



**Monitoring report form for CDM programme of activities
(Version 05.0)**

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

MONITORING REPORT			
Title of the PoA	Household energy appliance programme		
UNFCCC reference number of the PoA	10030		
Version number of the PoA-DD applicable to this monitoring report	22		
Version number of this monitoring report	02.1		
Completion date of this monitoring report	03/01/2022		
Monitoring period number	Third Monitoring Period		
Duration of this monitoring period	01/08/2020 ¹ to 31/12/2020		
Monitoring report number for this monitoring period	01		
Coordinating/managing entity	Differ Cookstoves AS		
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)	
	Myanmar	No	
	Democratic Republic of Timor-Leste	No	
	Lao PDR	Yes	
	Cambodia	Yes	
	Kenya	No	
	Uganda	No	
Applied methodologies and standardized baselines	AMS-I.A Electricity generation by the user, Version 16 AMS-II.G Energy efficiency measures in thermal applications of non-renewable biomass, Version 6		
Sectoral scopes	Sectoral Scopes: 01, 03		
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 until 31 December 2020	Amount achieved from 1 January 2021
	0	32,607	0

¹ both days included

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	105,707
--	---------

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

The proposed PoA aims to distribute solar lighting systems (lanterns, home systems) and improved cook stoves to households in Myanmar, Timor-Leste, Lao PDR, Cambodia, Kenya and Uganda. Differ Cookstoves AS (Differ Cookstoves), is the Coordinating / Managing Entity (CME) for all the component project activities (CPAs) in the PoA.

The CPAs covered under this monitoring report involve distribution of improved cookstoves to households which prior to project implementation relied on inefficient three stone fire or similar traditional cookstoves thereby resulting in saving in terms of non renewable biomass consumed and hence leading to reduction in greenhouse gases. Ecoeye Co., Ltd. (Ecoeye) and Korea Zinc Co. Ltd. (Korea Zinc) have fully financed all improved cooking stoves distributed to the households.

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
Household appliance distribution in [insert country name]-CPA XXX	22	1 & 3	AMS-I.A: "Approved small scale methodology: Electricity generation by the user" (Version 16.0) AMS-II.G: "Approved small scale methodology: Energy efficiency measures in thermal applications of non-renewable biomass" (Version 06.0)

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)
Household appliance distribution in Timor-Leste 10030-P1-0001-CP1 Version 13	18	Household appliance distribution in [insert country name]-CPA XXX	Renewable 10/03/2016– 09/03/2023	no
Household appliance distribution in Myanmar - CPA002 10030-P1-0002-CP1 Version 03	18	Household appliance distribution in [insert country name]-CPA XXX	Renewable 08/01/2020- 07/01/2027	no
Household appliance distribution in Lao PDR -	22	Household appliance distribution in [insert country name]-CPA	Renewable 08/01/2020-	Yes

CPA003 10030-P1-0003-CP1 Version 04.1		XXX	07/01/2027	
Household appliance distribution in Cambodia – CPA004 10030-P1-0004-CP1 Version 04.1	22	Household appliance distribution in [insert country name]-CPA XXX	Renewable 08/01/2020- 07/01/2027	Yes

A.2. Coordinating/managing entity

>>

Differ Cookstoves AS is the CME of the PoA and is responsible for all communications with the Executive Board.

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

>>

The PoA- “Household energy appliance programme” is a voluntary initiative aimed at providing energy efficiency technologies to households.

The PoA allows implementation of following technologies

1.Solar lighting systems (lanterns / home systems):

New solar photovoltaic based renewable electricity generation units (greenfield installations) that produce electricity all of which is used for lighting on-site/locally by households.

2.Efficient cook stoves:

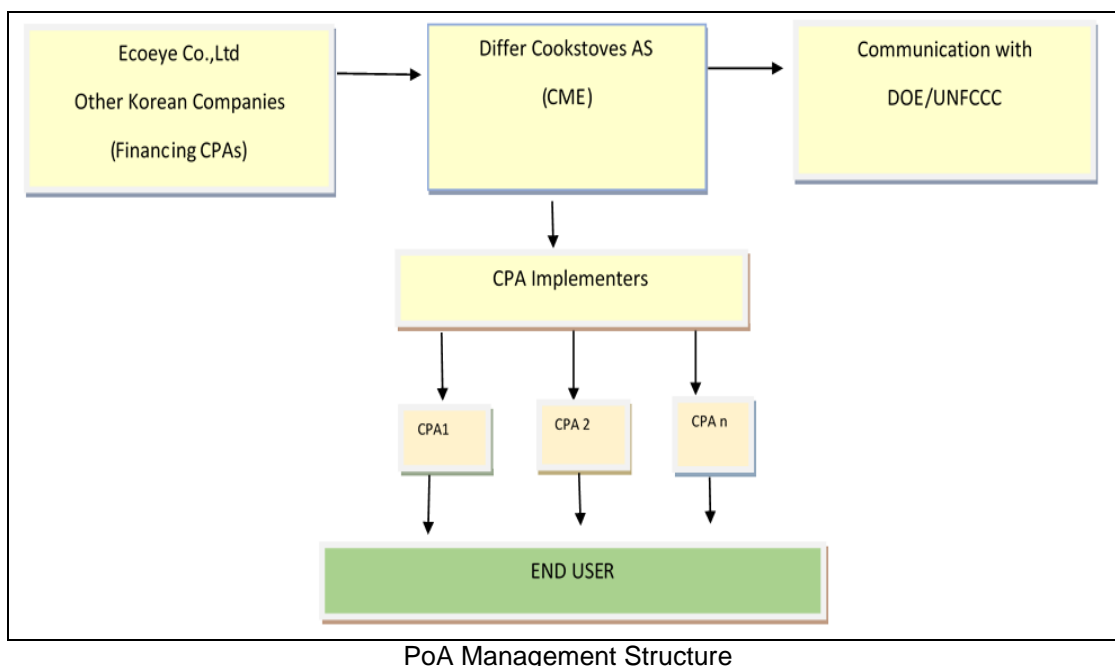
Introduction of high efficiency biomass fired cook stoves in households

OR a Combination of solar lighting systems and efficient cookstoves.

