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

MONITORING REPORT		
Title of the PoA	IDCOL Improved Cook Stove Program	
UNFCCC reference number of the PoA	10512	
Version numbers of the PoA-DD applicable to this monitoring report	03	
Version number of this monitoring report	04	
Completion date of this monitoring report	24/12/2020	
Monitoring period number	01	
Duration of this monitoring period	15/01/2020 to 31/08/2020 (Inclusive of both days)	
Monitoring report number for this monitoring period	01	
Coordinating/managing entity	Infrastructure Development Company Limited	
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)
	Republic of Bangladesh	Yes
Applied methodologies and standardized baselines	Methodologies: AMS-II.G. ver. 10- Energy efficiency measures in thermal applications of non-renewable biomass Standard Basleine: Not Applicable	
Sectoral scopes	3 : Energy demand	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0 tCO_2e	456,395 tCO2e
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	805,691 tCO_2e	

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

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The objectives of the IDCOL ICS program is to reduce GHG emissions, solid fuel use for cooking and the impact of HAP - which disproportionally affects women and children - by creating a sustainable market-based approach towards adoption of higher efficiency cook-stoves in the country. The program aims to develop a sustainable market for ICS by supporting development of a supply chain in rural Bangladesh and creating demand for ICS with the goal of achieving 100% coverage of ICS by 2030 as per Bangladesh Government's Country Action Plan for Clean Cookstoves.

A number of types of stoves are included in the program: portable stoves, single and double mouth chimney stoves including commercial stoves and metallic stoves. In this PoA, IDCOL intends to increase the share of higher efficiency stoves, which have greater impact in terms of reducing GHG emissions and household air pollution. The CPA under the PoA aid in reducing greenhouse gas (GHG) emissions by replacing traditional wood-fuel three stone stoves with wood-fuel ICS. The replacement of traditional stoves by ICS improves heat transfer to the cooking utensil thereby reducing the amount of fuel (non-renewable biomass) required for cooking. A reduction in consumption of non-renewable biomass contributes towards reduction in GHG emissions into the atmosphere. Thus, ICS reduce GHG emissions through their improved thermal efficiency as compared to traditional/ baseline stoves.

In accordance with version 10.0 of the small-scale CDM methodology AMS-II.G., in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs. This program is managed by Infrastructure Development Company Limited (IDCOL) as the Coordinating/Managing Entity (CME). IDCOL will coordinate with different CPA implementers, as applicable. The PoA is a voluntary action by the CME.

During the current monitoring period 456,395 tCO_2e GHG emission reduction achieved by CPA.

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: IDCOL Improved Cook Stove Program – CPA 01 Reference No.: CPA 01 Date 17/12/2019	Version 03 Date 17/09/2019	Sectoral Scope 3 : Energy demand	Methodologies: AMS-II.G.:" "Energy efficiency measures in thermal applications of non-renewable biomass (ver. 10) Standardized Baseline: Not applicable

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)
Title: IDCOL Improved Cook Stove Program – CPA 01	Version 03 Date 17/09/2019	Title: IDCOL Improved Cook Stove Program – CPA 01	Type: Fixed Duration: 15/01/2020 -	Yes

Reference Number: 10512-P1-0001-CP1		Generic Reference No.: CPA 01 Date 17/12/2019	14/01/2030	

A.2. Coordinating/managing entity

Infrastructure Development Company Limited

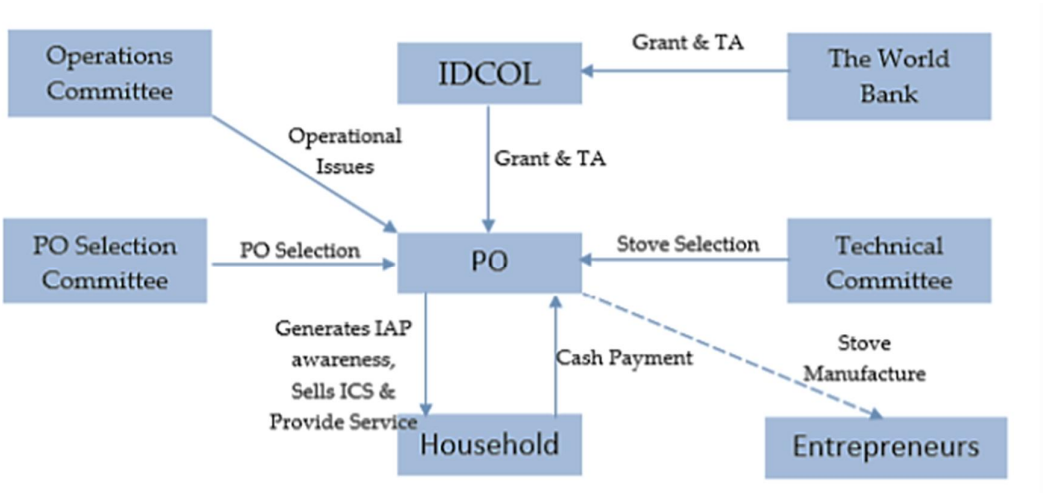
SECTION B. Implementation of PoA

B.1. Description of implemented PoA

IDCOL as the CME of the PoA has a dedicated Project Management Unit (PMU), whereas IDCOL Board is responsible for oversight, policy guidance and monitoring of the PMUs. IDCOL will implement the PoA with the help of Partner Organizations (PO) who are mostly NGOs or MFI or Private entity. IDCOL channels grant and capacity building supports to the POs for implementation of the program with the financial assistance from the World Bank. POs conduct demand creation activities and sell ICS and provide after sales services to the households. The POs may engage local entrepreneurs in ICS Manufacturing and Installation activities.

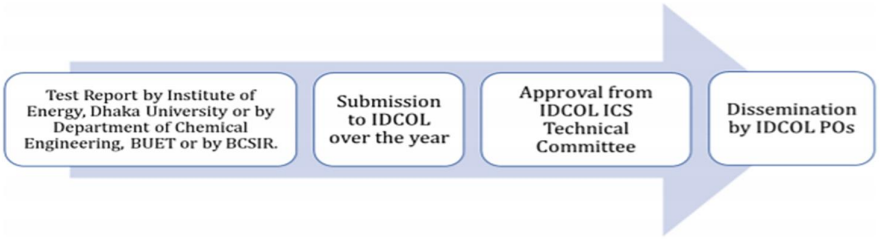
An independent PO Selection committee selects the POs to work under the program as per an approved selection criterion whereas an independent Technical Committee (TC) determines technical standards, approves eligible stove models to be sold under the program and provides technical guidance. An Operational Committee (OC) consisting representatives from IDCOL and POs sits monthly to discuss implementation status and operational issues under the program. IDCOL adopted a cluster-based approach for program implementation where each Upazila (Subdistrict) consists of a cluster and preferably only one PO working in a particular cluster.

