex ante at PoA level |
| 8    | Number of project devices of type $i$ and batch $j$ operating during year $y$  | $N_{y,i,j}$                          | Number               | 164373   | Calculated   |
| 9    | Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type $i$ and batch $j$                 | $B_{old,i,j}$                        | tonnes/hh/yr         | 4.18   | Calculated at CPA level  |
| 10   | Annual quantity of woody biomass that would have been used in the household in the absence of the  | $B_{old,HH}$                         | tonnes/hh/yr         | 4.18   | Historical data. Fixed Ex ante at PoA level                        |

|    |   |                            |                   |        |                        |
|----|---|----------------------------|-------------------|--------|------------------------|
|    | project activity to generate useful thermal energy equivalent to that provided by the project devices |                            |                   |        |                        |
| 11 | Number of project device per household  | $N_{d,HH}$                 | Number            | 1      | Monitored at CPA level |
| 12 | Leakage emissions per ICS in the year y   | $LE_{i,j,S26-13(366-730)}$ | tCO <sub>2e</sub> | 0.1270 | Calculated             |
|    |   | $LE_{i,j,S26-13(1-365)}$   |                   | 0.1264 |                        |
|    |   | $LE_{j,S32-13(1-365)}$     |                   | 0.1417 |                        |
| 13 | Emission reductions by each project device of type i during year y in t CO <sub>2e</sub>              | $ER_{i,j,S26-13(366-730)}$ | tCO <sub>2e</sub> | 2.4135 | Calculated             |
|    |   | $ER_{i,j,S26-13(1-365)}$   |                   | 2.4023 |                        |
|    |   | $ER_{j,S32-13(1-365)}$     |                   | 2.6918 |                        |

## F.2. Calculation of project emissions or actual net removals

>>Not applicable.

## F.3. Calculation of leakage emissions

>>

AMS.II.G., version 08.0 suggests two sources of leakage:

- a) Leakage related to the non-renewable woody biomass saved by the project activity. This was assessed by the following method:

$B_{y,savings,i,j}$  is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.

Table 11: Leakage Calculation

| Model                              | Formula   | Value  |
|------------------------------------|---|--------|
| $LE_{i,j,S26-13(366-730)/unit/yr}$ | $B_{y,savings,i,j,26-13(366-730)} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel}^* (1 - 0.95)$ | 0.1270 |
| $LE_{i,j,S26-13(1-365)/unit/yr}$   | $B_{y,savings,i,j,26-13(1-365)} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel}^* (1 - 0.95)$   | 0.1264 |
| $LE_{j,S32-13(1-365)/unit/yr}$     | $B_{y,savings,i,j,32-13(1-365)} \times N_{y,i,j} \times \mu_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\ fuel}^* (1 - 0.95)$   | 0.1417 |

- b) If devices currently being utilised outside the project boundary are transferred to the project activity, then leakage is to be considered.

No transfer of project devices from outside to the project activity area, hence this type of leakage was not considered.

**F.4. Calculation of emission reductions or net anthropogenic removals**

| CPA UNFCCC reference number | Baseline GHG emissions or baseline net GHG removals (t CO <sub>2</sub> e) | Project GHG emissions or actual net GHG removals (t CO <sub>2</sub> e) | Leakage GHG emissions (t CO <sub>2</sub> e) | GHG emission reductions or net anthropogenic GHG removals (t CO <sub>2</sub> e) |                 |              |
|-----------------------------|---|--|---|---|-----------------|--------------|
|                             |   |  |   | Before 01/01/2013   | From 01/01/2013 | Total amount |
| 10415-P1-0002-CP1           | 216178  | 0  | 10809                                       | 0   | 205369          | 205369       |
| <b>Total</b>                | 216178  | 0  | 10809                                       | 0   | 205369          | 205369       |

**F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs**

| CPA UNFCCC reference number | Amount achieved during this monitoring period (tCO <sub>2</sub> e) | Amount estimated ex ante for this monitoring period in the CPA-DD (t CO <sub>2</sub> e) |
|-----------------------------|--|---|
| 10415-P1-0002-CP1           | 205369   | 209508  |
| <b>Total</b>                | 205369   | 209508  |

**F.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the CPA-DD”**

&gt;&gt;

As per the registered CPA DD, for ICS S 26-13 annual emission reductions of 2.276 tCO<sub>2</sub>e/yr/unit and for ICS S32-13 annual emission reductions of 2.581 tCO<sub>2</sub>e/yr/unit were estimated. Therefore, following unitary method, the amount of estimated ex-ante for this monitoring period has been identified.

Table 12: Estimated Ex-ante Calculation<sup>15</sup>

| CPA   | ERs in MP02 | Ex-Ante ERs |
|-------|-------------|-------------|
| Total | 205369      | 209508      |

**F.6. Remarks on increase in achieved emission reductions**

&gt;&gt;There is no increase in the achieved emission reductions.

**F.7. Remarks on scale of small-scale CPAs**

&gt;&gt;

According to the registered CPA DD section *F* subsection *k*- *Where applicable, the conditions that ensure that every CPA meets the small-scale or microscale threshold and remains within those thresholds throughout the crediting period of the CPA. However, for a CPA that consists of only units that qualify as microscale CDM units” as defined in the methodological tool “Demonstration of additionality of microscale project activities”, this condition is not required.*

The annual energy savings of ICS S 26-13 (366-730), S 26-13 (1-365) and ICS S 32-13 (1-365) for this monitoring period is only 11.60 MWh<sup>th</sup>, 11.55 MWh<sup>th</sup> and 12.94 MWh<sup>th</sup> respectively<sup>16</sup> which is less than 1% of

<sup>15</sup>Please refer ER calculation sheet for details<sup>16</sup>Please refer ER calculation sheet for details



the small-scale CDM thresholds i.e. 1800 MWh<sup>17</sup> and also satisfies the condition i.e. annual energy savings of no more than 20 GWh/year to qualify as a microscale CDM unit<sup>18</sup>. Therefore compliance of the CPA with the small-scale thresholds at the aggregate level of the CPA is not required.

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<sup>17</sup>CDM project standard for programmes of activities version 02.0. Paragraph 122

<sup>18</sup>Methodological tool Demonstration of additionality of microscale project activities Version 09.0. Paragraph 12

## Document information

| <i>Version</i>   | <i>Date</i>  | <i>Description</i>  |
|--|--------------|---|
| 03.0   | 31May 2019   | Revision to: <ul style="list-style-type: none"> <li>• Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN);</li> <li>• Add a section on remarks on the observance of the scale limit of small-scale CPAs during the crediting periods;</li> <li>• Add "changes specific to afforestation or reforestation activities/CPA" as a possible post-registration changes;</li> <li>• Clarify the reporting of net anthropogenic GHG removals for A/R PoAs between two commitment periods;</li> <li>• Make structural and editorial improvements.</li> </ul> |
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