The CPAs included in this monitoring report belong to option 2, that is installation/distribution of improved cookstoves to households.

Differ Cookstoves AS is the Coordinating / Managing Entity (CME) for the PoA and is the overall in-charge for operational and management arrangements for the implementation of the PoA. It was primarily involved in the following activities with respect to implementation of the PoA as well as monitoring of the emission reduction claimed under the present monitoring plan.

- Creating PoA documentation (forms F-CDM-SSC-PoA-DD and F-CDM-SSC-CPA-DD)
- Checking for compliance of CPAs with inclusion eligibility criteria
- Obtaining a Letter of Authorization from the host country
- Obtaining a Letter of Approval from the host country and the Annex I party involved for the CPA
- Coordinating and communicating with the validating/verifying DoE and the EB
- Conducting training and capacity building exercises for personnel of CPA implementing bodies for data monitoring, recording and reporting in accordance with CPA-DD, as well as equipment use/maintenance/repair, sales and financial management
- Periodically collecting data on monitoring parameters from CPA implementing bodies as per the monitoring plan defined in the respective CPA-DD
- Drafting monitoring reports for all CPAs in accordance with the methodology outlined in the PoA-DD
- Requesting the UNFCCC to issue CERs into a registry account of the CER buyer(s)



User information such as name, address, etc along with stove registration details have been maintained in the form of CPA database for individual CPAs. Through this document end users of a stove can be traced with the help of stove registration number.

Installed Technology for each CPA included under this monitoring activity-

Lao PDR CPA- Single model of improved cookstoves-SSM-S32-13 were distributed to households which were using three stone fire or iron tri pod prior to implementation of project activity. The project stoves are portable stoves giving user the advantage of using it in a place of their choice and convenience. These stoves have a manufacturer specified efficiency of 38.5% as compared to 10% efficiency of the baseline stoves. Further technical details of the stove have been included in section C below.

Cambodia CPA – Under the CPA, two models of improved stoves SSM-S32-13 and Kuniokoa were individually distributed (each end user receiving either SSM-S32-13 or Kuniokoa) to households previously using three stone fire or iron tripod. Manufacturer specified efficiency of stoves are 38.5% and 41.6% respectively. Further technical details have been included in section C below.

Monitoring and Sampling

A separate sampling plan was applied for each CPA and subsequently monitoring was carried out individually for each. For Cambodia CPA, since two different models of stoves had been distributed to end users, separate sampling for each model was carried out. The parameters that were monitored and their sampling details have been included in section E below.

Data was collected from households randomly selected amongst the target population thus the selected samples are representative of the population.

The preparation of monitoring report, verification and communication with CDM Executive Board has been undertaken by the CME.

CPA inclusion/implementation details

10030-P1-0003-CP1 (Lao PDR)

CPA inclusion date	08-01-2020
Crediting period	08/01/2020 to 07/01/2027
Current Monitoring period	
Start Date	01/08/2020
End Date	31/12/2020
Period for which CERs are being claimed	01/08/2020 to 31/12/2020
Total stoves recorded in database	20130
Number of SSM-S32 stoves of age - 1 year	19239
Number of SSM-S32 stoves of age - 2 years	40
Number of SSM-S32 stoves of age – 3 years	851

10030-P1-0004-CP1 (Cambodia)

CPA inclusion date	08-01-2020
Crediting period	08/01/2020 to 07/01/2027
Current Monitoring period	
Start Date	01/08/2020
End Date	31/12/2020
Period for which CERs are being claimed	01/08/2020 to 31/12/2020
Total stoves recorded in database (SSM+ Kuniokoa)	14467
Number of SSM-S32 stoves of age – 1year	14,109
Number of SSM-S32 stoves of age – 2years	195
Number of Kuniokoa stoves of age – 1year	163

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

>>

PRC-10030-001Approval date-26th July 2019**Approach to determine B_{old}**

The applied methodology AMS II.G., version 06 gives 3 options for determining B_{old} value.

- (a) *Estimated as the average annual consumption of woody biomass per device (tonnes/year). This may be derived from historical data or a sample survey of local usage;*
- (b) *Calculated from the thermal energy generated in the project activity*
- (c) *A default value of 0.5 tonnes per capita per year may be used*

In Section I.6.1, the registered PoA made it mandatory to use option (a) for determining B_{old} for Charcoal cookstoves and option (c) for determining B_{old} value for wood fuel cook stoves. This condition has been corrected and now either of options (a) or (c) can be used for determining B_{old} value for wood fuel cook stoves.

Accordingly, the parameter table in Section I.6.2 for parameter B_{old} is updated to reflect the corrections made above.

Section I.4 Project boundary, sources and greenhouse gases

During the registration, CO₂ was mistakenly excluded from project scenario under “*In case of CPAs involving deployment of efficient cook stoves*”. The edit is made to correct the mistake.

PRC-10030-005

Approval date-02nd December 2020

1)Sampling plan- according to registered and approved PoA DD version 21, the confidence/precision requirement was set at 90/10; However, according to paragraph 22 of Standard for sampling and surveys of CDM project activities and programmes of activities, version 05.0, if the CPA consists solely of microscale CDM units, 95/10 confidence/precision is to be applied for sampling surveys. This requirement has now been added to the sampling plan of current PoA DD- version 22.

2)Source data or document for fNRB for included host countries- In in version 21 of the PoA DD, there was not enough clarity on the source of data/document that has been used for fNRB calculation. Details have now been included in Appendix 4 of Version 22 of the document.

3)Editorial corrections - a few editorial corrections were made to the PoA DD to improve clarity.