The overall structure of the PoA is depicted in the following figure:

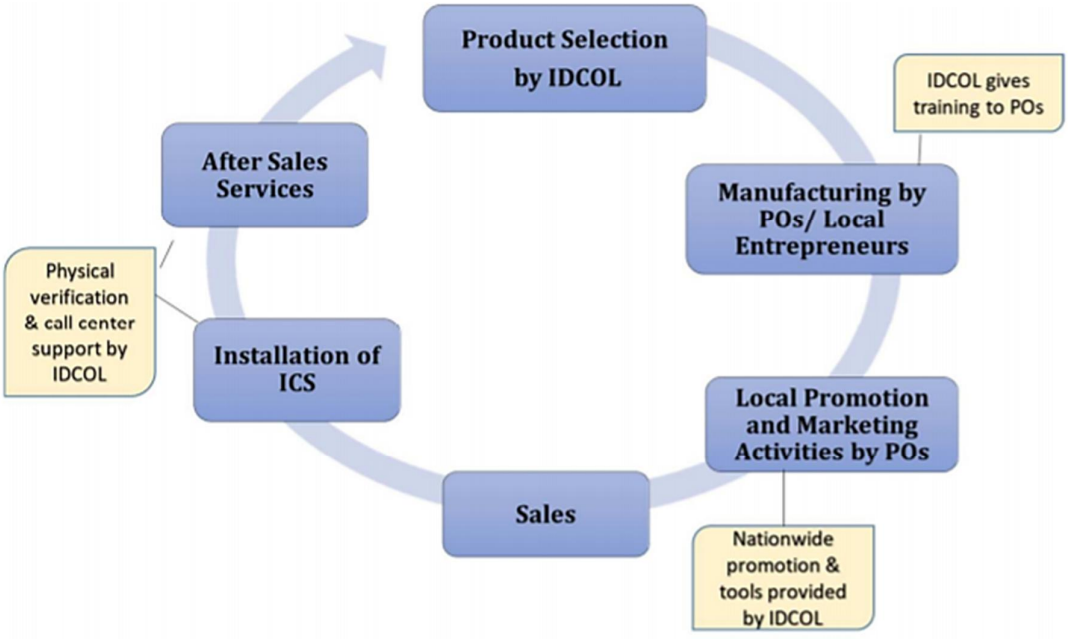


PO is responsible for the following: • Promotion and awareness campaign in the cluster; • Capacity development at cluster level with a view to ensuring 100% penetration of ICS.

The selection of the ICS is done as per the following stove inclusion procedure:

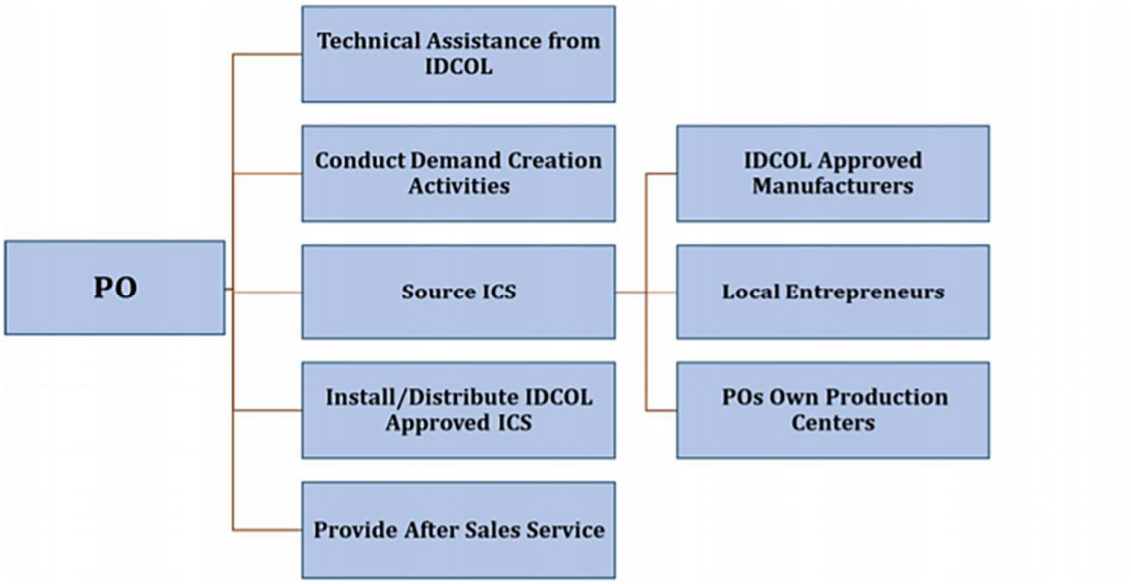


For stove distribution and in particular the fixed type concrete stoves, the supply chain is as follows:



IDCOL used web-based software to keep track of each installed stove having unique serial number. POs use the software to record installation while IDCOL monitoring team enter the inspection findings.

The activities carried out by the Partner Organisations is depicted in the graphic below:



As CME, IDCOL performed the following responsibilities :

- General management and financing of the PoA;
- Communications with the CDM EB, including on matters related to PoA/CPA inclusion, validation, verifications and emission reductions
- Identification of CPA implementers and selection and preparation of CPA for their inclusion in the PoA, ensuring that any CPA under the PoA are neither registered as an individual CDM project activity nor included in another registered PoA
- IDCOL ensured that the same approved baseline and monitoring methodology is applied to all the CPA;
- IDCOL established CER ownership agreements with the CPA implementer;
- IDCOL ensured that the CPA implementer have CER transfer agreements with each local partner
- Managed the data base (document control for each CPA) for calculating ERs based on data received from the CPA implementer; and
- Assessment of competency of entities (external consultant/partner, if any) involved in CPA inclusions as well as ensure that project documents are technically reviewed (either internally or externally outsourced)
- IDCOL facilitated validation and verification of the program by a Designated Operational Entity.
- Training and capacity development of POs and maintaining training records.
- Improvement in Management system as and when required.

IDCOL is the CPA implementer of the implemented CPA01 and performed the following responsibilities :

- IDCOL identified local partners for manufacturing and installation of ICS as per specifications and materials as communicate by CME/CPA Implementer.
- Executed agreement with the local partners, for transfer of emission reductions in favour of themselves / CME.
- Executed agreement with the ICS beneficiary, for transfer of emission reductions in favour of themselves / CME.
- Disburshed incentives/subsidies to the local partner (according to their role and as per CME instructions, if any).
- Inspected installed ICS, Collection of ICS data from the field and recording / archiving of collected data.
- Conducted ex-post monitoring of ICS installed for performance, usage as per monitoring requirements set out in the registered monitoring plan.
- Conducted Training of local partners on production, installation, maintenance and after-sales services of ICS and maintained records.
- Carried out national level awareness raising and demand creation activities.

The role of local partner is detailed below:

- Manufactured and installed ICSs at beneficiary households.
- Excuted agreement with the ICS beneficiary, for transfer of emission reductions in favour of themselves / CME.
- Collected and recorded the end user information, including date of ICS installation, its location and baseline information.
- Provided after sales maintenance services to ICS beneficiaries as per the terms and conditions agreed with CME / CPA implementer. Adequate record keeping systems for the compilation, computation and storage of installation data collected as per CME/CPA implementer instructions.

B.2. Post-registration changes to PoA

B.2.1. Corrections

>>
No any Post-registration changes during the current monitoring period to PoA

B.2.2. Inclusion of monitoring plan

>>
No any inclusion of monitoring plan during the current monitoring period

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

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No any permanenet changes to registered monitoring plan, or permanenet deviation of monitoring from the applied methodologies, standard baselines, or other methodological regulatory documents during the current monitoring period.

B.2.4. Changes to programme design

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No any permanenet changes during the current monitoring period to PoA.

B.2.5. Changes specific to afforestation or reforestation activities

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Not applicable as this PoA is not an afforestration or reforestraion activity.

PART II Monitoring of CPAs

>> This Monitoring Report covers CPA 01 (10512-P1-0001-CP1). This CPA follows the generic CPA as identified in section A.1.2, Part I of this monitoring report above.

SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

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The CPA involves commercial dissemination of 598,906 high efficiency biomass fired cook stoves (ICS) to replace the traditional inefficient cook-stoves in Bangladesh until first monitoring period. IDCOL as the coordinating and managing entity (CME) for the PoA will work with Partner Organisations (POs), who are mostly Non-Government Organizations, Micro Finance Institutions and some private sector companies who produce/procure and install cooking systems as per technical standards set by IDCOL.