B.2.2. Inclusion of monitoring plan

>>

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

>>

PRC-10030-001

Approval date: 26th July 2019

(i)The initial monitoring plan requires the monitoring to be conducted separately for each CPA. The revision is made to enable sampling by grouping of CPAs if the following requirement is met -

“Alternatively, for the CPAs implemented in the same country and applying the same combinations of methodologies, a single sampling plan covering a group of CPAs can be undertaken to collect the data required.”

(ii)Revision is made on sample size calculation to demonstrate the use of Student’s t-distribution where the parameter of interest is a numeric mean value (i.e. not a proportion or percentage) and the resulting sample size is less than 30.

(iii)Requirement of reporting number of members in a household has been removed.

(iv) Approach to determine B_{y,saving}

In Section I.6.1, under “*In case of CPAs involving deployment of efficient cook stoves*”, the formula below is added to allow additional option to determine B_{y,savings,i,a}.

$$B_{y,savings,i,a} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,i,a=1} \times \Delta \eta_{y,i,a}}{\eta_{old}} - 1 \right)$$

Accordingly, the parameter table for B_{y=1,new,i,survey} is added in Section I.7.1.

PRC-10030-002

Approval Date-12/05/2020

1. Approach to determine $B_{y,saving}$

In the registered, approved PoA DD version 18, estimation of $B_{y,saving}$ for Lao PDR was based on equation 5 of the applied methodology under Water Boiling Test option. Through this PRC, the CME has revised the option and now equation 6 of the applied methodology is proposed to be used for estimation of $B_{y,saving}$.

Accordingly in Section I.7.1, choice of option for Lao PDR has been changed to 2, for parameter $B_{y,saving,i,a}$ and for $B_{y=1,new,i,survey}$, Lao PDR has been added.

2. Option to declare the value of $B_{y=1,new,i,survey}$ at the time of first verification.

The option of declaring $B_{y=1,new,i,survey}$ value at the time of first verification has been included keeping in mind the CPAs for which project stove installation begins after CPA inclusion hence the value $B_{y=1,new,i,survey}$ is not available at the time of inclusion.

B.2.4. Changes to programme design

>>

PRC-10030-001

Approval date-26th July 2019

(i) Expansion of the geographical coverage or to include additional host Parties

Lao PDR and Cambodia are included as additional boundary to the PoA and the relevant sections/information in PoA-DD are updated accordingly.

(ii) Changes to Project Participant

Withdrawal of Brighterlite Norway AS, as project Participant.

(iii) A revision to the eligibility criteria pertaining to the demonstration of additionality

During the registration, each CPA was considered as small-scale project activity and Methodological tool: "Demonstration of additionality of small-scale project activities" was applied for the CPA. However, as each CPA being developed under the present PoA is envisaged to consist exclusively of units that can be defined as microscale CDM unit hence Methodological tool: Demonstration of Additionality of microscale project activities; version 09.0 is being applied for demonstration of additionality. Accordingly, section C of the PoA DD has been revised.

(iv) Revision in eligibility criteria for inclusion of CPA in section H.3 and K

Addition of criteria as per paragraph 124 (m) and (n) of CDM project standard for programmes of activities; version 02.0; exempting CPAs consisting solely of microscale CDM units from demonstrating compliance with small scale or microscale threshold at the CPA level as well as conducting debundling check.

(v) Revision in eligibility criteria to remove criteria on Environmental Impact Analysis to be conducted at CPA level

Environmental Impact Analysis will be conducted at PoA level for each of the geographic boundary included in the programme, hence this criterion is being removed from the eligibility criteria for inclusion of CPAs.

(vi) Removal of applied methodology and standardized baselines from the PoA-DD

The PoA removes the application of methodology AMS-III.AV: Low greenhouse gas emitting safe drinking water production systems (version 4) and its standardized baselines from PoA-DD. In accordance with the removal of AMS-III.AV, the application of water filter is removed from PoA-DD.

(vii) Change of technologies/measures

The PoA removes the option to replace charcoal stoves, therefore only replacement of wood-fuel stoves will be considered under this PoA.

PRC-10030-002

Approval Date-12/05/2020

1. Expansion of the geographical coverage or to include additional host Parties
Kenya and Uganda are included as additional boundary to the PoA and the relevant sections/information in PoA-DD are updated accordingly.

2. Revision to eligibility criteria pertaining to demonstration of additionality
Application of figure 1 in appendix to Tool 21, 'Demonstration of additionality of small- scale project activities' (version 13.0) for demonstrating additionality of project activities which are not eligible for auto additionality under tool 19.

B.2.5. Changes specific to afforestation or reforestation activities

>>

Not Applicable

PART II Monitoring of CPAs

>>

There are two specific case CPAs 10030-P1-0003-CP1 and 10030-P1-0004-CP1 which are included in this monitoring report. Monitoring for each specific CPA has been conducted individually.

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

>>

The CPAs involve the distribution of improved cook stoves (ICS) to households in Lao People's Democratic Republic (Lao PDR) and Cambodia by C-Quest Capital Stoves Asia Limited (CQC). In line with the generic CPA, the present CPAs, are type II; energy efficiency project activity involving distribution of efficient cookstoves. Each of these stoves qualify as a 'microscale CDM unit' as the energy saving per stove is below the microscale threshold.