Majority of the population in Bangladesh is not aware of the fuel saving potential of ICS or that the use of traditional biomass fuels is associated with GHG emissions and health hazards through household air pollution. In the absence of the CPA, the rural households would continue to use the traditional inefficient cook-stoves using traditional biomass fuels, the emissions of which particularly harms women and children, who are disproportionately exposed to it.

The CPA will result in an estimated annual average GHG reductions of 1,278,597 tCO_2e and total GHG emission reductions of 12,785,973 tCO_2e over a 10-year crediting period.

During the current monitoring period 456,395 tCO_2e GHG emission reduction achieved by CPA.

The CPA is a small scale type II category CPA.

Description of the installed technology, technical processes and equipment:

Improved Cook Stoves are designed to increase heat transfer to the cooking pot, while being suitable for traditional utensils and cooking habits of people in Bangladesh. The improvement in thermal efficiency is achieved by optimizing the dimensions of the ICS combustion chamber and ensuring effective airflow to aid complete combustion of biomass.

The specification of the ICS and the installation for the CPA is as follows:

Tier	Stove	Materials	Thermal Efficiency[1]			ICS installed[2]		
			2018	2019	2020	2018	2019	2020
Tier 2	Single Mouth 10" with Insulation and Lining	1.25" thick outer concrete layer	0.30	0.29	0.30	1189	8289	6098
Tier 3	Single Mouth 8" Portable with Insulation and Lining	1.25" thick outer concrete layer	0.35	0.35	0.35	58836	284898	229272
Tier 3	Double mouth (9" & 8") with Insulation and Lining	1.25" thick outer concrete layer of stove body	0.34	0.33	0.34	1335	4612	3129
Tier 3	Double mouth (10" & 9") with Insulation and Lining	1.25" thick outer concrete layer of stove body	0.37	0.39	0.39	278	808	162

The ICSs are in continued operation since their installation

C.2. Location of CPAs

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The CPA is located within the boundary of Bangladesh. Specifically, the ICS under the CPA are spread over the districts within Bangladesh.

The geographical coordinates of Bangladesh are 23°45′50″N - 90°23′20″E

[1] As per WBT report

[2] As per ICS installation database

Further, for each ICS under each CPA has a serial no, apart from that the information on the location of the ICS has been recorded by collecting address of the user where the ICS is installed. Thus, location of each ICS in the CPA can be traced back. The exact address including Village, Post Office, Union name, Upazilla and District are available in ICS Installation database.

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

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No temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies, standardized baselines or other methodological regulatory documents during the current monitoring period.

C.3.2. Corrections

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No any corrections to CPA during the current monitoring period.

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

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No any changes to the start date of the crediting period during the current monitoring period.

C.3.4. Inclusion of monitoring plan

>>

No any inclusion of monitoring plan during the current monitoing period.

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

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No any permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documentsduring the current monitoing period.

C.3.6. Changes to project design

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No any changes to project design during the current monitoing period.

C.3.7. Changes specific to afforestation or reforestation CPA

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Not applicable as this CPA is not an afforestration or reforestraion activity

SECTION D. Description of monitoring system of CPAs

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Each ICS carries a unique serial number. Information on details about the user, serial number of ICS and the installation date is recorded at the time of installation of the ICS by the respective Partner Organisations (PO). All entries are directly feed to the IDCOL database by the PO. The databse containing ICS and user records is maintained and reviewed regularly.

Data on other ex-post parameters, including operational performance of ICS, continued usage of baseline stove, etc are recorded objectively during sample surveys conducted annually. For the current monitoring period, sampling was done using 95/10 as confidence / precision. Monitoring consisted of checking the representative samples against monitoring plan parameters using a questionnaire based survey. The data collected was transferred into excel sheet for analysis and calculation of emission reductions. IDCOL is responsible for developing the Monitoring Report; and for ensuring adherence to the monitoring procedures set in the monitoring plan.

The data recorded at the time of installation, as well as that collected through sampling surveys / tests are transferred onto the emission reduction calculation workbook. For results of the ER calculations, refer ER calculation sheet.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Data/Parameter	$B_{old,p}$
Unit	tonnes/person/year
Description	Annual quantity of woody biomass that would have been used per person 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	AMS II.G. version 10.0
Value(s) applied	0.50
Choice of data or measurement methods and procedures	Default value specified by the methodology
Purpose of data/parameter	To calculate baseline emission
Additional comments	-

Data/Parameter	$N_{p,HH}$
Unit	Number
Description	Average number of persons served per household prior to project implementation
Source of data	Statistical Year Book Bangladesh, 37th Edition, Bangladesh Bureau of Statistics (2017)
Value(s) applied	4.48
Choice of data or measurement methods and procedures	-
Purpose of data/parameter	To calculate baseline emission
Additional comments	-

Data/Parameter	$B_{old,HH}$
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	Calculated or determined using ex-ante baseline surveys/ published information / literature
Value(s) applied	2.24
Choice of data or measurement methods and procedures	Calculated based on $B_{old,p}$ times $N_{p,HH}$

Purpose of data/parameter	To calculate baseline emission
Additional comments	$B_{old,i,j}$ equals $B_{old,HH}$ when only one project device per household is distributed. During the stove installation, the presence of existing project ICS, if any, shall be monitored and in case an existing project ICS is found installed in the same household, the subsequent (second) ICS will not be included in the CPA. Alternatively, the presence of multiple project ICS in a household may be determined ex-post during surveys and the total ICS population shall be discounted by the fraction of sampled household found using more than one project ICS.

Data/Parameter	$f_{NRB,y}$
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	Calculated as per Tool: Calculation of the fraction of non-renewable biomass, EB 97, Annex 9
Value(s) applied	0.843
Choice of data or measurement methods and procedures	As per the "TOOL30: Calculation of the fraction of non-renewable biomass"
Purpose of data/parameter	To calculate baseline emission
Additional comments	-

Data/Parameter	$EF_{projected\_fossil\ fuel}$
Unit	tCO_2e/TJ
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. version 10.0
Value(s) applied	63.7
Choice of data or measurement methods and procedures	Default value specified by the methodology
Purpose of data/parameter	To calculate baseline emission
Additional comments	-

Data/Parameter	$NCV_{biomass}$
Unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	AMS II.G. version 10.0
Value(s) applied	0.0156
Choice of data or measurement methods and procedures	IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried', as indicated in the methodology
Purpose of data/parameter	To calculate baseline emission

Additional comments	-

Data/Parameter	$\eta_{old,i,j}$
Unit	Fraction
Description	Efficiency of the old devices being replaced by project devices of type i and batch j
Source of data	AMS II.G. version 10.0
Value(s) applied	0.11
Choice of data or measurement methods and procedures	As per the Bangladesh Country Action Plan for Clean Cookstoves, more than 90% households use Three Stone Fire Stove / conventional stoves in Bangladesh. Therefore, following the approved CDM methodology AMS II.G/v10, a default value of 10% has been used for the 90% conventional stoves and for other types of baseline stoves a default value of 20% has been used. Thus, a weighted average efficiency of 11% with a 90:10 mix has been considered.
Purpose of data/parameter	To calculate baseline emission
Additional comments	-

Data/Parameter	**NTG**
Unit	Fraction
Description	Net to gross adjustment factor
Source of data	AMS II.G. version 10.0
Value(s) applied	0.95
Choice of data or measurement methods and procedures	As per the methodology AMS II.G Version 10.0, para 34, $B_{y,savings,i,j}$ is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case surveys are not required.
Purpose of data/parameter	To calculate leakage
Additional comments	-