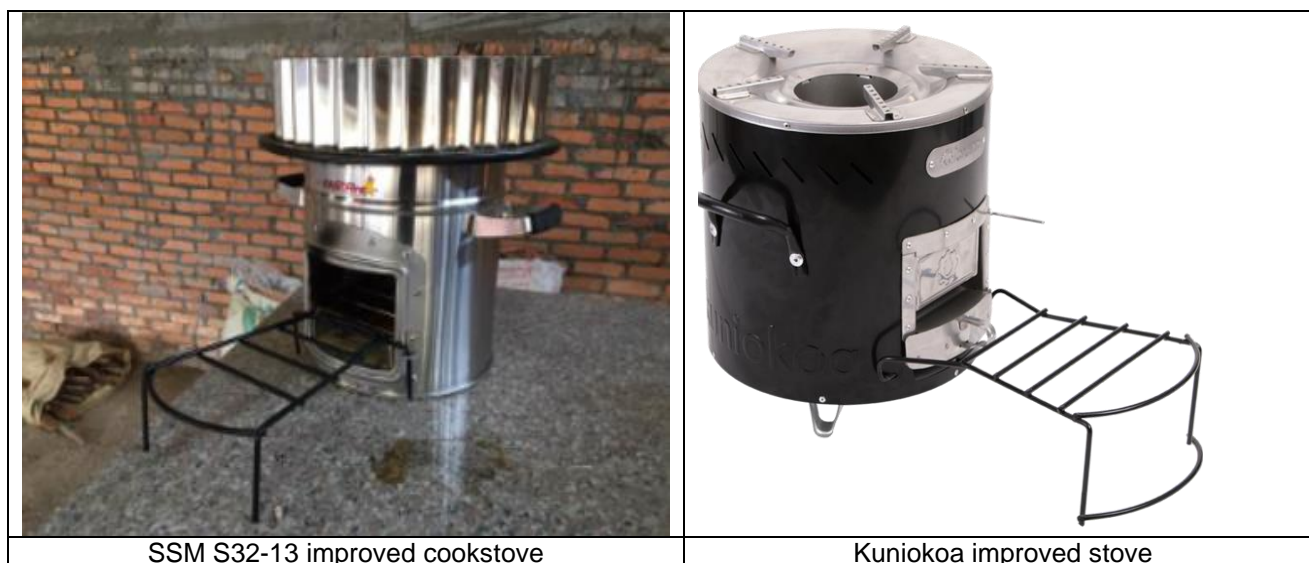
The distribution of improved cook stoves have displaced the use of non-renewable biomass to meet similar thermal energy needs for cooking in households. Prior to project activity, the households were using traditional cookstoves with very low efficiency leading to consumption of copious amount of firewood for preparing meals. Thus, the project activity has resulted in a reduction of GHG emissions from the baseline scenario.

Ecoeye Co., Ltd. (Ecoeye) and Korea Zinc Co. Ltd. (Korea Zinc) have fully financed all improved cooking stoves distributed to the households, and the total project cost per stove is USD 29.50.

Improved cookstove technology distributed under both the CPAs included in this monitoring report are

10030-P1-0003-CP1: SSM S32-13

10030-P1-0004-CP1: SSM S32-13 and Kuniokoa.



SSM S32-13 improved cookstove

Kuniokoa improved stove

The following are the technical specifications of the stove

Parameter	SSM S32-13	Kuniokoa
Thermal Efficiency	38.5%	41.6%
Dimensions	24.5 cm height, 32 cm diameter	32.1 cm height, 28.2 cm diameter
Material	<ul style="list-style-type: none"> ▪ Stove Top: Cast Iron, Diameter 32 cm ▪ Stove Body: 0.6mm Stainless Steel Grade 304 ▪ Grate Mouth: 1mm Stainless Steel, Grade 304 ▪ Combustion Chamber: Refractory Ceramic Chamber ▪ Metal Liner: 1mm Stainless Steel, Grade 201 ▪ Pot Skirt: Corrugated Adjustable Pot Skirt with Clip, 0.5mm Stainless Steel, Grade 201 	<ul style="list-style-type: none"> ▪ Stove Body: CRCA Carbon Steel painted high gloss black epoxy power coat ▪ Pot Rest: Stainless Steel ▪ Burning Chamber: Stainless Steel ▪ Fuel Feeding Door: Stainless Steel ▪ Stick Shelf: CRCA ▪ Legs: Aluzinc

For the current monitoring period, a total of 20,130 stoves have been registered in the database for 10030-P1-0003-CP1, of which 19,239 stoves have been distributed in the current year (i.e within one year of current monitoring period end date) hence are age 1 stoves, 40 stoves are age 2 stoves and 851 stoves belong to age group 3 as on last day of current monitoring period. For 10030-P1-0004-CP1, a total of 14,467 stoves have been registered in the database of which 163 are Kuniokoa stoves installed in the current year whereas 14,304 are SSM S32-13 stoves (14109 belonging to age= 1 year and 195 belonging to age = 2 years as on last day of current monitoring period).

CPA Implementation details

CPA	10030-P1-0003-CP1	10030-P1-0004-CP1	
	Lao PDR	Cambodia	
Stove Model	SSM S32-13	SSM S32-13	Kuniokoa
Total no of Stoves	20130	14304	163

Implementation Start date for stoves of age =3	23/10/2018	-	-
Implementation end date for stoves of age =3	01/11/2018	-	-
Implementation Start date for stoves of age =2	29/10/2019	24/01/2019	-
Implementation end date for stoves of age =2	01/11/2019	24/01/2019	-
Implementation Start date for stoves of age=1	09/06/2020	08/03/2020	22/07/2020
Implementation end date for stoves of age=1	29/12/2020	31/12/2020	22/07/2020

C.2. Location of CPAs

>>

CPA 10030-P1-0003-CP1

The CPA has been implemented in Lao PDR.

Longitude:19° 51' 22.6" ; Latitude:102° 29' 43.8" E



Physical and geographical boundary of Lao PDR.

CPA 10030-P1-0004-CP1

The CPA has been implemented in Cambodia

Longitude:11° 59' 16.68" N ;Latitude:104° 58' 50.21" E



Physical and geographical boundary of Cambodia

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

>>

PRC-10030-003 & PRC-10030-004

Version number of CPA DD-

1. Household appliance distribution in Lao PDR – CPA003; version 03.1

2. Household appliance distribution in Cambodia – CPA004; version 03.1

Version number of PoA DD- Version 21.0

Completion date of validation report- 14/05/2020

PRC Approval Date

PRC-10030-003: 10030-P1-0003-CP1 Household Appliance Distribution in Lao PDR-CPA003-06/07/2020²

PRC-10030-004: 10030-P1-0004-CP1 Household Appliance Distribution in Cambodia-CPA004-06/07/2020³

Corrections that do not affect project design.