E.2. Data and parameters monitored

Data/Parameter	$N_{y,i,j}$
Unit	-
Description	Number of project devices of type *i* and batch *j* operating during year *y*
Measured/calculated/ default	Calculated
Source of data	ICS installation database

Value(s) of monitored parameter	<table><tr><td>Tier</td><td>Stove</td><td>2018</td><td>2019</td><td>2020</td></tr><tr><td>Tier 2</td><td>Single Mouth 10" with Insulation and Lining</td><td>1189</td><td>8289</td><td>6098</td></tr><tr><td>Tier 3</td><td>Single Mouth 8" Portable with Insulation and Lining</td><td>58836</td><td>284898</td><td>229272</td></tr><tr><td>Tier 3</td><td>Double mouth (9" & 8") with Insulation and Lining</td><td>1335</td><td>4612</td><td>3129</td></tr><tr><td>Tier 3</td><td>Double mouth (10" & 9") with Insulation and Lining</td><td>278</td><td>808</td><td>162</td></tr></table>
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	At least once every two years (biennial)
Calculation method (if applicable)	The CPA implementer is maintaining database of all the ICS installed. A usage monitoring survey was conducted in September 2020 to determine the number of operating stoves of type i and batch j on a sampling basis.
QA/QC procedures	A 95 /10 confidence / margin of error is applied for the sampling parameter as per para 22 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version 08.0.
Purpose of data/parameter	To calculate baseline emissions
Additional comments	

Data/Parameter	μ_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	Fraction based on monitoring survey results
Value(s) of monitored parameter	<table><tr><td>Tier</td><td>Stove</td><td>Monitored value</td></tr><tr><td>Tier 2</td><td>Single Mouth 10" with Insulation and Lining</td><td>1</td></tr><tr><td>Tier 3</td><td>Single Mouth 8" Portable with Insulation and Lining</td><td>1</td></tr><tr><td>Tier 3</td><td>Double mouth (9" & 8") with Insulation and Lining</td><td>1</td></tr><tr><td>Tier 3</td><td>Double mouth (10" & 9") with Insulation and Lining</td><td>1</td></tr></table> Survey was conducted on 08/09/2020. No baseline stove was found being used in the monitored samples during the monitoring survey conducted during monitoring period
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	At least once every two years (biennial)

Calculation method (if applicable)	The sampled households were checked for presence of baseline stove and if it was being used along with project stove for cooking. For samples where baseline stove was found not being used, μ_y = 1.0. The surveys were designed to capture the cooking habits and stove usage of households in the region, including quantification of use of baseline devices, by formulating questions and/or collecting evidences to determine the frequency of usage of both the project devices and baseline devices. For example, if there were 3 pre-project devices per household and it was determined during the survey that use of one of them continues during the crediting period then a conservative adjustment factor of 0.66 is applied for the relevant monitoring period. In the case where there was only one pre-project device per household and its use during the project period continues along with the project stove to meet 25% of the cooking needs of the household in which case the adjustment factor is 0.75. The method 1 of the methodology has been used to monitor this MR.
QA/QC procedures	A 95 /10 confidence / margin of error is achieved for the sampling parameter irrespective of annual / biennial monitoring frequency as per para 22 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version 08.0.
Purpose of data/parameter	To calculate baseline emissions
Additional comments	-

Data/Parameter	$\eta_{\text{new,i,j}}$
Unit	Fraction
Description	Efficiency of the device of each type i and batch j implemented as part of the project activity
Measured/calculated/ default	Measured
Source of data	WBT test reports

Value(s) of monitored parameter

Tier	Stove	2018	2019	2020
Tier 2	Single Mouth 10" with Insulation and Lining	0.30	0.29	0.30
Tier 3	Single Mouth 8" Portable with Insulation and Lining	0.35	0.35	0.35
Tier 3	Double mouth (9" & 8") with Insulation and Lining	0.34	0.33	0.34
Tier 3	Double mouth (10" & 9") with Insulation and Lining	0.37	0.39	0.39

<table>
<tr><td>Monitoring equipment</td><td>The following equipment was used for conducting WBTs
<table>
<tr><td>Specifications</td><td>Digital Thermometer</td><td>Digital Weighing Scale</td><td>Digital Moisture Meter</td></tr>
<tr><td>Manufacturer</td><td>Lutron Electronic Enterprise Co. Ltd.,Taiwan</td><td>Lutron Electronic Enterprise Co. Ltd.,Taiwan</td><td>Camry, China</td></tr>
<tr><td>Model</td><td>TM-9126</td><td>MS-7003</td><td>ACS-30-JE21</td></tr>
<tr><td>Serial No.</td><td>Q663607, Q663608, Q663609, Q663610, Q663611, Q663612, Q663613, Q663614, Q663618</td><td>AI.55589, AI.55592 AI.55593</td><td></td></tr>
<tr><td>No. of Units</td><td>09</td><td>03</td><td>03</td></tr>
<tr><td>Accuracy</td><td>±(0.2% + 0.5°C)</td><td>±(5% + 5d)</td><td>Capacity:30 kg d=2g</td></tr>
</table>
The equipment were newly purchased at the time of use so measurements were done with the necessary guarantees.
Manufacturer specifications on efficiency based on water boiling test (WBT) has been used.
The WBT has been carried out in accordance with national standards (if available) or international standards or guidelines (e.g. the WBT procedures specified by the partnership for clean indoor air (PCIA): <http://www.pciaonline.org/testing>. The sampling test of stoves by such certification bodies/agents or manufacturers conducted following a 95/10 precision in accordance with the “Standard for sampling and surveys for CDM project activities and programme of activities”.
The WBT test has been conducted on 51 nos. of stove to meet the sampling requirement of monitoring plan of the project activity.</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Annually</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Recorded at the time of commissioning/distribution;
Adjusted for the loss of efficiency as paragraph 32 of the registered CPA DD</td></tr>
<tr><td>QA/QC procedures</td><td>The equipment used for testing was newly purchased</td></tr>
<tr><td>Purpose of data/parameter</td><td>To calculate baseline emissions</td></tr>
</table>

Additional comments	Following provisions in paragraph 32 of AMS II.G. version-10, to account for loss in efficiency of the project devices, CPAs can use any one of the following options (c)Determine the rate of efficiency drop for a representative sample of the first batch of project device i in year y and assume that same rate of loss in efficiency applies to all other batches. In other words, it may be assumed that the degradation of efficiency measured in a representative sample of the first batch of project devices i apply to all subsequent batches. The efficiency of the project devices in the first batch has to be monitored annually through representative samples and this rate of loss in efficiency may be applied correspondingly to all batches; (d)Determine the loss in efficiency annually from a representative sample of each batch and use the actual loss rate that is measured.

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	ICS Installation database
Value(s) of monitored parameter	Refer ICS installation database
Monitoring equipment	Not Applicable
Measuring/reading/recording frequency	Recorded at the time of commissioning/distribution
Calculation method (if applicable)	Not Applicable
QA/QC procedures	Not Applicable
Purpose of data/parameter	To calculate baseline emissions
Additional comments	-

E.3. Implementation of sampling plan

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Sampling plan as per PoA-DD. A single sampling plan covering all the ICS under the PoA have been covered in this monitoring report to estimate parameter values.