PRC-10030-006

Corrections

² <https://cdm.unfccc.int/CPAPostRegChanges/DB/prcp316135586/view>

³ <https://cdm.unfccc.int/CPAPostRegChanges/DB/prcp482532165/view>

- 1) Sampling plan: The confidence/precision required for CPAs which consist solely of 'microscale CDM units' is 95/10 in accordance with paragraph 22 of Standard for Sampling and surveys of CDM project activities and programme of activities, version 05.0. However, the sampling plan in registered CPA DD required confidence precision of 90/10 as per methodology. As the CPA consists solely of 'microscale CDM units', the above- mentioned correction has been made in the applicable section of the CPA DD.
- 2) Editorial corrections: A few editorial corrections including footnote 7 and 8 have been made to improve clarity in the CPA DD.

PRC-10030-007

Corrections

- 1) Sampling plan: The confidence/precision required for CPAs which consist solely of 'microscale CDM units' is 95/10 in accordance with paragraph 22 of Standard for Sampling and surveys of CDM project activities and programme of activities, version 05.0. However, the sampling plan in registered CPA DD required confidence precision of 90/10 as per methodology. As the CPA consists solely of 'microscale CDM units', the above- mentioned correction has been made in the applicable section of the CPA DD.
- 2) fNRB: the source document for fNRB has been corrected in Section B.4.2 to include the information that fNRB report prepared by C4Ecosolutions which was hired by the CME has been used for fNRB estimation.
- 3) Editorial corrections: A few editorial corrections including footnote 6 and 7 have been made to improve clarity in the CPA DD.

Version number of CPA DD-

PRC-10030-006- Household appliance distribution in Lao PDR – CPA003; version 04.1

PRC-10030-007- Household appliance distribution in Cambodia – CPA004; version 04.1

Version number of PoA DD- Version 22.0

Completion date of validation report- 16/12/2020 (PRC-10030-006)

Completion date of validation report- 18/12/2020 (PRC-10030-007)

PRC Approval Date

PRC-10030-006: 10030-P1-0003-CP1 Household Appliance Distribution in Lao PDR-CPA003-09/02/2021⁴

PRC-10030-007: 10030-P1-0004-CP1 Household Appliance Distribution in Cambodia-CPA004-09/02/2021⁵

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

>>

PRC-10030-006

Crediting period start date: at the time of inclusion, the start date was erroneously mentioned as 07/01/2020, whereas the actual date of inclusion as per project page is 08/01/2020. This discrepancy has been corrected.

PRC-10030-007

Crediting period start date: at the time of inclusion, the start date was erroneously mentioned as 07/01/2020, whereas the actual date of inclusion as per project page is 08/01/2020. This discrepancy has been corrected.

⁴ [CDM: Household appliance distribution in Lao PDR – CPA003 \(unfccc.int\)](#)

⁵ [CDM: Household appliance distribution in Cambodia – CPA004 \(unfccc.int\)](#)

Version number of CPA DD-

PRC-10030-006- Household appliance distribution in Lao PDR – CPA003; version 04.1

PRC-10030-007- Household appliance distribution in Cambodia – CPA004; version 04.1

Version number of PoA DD- Version 22.0

Completion date of validation report- 16/12/2020 (PRC-10030-006)

Completion date of validation report- 18/12/2020 (PRC-10030)

PRC Approval Date

PRC-10030-006: 10030-P1-0003-CP1 Household Appliance Distribution in Lao PDR-CPA003-09/02/2021⁶

PRC-10030-007: 10030-P1-0004-CP1 Household Appliance Distribution in Cambodia-CPA004-09/02/2021⁷

C.3.4. Inclusion of monitoring plan

>>

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

>>

Not applicable

C.3.6. Changes to project design

>>

Not applicable

C.3.7. Changes specific to afforestation or reforestation CPA

>>

Not applicable

SECTION D. Description of monitoring system of CPAs

>>

The monitoring plan for the CPA has been designed based on the requirements of the applied methodology. An electronic database for the project activity is maintained by the CME. This database is also accessible to the CME, CPA implementing body, and the verifying DOE.

The project database was populated during the distribution of appliances and is updated based on subsequent replacements. The database includes the following general information:

- Installation date of appliance
- Unique ID number of appliance
- Name of recipient
- Contact details of recipient
- Location of household (village, district and/or GPS coordinates)

⁶ [CDM: Household appliance distribution in Lao PDR – CPA003 \(unfccc.int\)](http://unfccc.int)

⁷ [CDM: Household appliance distribution in Cambodia – CPA004 \(unfccc.int\)](http://unfccc.int)

It also includes the following information specific to technology deployed:

- Baseline cooking fuel
- Baseline stove type
- Usage of any other ICS prior to project activity

Enumerators, coordinated by the CME, were trained on the basic concept of the programme and were introduced to the registration form as well as the survey questionnaire before being sent to the field. They were also made to fill sample questionnaires during the training process and problems faced during the test filling were shared and discussed to avoid similar problems in the actual survey.

Simple random sampling was used to select sample stoves. The sample size for each CPA was determined using the Standard: Sampling and surveys for CDM project activities and programmes of activities Version 05.0. The level of precision has been selected as 95/10 as per paragraph 22 of the standard. (95% confidence interval and 10% margin of error).

10030-P1-0003-CP1

Proportion Parameters			Mean Parameter	
Parameters	$N_{y,i,a}$	$\mu_{y,i}$	$\eta_{new,i,a}$ (age 3)	$\eta_{new,i,a=1}$ (age 1)
Relative Precision achieved-SSM S32-13	0%	6%	0.14%	0.27%

10030-P1-0004-CP1

Proportion Parameters			Mean Parameter	
Parameters	$N_{y,i,a}$	$\mu_{y,i}$	$\eta_{new,i,a}$ (age 2)	$\eta_{new,i,a=1}$ (age 1)
Relative Precision achieved-SSM S32-13	0%	7%	0.16%	0.23%
Relative Precision achieved- Kuniokoa	0%	6%	NA	NA ⁸

The parameters that have been measured by the monitoring survey are listed in the Sampling Plan. The number of total installed appliances (per type of installed appliance) has been multiplied by the percent of respective operational appliances to get the actual number of operational appliances for the present monitoring period. Samples have been selected randomly for each CPA from the electronic database. Operational appliances have been identified by asking the sample households if the appliance installed in his/her house is in operating condition or not as well as from physical verification.