The number of units installed under the CPA are as follows:

Tier	Stove	2018	2019	2020	CPA Ref No.	Type of ICS eligible under CPA	CPA monitoring period covered under this PoA monitoring period
Tier 2	Single Mouth 10" with Insulation and Lining	1189	8289	6098	10512-P1-0001-CP1	Wood Fuel	15/01/2020 to 31/08/2020 (Inclusive of both days)
Tier 3	Single Mouth 8" Portable with Insulation and Lining	58836	284898	229272			
Tier 3	Double mouth (9" & 8") with Insulation and Lining	1335	4612	3129			
Tier 3	Double mouth (10" & 9") with Insulation and Lining	278	808	162			

Description of implemented sampling design:

Due to the large number of ICS installed under the CPA it is not economically feasible to monitor each individual ICS unit installed, therefore, a representative sampling was performed as part of the CPA Sampling Plan. The Sampling Standard version 08.0 (paragraph 23) mandates application of 95/10 confidence/precision for CPAs solely composed of micro-scale CDM units hence the same was applied as a conservative measure despite the methodology taking precedence.

The objective of the sampling was to obtain an unbiased and reliable estimate of the proportion or mean value of the following parameters over the course of the monitoring period, and with 95/10 confidence/precision. The sampling plan consists of monitoring the following parameters as mentioned below:

S. No.	Monitoring Parameter	Description of Monitoring Parameter
1.	$N_{y,i,j}$	Number of project devices of type *i* and batch *j* operating during year *y*
2	μ_y	Adjustment to account for any continued use of pre-project devices during the year *y*
3	$\eta_{\text{new,i,j}}$	Efficiency of the device of each type i and batch j implemented as part of the project activity

The target population is the total ICS population served under the CPA (and covered under the monitoring report), and the sampling frame consists of aggregated data of end-users of the ICS as recorded in the CPA Database.

The sampling was conducted using stratified random sampling technique over the sampling frame. The ICS in the sampling frame were stratified by ICS models (Tier 2 -Single Mouth 10" & Tier 3- Single mounth 8", Double mouth (9" & 8"), Double mouth (10" & 9")) and batches 'j' i.e., year of installation (2018, 2019 and 2020). Thus, the population was categorised into applicable sampling strata for identifying samples for various monitoring parameters, as applicable. The sample size was calculated as per section B.5 of the registered CPA-DD. The expected parameter values (mean, standard deviation and proportion) have been determined based on CME's knowledge and experience as per para 13(b) and 13(c) of the Sampling and surveys for CDM project activities and programmes of activities, Version 08.0.

Parameter	Total population (N)	Expected results	Reliability	Sample Size (n) required	Samples covered during monitoring

$\eta_{y,Tier\ 2,CPA1,Installed,}$ 2018, SM 10"	1189	0.30 (mean) 0.03040 (SD)	95/10	2	3
$\eta_{y,,Tier}$ 2,CPA1,Installed, 2019, SM 10"	8289	0.30 (mean) 0.03040 (SD)	95/10	2	3
$\eta_{y,,Tier}$ 2,CPA1,Installed, 2020, SM 10"	6098	0.30 (mean) 0.0300 (SD)	95/10	2	3
$\eta_{y,,Tier}$ 3,CPA1,Installed, 2018, SM 8"	58836	0.35 (mean) 0.03521 (SD)	95/10	7	8
$\eta_{y,,Tier}$ 3,CPA1,Installed, 2019, SM 8"	284898	0.35 (mean) 0.03521 (SD)	95/10	7	8
$\eta_{y,,Tier}$ 3,CPA1,Installed, 2020, SM 8"	229272	0.35 (mean) 0.03500 (SD)	95/10	7	8
$\eta_{y,,Tier}$ 3,CPA1,Installed, 2018, , DM (9"&8")	1335	0.34 (mean) 0.03448 (SD)	95/10	2	3
$\eta_{y,,Tier}$ 3,CPA1,Installed, 2019, , DM (9"&8")	4612	0.34 (mean) 0.03448 (SD)	95/10	2	3
$\eta_{y,Tier\ 3,CPA1,Installed,}$ 2020, , DM (9"&8")	3129	0.34 (mean) 0.03400 (SD)	95/10	2	2
$\eta_{y,Tier\ 3,CPA1,Installed,}$ **2018**, , DM (10"&9")	278	0.39 (mean) 0.03931 (SD)	95/10	2	3
$\eta_{y,,Tier\ 3,CPA1,Installed,}$ **2019**, , DM (10"&9")	808	0.39 (mean) 0.03931 (SD)	95/10	2	3
$\eta_{y,Tier\ 3,CPA1,Installed,}$ **2020**, , DM (10"&9")	162	0.39 (mean) 0.03900 (SD)	95/10	2	4

The sample size is determined using the following formulas:

$$n \geq \frac{z^2 * N * V}{(N-1) * precision^2 + z^2 * V}$$

Where,
n = number of ICS to be sampled
N = Total number of ICS in the population
Z = Constant referring to level of confidence (1.96 for 95 % confidence)
Precision = Required precision (e.g. 10% = 0.1)

For Proportion based parameters ($N_{y,i,j}$ and μ_y)

$V = \frac{SD^2}{\bar{p}^2}$ Where:

$$SD^2 = \frac{\sum_{i=1}^{k} g_i * p_i * (1 - p_i)}{N}$$

$$\bar{p} = \frac{\sum_{i=1}^{k} g_i * p_i}{N}$$

Where,
gi= weight of strata i in the population
i= expected proportion of strata i in the population
k = total number of strata in the population

$$V = \left(\frac{SD}{Mean} \right)^2$$

Where

$$SD^2 = \frac{\sum_{i=1}^{k} g_i * SD_i^{\,2}}{N}$$

$$Mean = \frac{\sum_{i=1}^{k} g_i * m_i}{N}$$

Where,
SDi= expected standard deviation of strata i in the population
mi = expected mean of strata i in the population

Each ICS in the target strata is uniquely identifiable by its ICS number, was allocated a sample number, starting at 1 and increasing up to the total number of ICS in the strata. Random numbers were generated (using online random number generator and the numbers obtained were used to identify the samples from the corresponding strata for monitoring. A higher number of samples were selected for monitoring than that required to ensure that the desired precision / confidence is achieved as well as have cover for no-responses. The following tables demonstrate the sample size determined:

Monitoring Parameter	Stove Efficiency $\eta_{new,i,j}$ (batch, 2018)					
Sampling Frame requirement as per PoA-DD	Given stove model and vintage population					
Sampling approach	Stratified random sampling across stove model and vintage					
Sampling Tier (i)	Batch (j)	Stove Model	Sampling frame size	Expected Mean Efficiency (Fraction)	Expected SD	Calculated Sample Size
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	0.30	0.03040	2
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	0.35	0.03521	7
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	0.34	0.03448	2
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	0.39	0.03931	2
Sample size determination						
Estimated efficiency (mean)						0.35
Estimated Standard Deviation of efficiency (SD)						0.04
$V_{mean} = (SD/mean)^2$						0.01
Minimum Sample Size required (efficiency)						4
tDistribution sample size adjustment					Iteration 1	11
					Iteration 2	5
					Iteration 3	8
					Iteration 4	6
					Iteration 5	7
					Iteration 6	6
					Iteration 7	7
Monitoring results						
Tier (i)	Batch (j)	Stove Type	Sampling frame size	Monitored Sample Size	Monitored Efficiency	Monitored Standard Deviation
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	3	0.30	0.0100
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	8	0.35	0.0198
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	3	0.34	0.0264
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	3	0.37	0.0271
Reliability Check						
Samples Monitored						17
Mean Efficiency						0.345
Standard error of mean						0.67%
Relative precision (Margin of error) (%)						0.12%
Result						Ok, reliability level met
Lower Bound confidence value						Not applicable

Monitoring Parameter	Stove Efficiency $\eta_{new,i,j}$ (batch, 2019)					
Sampling Frame requirement as per PoA-DD	Given stove model and vintage population					
Sampling approach	Stratified random sampling across stove model and vintage					
Sampling Tier (i)	Batch (j)	Stove Model	Sampling frame size	Expected Mean Efficiency (Fraction)	Expected SD	Calculated Sample Size
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	0.30	0.03040	2
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	0.35	0.03521	7
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	0.34	0.03448	2
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	0.39	0.03931	2
Sample size determination						
Estimated efficiency (mean)						0.35
Estimated Standard Deviation of efficiency (SD)						0.04
$V_{mean} = (SD/mean)^2$						0.01
Minimum Sample Size required (efficiency)						4
tDistribution sample size adjustment					Iteration 1	11
					Iteration 2	5
					Iteration 3	8
					Iteration 4	6
					Iteration 5	7
					Iteration 6	6
					Iteration 7	7
Monitoring results						
Tier (i)	Batch (j)	Stove Typr	Sampling	Monitored Sample Size	Monitored Efficiency	Monitored Standard
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	3	0.29	0.0193
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	8	0.35	0.0193
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	3	0.33	0.0193
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	3	0.39	0.0193
Reliability Check						
Samples Monitored						17
Mean Efficiency						0.345
Standard error of mean						0.65%
Relative precision (Margin of error) (%)						0.12%
Result						Ok, reliability level met
Lower Bound confidence value						Not applicable

Collected Data:
Data was collected for $N_{y,i,j}$ and μ_y following a specially design survey form. The information collected was introduced into an electronic database, the CPA Monitoring Record. The survey forms were designed to allow the surveyors to collect the necessary information from field visit for the ER calculations. The monitoring surveys (for determining $N_{y,i,j}$ and μ_y) were done during September 2020.

For the thermal efficiency of the stoves to determine $\eta_{new,i,j}$, water boiling tests were conducted for measuring stove efficiency.

Analysis of data collectedand confidence/precision achieved

Analysis of the data monitored through sampling revealed the following results:

Sampling Constants	Values
Monitoring period start	15-01-2020
Monitoring period end	31-08-2020
Level of Sampling	CPA 01
Confidence (%) (90 or 95)	95%
Margin of Error (%)	10%
Z value	1.960

Monitoring Parameter	Stove Efficiency $\eta_{new,i,j}$ (batch, 2018)					
Sampling Frame requirement as per PoA-DD	Given stove model and vintage population					
Sampling approach	Stratified random sampling across stove model and vintage					
Sampling Tier (i)	Batch (j)	Stove Model	Sampling frame size	Expected Mean Efficiency (Fraction)	Expected SD	Calculated Sample Size
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	0.30	0.03040	2
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	0.35	0.03521	7
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	0.34	0.03448	2
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	0.39	0.03931	2
Sample size determination						
Estimated efficiency (mean)						0.35
Estimated Standard Deviation of efficiency (SD)						0.04
$V_{mean} = (SD/mean)^2$						0.01
Minimum Sample Size required (efficiency)						4
tDistribution sample size adjustment					Iteration 1	11
					Iteration 2	5
					Iteration 3	8
					Iteration 4	6
					Iteration 5	7
					Iteration 6	6
					Iteration 7	7
Monitoring results						
Tier (i)	Batch (j)	Stove Type	Sampling frame size	Monitored Sample Size	Monitored Efficiency	Monitored Standard Deviation
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1235	3	0.30	0.0100
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	61840	8	0.35	0.0198
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1408	3	0.34	0.0264
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	294	3	0.37	0.0271
Reliability Check						
Samples Monitored						17
Mean Efficiency						0.345
Standard error of mean						0.67%
Relative precision (Margin of error) (%)						0.12%
Result						Ok, reliability level met
Lower Bound confidence value						Not applicable

Monitoring Parameter	Stove Efficiency $\eta_{new,i,j}$ (batch, 2019)					
Sampling Frame requirement as per PoA-DD	Given stove model and vintage population					
Sampling approach	Stratified random sampling across stove model and vintage					
Sampling Tier (i)	Batch (j)	Stove Model	Sampling frame size	Expected Mean Efficiency (Fraction)	Expected SD	Calculated Sample Size
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	0.30	0.03040	2
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	0.35	0.03521	7
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	0.34	0.03448	2
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	0.39	0.03931	2
Sample size determination						
Estimated efficiency (mean)						0.35
Estimated Standard Deviation of efficiency (SD)						0.04
$V_{mean} = (SD/mean)^2$						0.01
Minimum Sample Size required (efficiency)						4
tDistribution sample size adjustment					Iteration 1	11
					Iteration 2	5
					Iteration 3	8
					Iteration 4	6
					Iteration 5	7
					Iteration 6	6
					Iteration 7	7
Monitoring results						
Tier (i)	Batch (j)	Stove Typr	Sampling	Monitored Sample Size	Monitored Efficiency	Monitored Standard
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	3	0.29	0.0193
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	8	0.35	0.0193
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	3	0.33	0.0193
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	3	0.39	0.0193
Reliability Check						
Samples Monitored						17
Mean Efficiency						0.345
Standard error of mean						0.65%
Relative precision (Margin of error) (%)						0.12%
Result						Ok, reliability level met
Lower Bound confidence value						Not applicable

Monitoring Parameter	Stove Efficiency $\eta_{new,i,j}$ (batch,2020)					
Sampling Frame requirement as per PoA-DD	Given stove model and vintage population					
Sampling approach	Stratified random sampling across stove model and vintage					
Sampling Tier (i)	Batch (j)	Stove Model	Sampling frame size	Expected Mean Efficiency (Fraction)	Expected SD	Calculated Sample Size
Tier 2	2020	Single Mouth 10" with Insulation and Lining	6098	0.30	0.03000	2
Tier 3	2020	Single Mouth 8" Portable with Insulation and Lining	229272	0.35	0.03500	7
Tier 3	2020	Double mouth (9" & 8") with Insulation and Lining	3129	0.34	0.03400	2
Tier 3	2020	Double mouth (10" & 9") with Insulation and Lining	162	0.39	0.03900	2
Sample size determination						
Estimated efficiency (mean)						0.35
Estimated Standard Deviation of efficiency (SD)						0.03
$V_{mean} = (SD/mean)^2$						0.01
Minimum Sample Size required (efficiency)						4
tDistribution sample size adjustment					Iteration 1	11
					Iteration 2	5
					Iteration 3	8
					Iteration 4	6
					Iteration 5	7
					Iteration 6	6
					Iteration 7	7
Monitoring results						
Tier (i)	Batch (j)	Stove Typr	Sampling frame size	Monitored Sample Size	Monitored Efficiency	Monitored Standard Deviation
Tier 2	2020	Single Mouth 10" with Insulation and Lining	1235	3	0.30	0.0193
Tier 3	2020	Single Mouth 8" Portable with Insulation and Lining	61840	8	0.35	0.0193
Tier 3	2020	Double mouth (9" & 8") with Insulation and Lining	1408	3	0.34	0.0193
Tier 3	2020	Double mouth (10" & 9") with Insulation and Lining	294	3	0.39	0.0193
Reliability Check						
Samples Monitored						17
Mean Efficiency						0.350
Standard error of mean						0.65%
Relative precision (Margin of error) (%)						0.12%
Result						Ok, reliability level met
Lower Bound confidence value						Not applicable