End user information was collected during sale/distribution of the stoves to end users by representatives of CPA implementer/CME. This information was collated into an electronic database from which project monitoring has been conducted. The database and Excel records were sent to the CME for checking prior to using them as the basis for monitoring activities.

Monitoring tasks, such as monitoring surveys, as well as survey tests have been conducted by the CME. Survey and test results were collected electronically via hand held devices using customized app and analysed using Excel to compile reports. The integrity of data has been cross-checked to ensure consistency.

⁸ All Kuniokoa stoves were installed on 22/07/2020, and hence are less than a year old as on the last day of the current monitoring period (31/12/2020). Thermal efficiency of these stoves in the year of installation (a=1 year) was determined through survey during the 2nd monitoring period. The same value is being used for this monitoring period.

SECTION E. Data and parameters**E.1. Data and parameters fixed ex ante**

Data/Parameter	NCV_{biomass}
Unit	TJ/tonne
Description	Net calorific value of the non-renewable woody biomass that is substituted
Source of data	Default value from AMS-II.G Version 6
Value(s) applied	0.015
Choice of data or measurement methods and procedures	Default value as per para 13 of AMS-II.G Version 6 and 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 1: Introduction, Table 1.2 Default Net Calorific Values (NCVs) and lower and upper limits of the 95% confidence intervals
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This value has been fixed ex-ante for the entire crediting period.

Data/Parameter	$EF_{\text{projected_fossil fuel}}$
Unit	tCO ₂ /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	Default value from AMS-II.G Version 6
Value(s) applied	81.6
Choice of data or measurement methods and procedures	Default value as per para 13 of AMS-II.G Version 6
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This value has been fixed ex-ante for the entire crediting period.

Data/Parameter	$f_{\text{NRB},y}$
Unit	Fraction
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass
Source of data	Registered PoA DD
Value(s) applied	Lao PDR: 0.88 Cambodia: 0.97
Choice of data or measurement methods and procedures	Calculated according to AMS II.G, version 6 using publicly available data
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This value has been fixed ex-ante for the entire crediting period.

Data/Parameter	L_y
Unit	Fraction
Description	Net to gross adjustment factor to account for leakage
Source of data	Default value from AMS-II.G Version 6
Value(s) applied	0.95

Choice of data or measurement methods and procedures	$B_{y,savings,i,a}$ is multiplied by a net to gross adjustment factor of 0.95 to account for leakages related to the non-renewable woody biomass saved by the project activity.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This value has been fixed ex-ante for the entire crediting period.

Data/Parameter	η_{old}
Unit	Fraction
Description	Efficiency of the pre-project device
Source of data	Fuelwood stove: Default value from AMS-II.G Version 6
Value(s) applied	10%
Choice of data or measurement methods and procedures	Fuelwood: Default value as per para 17 of AMS-II.G Version 6
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	This value has been fixed ex-ante for the entire crediting period.

E.2. Data and parameters monitored

Data/Parameter	$N_{y,i,a}$											
Unit	Number											
Description	Number of project devices of type <i>i</i> and age <i>a</i> operating in year <i>y</i>											
Measured/calculated/Default	measured											
Source of data	Annual household survey and project database											
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th></th> <th>Type</th> <th>$N_{y,i,a}$</th> </tr> </thead> <tbody> <tr> <td>10030-P1-0003-CP1</td> <td>SSM-S32-13</td> <td>20130</td> </tr> <tr> <td rowspan="2">10030-P1-0004-CP1</td> <td>SSM-S32-13</td> <td>14304</td> </tr> <tr> <td>Kuniokoa</td> <td>163</td> </tr> </tbody> </table>		Type	$N_{y,i,a}$	10030-P1-0003-CP1	SSM-S32-13	20130	10030-P1-0004-CP1	SSM-S32-13	14304	Kuniokoa	163
	Type	$N_{y,i,a}$										
10030-P1-0003-CP1	SSM-S32-13	20130										
10030-P1-0004-CP1	SSM-S32-13	14304										
	Kuniokoa	163										
Monitoring equipment	Not applicable											
Measuring/reading/recording frequency	annual											

Calculation method (if applicable)	The proportion of sampled ICS found to be in operation during the monitoring period was applied to the total number of stoves for each CPA when calculating emission reductions.				
		10030-P1-0003-CP1	10030-P1-0004-CP1		
	Proportion of stoves found operational	100%	SSM 100%	Kuniokoa 100%	
	Number of operational stoves for the monitoring period=Total number of stoves sold and registered in CPA * proportion in operation				
		Type	N_{total}	P_{operational}	N_{y,i,a}
	10030-P1-0003-CP1	SSM-S32-13	20130	100%	20130
	10030-P1-0004-CP1	SSM-S32-13	14304	100%	14304
		Kuniokoa	163	100%	163
QA/QC procedures	Each sale will be recorded in an electronic database along with the name of recipient, contact details, location of household (village, district and/or GPS coordinates and date of installation. Spot-check of data collection process would be done during on-going monitoring to ensure accuracy and transparency.				
Purpose of data/parameter	Calculation of baseline emissions				
Additional comments	-				

Data/Parameter	$\eta_{new,i,a=1}$
Unit	Fraction
Description	Thermal efficiency of the device of type <i>i</i> being deployed as part of the project activity in the year of its installation (a=1) for stoves of age = 1 year
Measured/calculated/Default	Measured in the current monitoring period and fixed hereafter.
Source of data	WBT test

Value(s) of monitored parameter	$\eta_{new,i,a=1}$ for stoves installed in current monitoring period		
	Model	10030-P1-0003-CP1	10030-P1-0004-CP1
	SSM S32-13	38.59%	38.51%
	Kuniokoa	-	41.59% ⁹
	$\eta_{new,i,a=1}$ for age 2 stoves ¹⁰		
	The value of $\eta_{new,i,a=1}$ for stoves of age 2 years (i.e. two years old as on the last day of the current monitoring period) was determined during the year of their installation and reported during the second monitoring period are as follows:		
	Model	10030-P1-0003-CP1	10030-P1-0004-CP1
	SSM S32-13 (Stove age-2)	38.43%	38.51 ¹¹ %
	Kuniokoa	NA	NA
	$\eta_{new,i,a=1}$ for age 3 stoves ¹²		
The value of $\eta_{new,i,a=1}$ for stoves of age 3 years (i.e. three years old as on the last day of the current monitoring period) was determined during the year of their installation and reported during the first monitoring period are as follows:			
Model	10030-P1-0003-CP1	10030-P1-0004-CP1	
SSM S32-13 (Stove age-2)	38.50%	NA	
Kuniokoa	NA	NA	

⁹ Please refer to footnote 8

¹⁰ Value replicated from 2nd monitoring report

¹¹ For 195 numbers of SSM S32 stoves installed in Cambodia (installation date- January 2019), the efficiency in 1st year of their installation was determined during first verification. The same value has been replicated here since for the present monitoring period, these 195 stoves now belong to age=2 years.

¹² Value replicated from 1st monitoring report

Monitoring equipment	The tests were conducted by trained staff in presence of CME representatives.		
	Calibration of instruments were carried out as per manufacturer's specification		
	Instrument	Model	Other details
	Weighing Scale	My Weigh KD8000	Range: upto 8 kg capacity Calibration facility: As per manufacturer's specification according to which the instrument can be self calibrated with known 5 Kg weight. Instrument was calibrated prior to each testing. Calibration frequency: as and when required
Digital Thermometer	Thomas Traceable Kangaroo Thermometer	Thermocouple Type: 7.5" Probe Length Range: -50 °C to 300 °C (± 1.1°C) Calibration facility: Thermometers used in Cambodia WBT tests -Calibrated by manufacturer on 17/05/2019 (1no.) and 11/06/2019 (2 nos.) Calibration due date: 17/05/2021 and 11/06/2021 respectively. Thermometers used in Lao WBT tests -Calibrated by manufacturer on 17/05/2019 (3nos.). Calibration due date: 17/05/2021. Calibration frequency: Once in two years	
Moisture meter	Extech MO210	Range- 6% to 44% for wood Calibration Facility- Instrument measurement verification check was done according to steps specified by manufacturer prior to each testing. Calibration frequency: not specified	
Measuring/reading/recording frequency	Once at the time of stove installation		
Calculation method (if applicable)	The efficiency was determined for cold start phase and hot start phase and then averaged for each stove.		
QA/QC procedures	WBT protocol 4.2.3 has been used for determination of this parameter.		
Purpose of data/parameter	Calculation of baseline emissions		
Additional comments	none		

Data/Parameter	$\eta_{new,i,a}$
Unit	Fraction
Description	Thermal efficiency of the device of type <i>i</i> being deployed as part of the project activity with age 'a'. (Stoves of age = 3 years for CPA0003 and stoves of age = 2 years for CPA0004 as on the last day of current monitoring period)

Measured/calculated/default	measured														
Source of data	WBT test														
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Model</th> <th>10030-P1-0003-CP1</th> <th>10030-P1-0004-CP1</th> </tr> </thead> <tbody> <tr> <td>SSM S32-13 ($\eta_{new,i,a=2}$)</td> <td>NA¹³</td> <td>38.59%</td> </tr> <tr> <td>SSM S32-13 ($\eta_{new,i,a=3}$)</td> <td>38.58%</td> <td>NA</td> </tr> </tbody> </table>			Model	10030-P1-0003-CP1	10030-P1-0004-CP1	SSM S32-13 ($\eta_{new,i,a=2}$)	NA ¹³	38.59%	SSM S32-13 ($\eta_{new,i,a=3}$)	38.58%	NA			
Model	10030-P1-0003-CP1	10030-P1-0004-CP1													
SSM S32-13 ($\eta_{new,i,a=2}$)	NA ¹³	38.59%													
SSM S32-13 ($\eta_{new,i,a=3}$)	38.58%	NA													
Monitoring equipment	<p>The tests were conducted by trained staff in presence of CME representatives. Calibration of instruments were carried out as per manufacturer's specification</p> <table border="1"> <thead> <tr> <th>Instrument</th> <th>Model</th> <th>Other details</th> </tr> </thead> <tbody> <tr> <td>Weighing Scale</td> <td>My Weigh KD8000</td> <td>Range: upto 8 kg capacity Calibration facility: As per manufacturer's specification according to which the instrument can be self calibrated with known 5 Kg weight. Instrument was calibrated prior to each testing. Calibration frequency: as and when required</td> </tr> <tr> <td>Digital Thermometer</td> <td>Thomas Traceable Kangaroo Thermometer</td> <td>Thermocouple Type: 7.5" Probe Length Range: -50 °C to 300 °C ($\pm 1.1^\circ\text{C}$) Calibration facility: Thermometers used in Cambodia WBT tests -Calibrated on 17/05/2019 (1 unit) and 11/06/2019 (2 units) Calibration due date: 17/05/2021 and 11/06/2021 respectively. Thermometers used in Lao WBT tests -Calibrated on 17/05/2019 (3 units). Calibration due date: 17/05/2021. Calibration frequency: Once in two years</td> </tr> <tr> <td>Moisture meter</td> <td>Exttech MO210</td> <td>Range- 6% to 44% for wood Calibration Facility- Instrument measurement verification check was done according to steps specified by manufacturer prior to each testing. Calibration frequency: not specified</td> </tr> </tbody> </table>			Instrument	Model	Other details	Weighing Scale	My Weigh KD8000	Range: upto 8 kg capacity Calibration facility: As per manufacturer's specification according to which the instrument can be self calibrated with known 5 Kg weight. Instrument was calibrated prior to each testing. Calibration frequency: as and when required	Digital Thermometer	Thomas Traceable Kangaroo Thermometer	Thermocouple Type: 7.5" Probe Length Range: -50 °C to 300 °C ($\pm 1.1^\circ\text{C}$) Calibration facility: Thermometers used in Cambodia WBT tests -Calibrated on 17/05/2019 (1 unit) and 11/06/2019 (2 units) Calibration due date: 17/05/2021 and 11/06/2021 respectively. Thermometers used in Lao WBT tests -Calibrated on 17/05/2019 (3 units). Calibration due date: 17/05/2021. Calibration frequency: Once in two years	Moisture meter	Exttech MO210	Range- 6% to 44% for wood Calibration Facility- Instrument measurement verification check was done according to steps specified by manufacturer prior to each testing. Calibration frequency: not specified
Instrument	Model	Other details													
Weighing Scale	My Weigh KD8000	Range: upto 8 kg capacity Calibration facility: As per manufacturer's specification according to which the instrument can be self calibrated with known 5 Kg weight. Instrument was calibrated prior to each testing. Calibration frequency: as and when required													
Digital Thermometer	Thomas Traceable Kangaroo Thermometer	Thermocouple Type: 7.5" Probe Length Range: -50 °C to 300 °C ($\pm 1.1^\circ\text{C}$) Calibration facility: Thermometers used in Cambodia WBT tests -Calibrated on 17/05/2019 (1 unit) and 11/06/2019 (2 units) Calibration due date: 17/05/2021 and 11/06/2021 respectively. Thermometers used in Lao WBT tests -Calibrated on 17/05/2019 (3 units). Calibration due date: 17/05/2021. Calibration frequency: Once in two years													
Moisture meter	Exttech MO210	Range- 6% to 44% for wood Calibration Facility- Instrument measurement verification check was done according to steps specified by manufacturer prior to each testing. Calibration frequency: not specified													
Measuring/reading/recording frequency	annually														
Calculation method (if applicable)	The efficiency was determined for cold start phase and hot start phase and then averaged for each stove.														