Monitoring parameter(s)	Utilization of Project stoves - μ_y				
Sampling frame(s)	Given stove model population				
Sampling approach	Stratified random sampling across stove models				
Tier	Year	Stove Model	Sampling Frame	Expected value	Calculated Sample Size (n)
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	0.90	1
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	0.90	5
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	0.90	1
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	0.90	1
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	0.90	1
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	0.90	21
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	0.90	1
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	0.90	1
Tier 2	2020	Single Mouth 10" with Insulation and Lining	6098	0.90	1
Tier 3	2020	Single Mouth 8" Portable with Insulation and Lining	229272	0.90	17
Tier 3	2020	Double mouth (9" & 8") with Insulation and Lining	3129	0.90	1
Tier 3	2020	Double mouth (10" & 9") with Insulation and Lining	162	0.90	1
Sample size determination					
Estimated utilization (p)					0.90
$V_{Utilization} = p(1-p)/p^2$					0.11
Minimum Sample Size required (days of utilization)					43
Monitoring results					
Tier	Year	Stove Model	Sampling frame size	Monitored Sample Size ($n_{i,j,total}$)	Monitored Operating Fraction ($n_{i,j,operational} / n_{i,j,total}$)
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	21	1.00
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	12	1.00
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	2	1.00
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	1	1.00
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	16	1.00
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	23	1.00
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	5	1.00
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	3	1.00
Tier 2	2020	Single Mouth 10" with Insulation and Lining	6098	5	1.00
Tier 3	2020	Single Mouth 8" Portable with Insulation and Lining	229272	9	1.00
Tier 3	2020	Double mouth (9" & 8") with Insulation and Lining	3129	2	1.00
Tier 3	2020	Double mouth (10" & 9") with Insulation and Lining	162	1	1.00
Reliability Check					
Samples Monitored					100
SoF Measured					1.0
Standard Error of SoF					0.00%
Relative precision (Margin of error)					0.00%
Result					Ok, reliability level met
Lower Bound confidence value					Not applicable

Monitoring parameter(s)	Utilization of Project stoves - μ_y				
Sampling frame(s)	Given stove model population				
Sampling approach	Stratified random sampling across stove models				
Tier	Year	Stove Model	Sampling Frame	Expected value	Calculated Sample Size (n)
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	0.90	1
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	0.90	5
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	0.90	1
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	0.90	1
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	0.90	1
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	0.90	21
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	0.90	1
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	0.90	1
Tier 2	2020	Single Mouth 10" with Insulation and Lining	6098	0.90	1
Tier 3	2020	Single Mouth 8" Portable with Insulation and Lining	229272	0.90	17
Tier 3	2020	Double mouth (9" & 8") with Insulation and Lining	3129	0.90	1
Tier 3	2020	Double mouth (10" & 9") with Insulation and Lining	162	0.90	1
Sample size determination					
Estimated utilization (p)					0.90
$V_{Utilization} = p(1-p)/p^2$					0.11
Minimum Sample Size required (days of utilization)					43
Monitoring results					
Tier	Year	Stove Model	Sampling Frame	Monitored Sample Size	Monitored Utilization
Tier 2	2018	Single Mouth 10" with Insulation and Lining	1189	21	1
Tier 3	2018	Single Mouth 8" Portable with Insulation and Lining	58836	12	1
Tier 3	2018	Double mouth (9" & 8") with Insulation and Lining	1335	2	1
Tier 3	2018	Double mouth (10" & 9") with Insulation and Lining	278	1	1
Tier 2	2019	Single Mouth 10" with Insulation and Lining	8289	16	1
Tier 3	2019	Single Mouth 8" Portable with Insulation and Lining	284898	23	1
Tier 3	2019	Double mouth (9" & 8") with Insulation and Lining	4612	5	1
Tier 3	2019	Double mouth (10" & 9") with Insulation and Lining	808	3	1
Tier 2	2020	Single Mouth 10" with Insulation and Lining	6098	5	1
Tier 3	2020	Single Mouth 8" Portable with Insulation and Lining	229272	9	1
Tier 3	2020	Double mouth (9" & 8") with Insulation and Lining	3129	2	1
Tier 3	2020	Double mouth (10" & 9") with Insulation and Lining	162	1	1
Reliability Check					
Samples Monitored					100
Utilization Measured					1.00
Standard Error of Utilization					0.00%
Relative precision (Margin of error)					0.00%
Result					Ok, reliability level met
Lower Bound confidence value					Not applicable

For detailed calculations refer ER calculator, worksheet 'Monitoring Survey'and 'WBT Summary'.

SECTION F. Calculation of emission reductions or net anthropogenic removals

F.1. Calculation of baseline emissions or baseline net removals

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As per applicable meth, AMS-II.G. version 10, Emission reductions are calculated as:

$$ER_y = \sum_i \sum_j ER_{y,i,j} - LE_y$$

Where:

i	=	Indices for the situation where more than one type of project device is introduced to replace the pre-project devices
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_2e
$ER_{y,i,j}$	=	Emission reductions by project device of type *i* and batch *j* during year *y* in t CO_2e
LE_y	=	Leakage emissions in the year *y*

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

Where:

$B_{y,savings,i,j}$	=	Quantity of woody biomass that is saved in tonnes per cookstove 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 (fNRB)
$NCV_{biomass}$	=	Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 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 63.7 t CO_2/TJ
$N_{y,i,j}$	=	Number of project devices of type *i* and batch *j* operating during year *y*
μ_y	=	Adjustment to account for any continued use of pre-project devices during the year *y* (fraction). Use 1.0 in other cases

Option 3: water boiling test (WBT):

$$B_{y,savings,i,j} = B_{old,i,j} \times (1 - \frac{\eta_{old,i,j}}{\eta_{new,i,j}})$$

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

$\eta_{old,i,j}$ = Efficiency of the old devices being replaced by project devices of type *i* and batch *j*

$\eta_{new,i,j}$ = Efficiency of the project device *i* and batch *j*

As only one project device is installed per household, the baseline woody biomass consumption per household ($B_{old,HH}$) is used as the total annual quantity of woody biomass that would have been used in the absence of the project activity in each device ($B_{old,i,j}$).

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

Accordingly, the Emission reductions could be presented as:

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

Sample calculations are as follows:

Data Ex Ante	Unit	Value	Source
$B_{old,p}$	tonnes/person/ year	0.50	Registered CPA-DD, section B.4.2
$N_{p,HH}$	Number	4.48	Registered CPA-DD, section B.4.2
$B_{old,i,j} = B_{old,HH}$	tonnes/household/ year	2.24	Registered CPA-DD, section B.4.2
$f_{NRB,y}$	Fraction	0.84	Registered CPA-DD, section B.4.2
$Ef_{project\ fossil\ fuel}$	tCO_{2e}/TJ	63.70	Registered CPA-DD, section B.4.2
NTG	Fraction	0.95	Registered CPA-DD, section B.4.2
$NCV_{biomass}$	TJ/tonne	0.016	Registered CPA-DD, section B.4.2
$\eta_{old,I,j}$	Percentage	11.00%	Registered CPA-DD, section B.4.2
Conversion factor		0.2777	GWh/TJ

Data Ex Ante	Unit	Value	Source
$B_{old,p}$	tonnes/person/ year	0.50	Registered CPA-DD, section B.4.2
$N_{p,HH}$	Number	4.48	Registered CPA-DD, section B.4.2
$B_{old,i,j} = B_{old,HH}$	tonnes/household/ year	2.24	Registered CPA-DD, section B.4.2
$f_{NRB,y}$	Fraction	0.84	Registered CPA-DD, section B.4.2
$Ef_{project\_fossil\ fuel}$	tCO_{2e}/TJ	63.70	Registered CPA-DD, section B.4.2
NTG	Fraction	0.95	Registered CPA-DD, section B.4.2
$NCV_{biomass}$	TJ/tonne	0.016	Registered CPA-DD, section B.4.2
$\eta_{old,i,j}$	Percentage	11.00%	Registered CPA-DD, section B.4.2
Conversion factor		0.2777	GWh/TJ

Data Ex Post	**Unit**	**Value**	**Source**
$N_{y,Tier\ 2,CPA1,Installed}$, **2018, SM 10"**	Number	1189	ICS Installation database
$N_{y,Tier\ 2,CPA1,Installed}$, **2019, SM 10"**	Number	8289	ICS Installation database
$N_{y,Tier\ 2,CPA1,Installed}$, **2020**, SM 10"	Number	6098	ICS Installation database
$N_{y,Tier\ 3,CPA1,Installed}$, **2018**, SM 8"	Number	58836	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2019**, SM 8"	Number	284898	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2020**, SM 8"	Number	229272	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2018**, , DM (9"&8")	Number	1335	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2019**, , DM (9"&8")	Number	4612	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2020**, , DM (9"&8")	Number	3129	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2018**, , DM (10"&9")	Number	278	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2019**, , DM (10"&9")	Number	808	ICS Installation Database
$N_{y,Tier\ 3,CPA1,Installed}$, **2020**, , DM (10"&9")	Number	162	ICS Installation Database
$B_{old,Tier\ 2}$, 2018, SM 10"	Tonnes/HH/year	2.13	Calculated
$B_{old,Tier\ 2}$, 2019, SM 10"	Tonnes/HH/year	2.13	Calculated
$B_{old,Tier\ 2}$, 2020, SM 10"	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2018,SM 8"	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2019,SM 8"	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2020,SM 8"	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2018,DM (9"&8")	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2019,DM (9"&8")	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2020,DM (9"&8")	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2018,DM (10"&9")	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2019,DM (10"&9")	Tonnes/HH/year	2.13	Calculated
$B_{old,\ tier\ 3}$, 2020,DM (10"&9")	Tonnes/HH/year	2.13	Calculated
$\eta_{new\ ,\ tier\ 2}$, 2018,SM 10"	Percentage	29.50%	Efficiency test records and results
$\eta_{new\ ,\ tier\ 2}$, 2019, SM 10"	Percentage	29.32%	Efficiency test records and results
$\eta_{new\ ,\ tier\ 2}$, 2020, SM10"	Percentage	30.23%	Efficiency test records and results
$\eta new_{,Tier\ 3,CPA1,Installed}$, **2018**, SM 8"	Percentage	34.56%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2019**, SM 8"	Percentage	34.68%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2020**, SM 8"	Percentage	35.08%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2018**, , DM (9"&8")	Percentage	34.11%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2019**, , DM (9"&8")	Percentage	32.80%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2020**, , DM (9"&8")	Percentage	34.32%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2018**, , DM (10"&9")	Percentage	37.24%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2019**, , DM (10"&9")	Percentage	38.51%	Efficiency test records and results
$N_{y,Tier\ 3,CPA1,Installed}$, **2020**, , DM (10"&9")	Percentage	39.23%	Efficiency test records and results
$B_{y,saving,\ Tier\ 2}$,2018,SM10"	Tonnes/year	1.335	Calculated
$B_{y,saving,\ Tier\ 2}$,2019,SM10"	Tonnes/year	1.330	Calculated
$B_{y,saving,\ Tier\ 2}$,2020,SM10"	Tonnes/year	1.354	Calculated
$B_{y,saving,\ tier\ 3}$,2018, SM8"	Tonnes/year	1.451	Calculated
$B_{y,saving,\ tier\ 3}$,2019, SM8"	Tonnes/year	1.453	Calculated
$B_{y,saving,\ tier\ 3}$,2020, SM8"	Tonnes/year	1.461	Calculated
$B_{y,saving,\ tier\ 3}$,2018, DM (9"&8")	Tonnes/year	1.442	Calculated
$B_{y,saving,\ tier\ 3}$,2019, DM (9"&8")	Tonnes/year	1.414	Calculated
$B_{y,saving,\ tier\ 3}$,2020, DM (9"&8")	Tonnes/year	1.446	Calculated
$B_{y,saving,\ tier\ 3}$,2018, DDM (10"&9")	Tonnes/year	1.500	Calculated
$B_{y,saving,\ tier\ 3}$,2019, DM (10"&9")	Tonnes/year	1.520	Calculated
$B_{y,saving,\ tier\ 3}$,2020, DM (10"&9")	Tonnes/year	1.531	Calculated
$Stove_{year}$	fraction	0.628	Calculated
$\mu_{y,tier\ 2}$	fraction	1.00	Monitoring survey records
$\mu_{y,\ tier\ 3}$	fraction	1.00	Monitoring survey records
$N_{y,Tier\ 2,2018,operational}$, SM10"	Number	1189	Sales database and monitoring survey records
$N_{y,Tier\ 2,2019,operational}$, SM10"	Number	8289	Sales database and monitoring survey records
$N_{y,Tier\ 2,2020,operational}$, SM10"	Number	6098	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2018,opeartioanl}$, SM 8"	Number	58836	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2019,opeartioanl}$, SM 8"	Number	284898	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2020,opeartioanl}$, SM 8"	Number	229272	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2018,opeartioanl}$, DM (9"&8")	Number	1335	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2019,opeartioanl}$, DM (9"&8")	Number	4612	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2020,opeartioanl}$, DM (9"&8")	Number	3129	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2018,opeartioanl}$, DM (10"&9")	Number	278	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2019,opeartioanl}$, DM (10"&9")	Number	808	Sales database and monitoring survey records
$N_{y,tier\ 3,\ 2020,opeartioanl}$, DM (10"&9")	Number	162	Sales database and monitoring survey records
Emission Reduction (ER)	**tCO_2**	**456395**	

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

>>
The calculation algorithm in the methodology directly calculates emission reductions hence this is not applicable.

F.3. Calculation of leakage emissions

>>
The calculation algorithm in the methodology directly calculates emission reductions hence this is not applicable.

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

CPA UNFCCC reference number	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)		
				Before 01/01/2013	From 01/01/2013	Total amount
10512-P1-0001-CP1	456,395	0	0	0	456,395	456,395
Total	456,395	0	0	0	456,395	456,395

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 (t CO_2e)	Amount estimated ex ante for this monitoring period in the CPA-DD (t CO_2e)
10512-P1-0001-CP1	456,395	805,691
Total	456,395	805,691

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

>>
The amount has been calculated on pro-rata basis:
[1,278,597 tCO_2 / 365 days] * number of monitoring days i.e. 230 =805,691 tCO_2.

F.6. Remarks on increase in achieved emission reductions

>>
Amount of GHG emission reduction achieved during this monitoring period is less than the amount estimated ex ante for this monitoring period in the CPA-DD.

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

>>
The CPA (10512-P1-0001-CP1) covered in the monitoring period is a Type II small-Scale CPA, solely composed of microscale units. The thermal energy saving by each of the ICS is only 0.006 GWh_{th} and this value is far less than the 1.8 GWh_{th} annual energy saving limit per ICS.

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Document information

Version	*Date*	*Description*
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN); • Add a section on remarks on the observance of the scale limit of small-scale CPAs during the crediting periods; • Add "changes specific to afforestation or reforestation activities/CPA" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R PoAs between two commitment periods; • Make structural and editorial improvements.
02.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for programmes of activities (CDM-EB93-A07-STAN); • Make editorial improvements.
01.0	1 April 2015	Initial publication.

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