¹³ In line with paragraph 17 of applied methodology.

QA/QC procedures	This parameter was determined using WBT protocol 4.2.3.
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	For stoves installed within one year from the last day of the current monitoring period (SSM S32-13 Stoves in Lao PDR and Cambodia CPAs and Kuniokoa Stoves in Cambodia CPA) $\eta_{new,i,a}$ is equal to $\eta_{new,i,a=1}$. The efficiency of age 2 stoves in Lao PDR has been calculated from the efficiency loss of the oldest batch as enumerated under paragraph 17 of applied methodology. The efficiency difference of the oldest batch (i.e batch 3 stoves) was 0.02% ($\eta_{new,i,a=1}$: 38.50% and $\eta_{new,i,a=2}$: 38.52%) between 1 st and 2 nd year of its operation.

Data/Parameter	$\Delta\eta_{y,i,a}$															
Unit	Fraction															
Description	Factor to consider the efficiency loss of the project device type <i>i</i> due to its aging at the year <i>y</i>															
Measured/calculated/default	calculated															
Source of data	WBT															
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Model</th> <th>10030-P1-0003-CP1</th> <th>10030-P1-0004-CP1</th> </tr> </thead> <tbody> <tr> <td>SSM S32-13 (age - 1yr)</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>SSM S32-13 (age - 2yr)</td> <td>1.001</td> <td>1.002</td> </tr> <tr> <td>SSM S32-13 (age - 3yr)</td> <td>1.002</td> <td>na</td> </tr> <tr> <td>Kuniokoa</td> <td>na</td> <td>1.0</td> </tr> </tbody> </table>	Model	10030-P1-0003-CP1	10030-P1-0004-CP1	SSM S32-13 (age - 1yr)	1.0	1.0	SSM S32-13 (age - 2yr)	1.001	1.002	SSM S32-13 (age - 3yr)	1.002	na	Kuniokoa	na	1.0
Model	10030-P1-0003-CP1	10030-P1-0004-CP1														
SSM S32-13 (age - 1yr)	1.0	1.0														
SSM S32-13 (age - 2yr)	1.001	1.002														
SSM S32-13 (age - 3yr)	1.002	na														
Kuniokoa	na	1.0														
Monitoring equipment	Not applicable															
Measuring/reading/recording frequency	annually															
Calculation method (if applicable)	Calculated as: $\Delta\eta_{y,ia} = \frac{\eta_{new,i,a}}{\eta_{new,i,a=1}}$															
QA/QC procedures	N/A															
Purpose of data/parameter	Baseline emission calculation															
Additional comments	none															

Data/Parameter	$B_{y=1,new,i,survey}$
Unit	t/year/device
Description	Annual quantity of woody biomass used during the project activity in tonnes per device of type <i>i</i>
Measured/calculated/default	measured
Source of data	Sample survey

Value(s) of monitored parameter	Model	CPA	
		10030-P1-0003-CP1	10030-P1-0004-CP1
	SSM S32-13	1.163 ¹⁴	1.142 ¹⁵
	Kuniokoa	na	1.427 ¹⁶
Monitoring equipment	Woodfuel consumption was weighed using following monitoring equipment. American Weigh Scales AMW-SR-20. Calibration facility: pre calibrated by manufacturer. The scale was recalibrated as per manufacturer's specification on 03/09/2020 for measuring wood fuel use in project for Kuniokoa stoves. Calibration frequency: as and when required. Range: 0.02lb-44lb		
Measuring/reading/recording frequency	Once during first year of CPA installation.		
Calculation method (if applicable)	In order to monitor $B_{y=1,new,i,survey}$, the CME undertook measurement of biomass used in the project stove for each of the sampled households. The survey was undertaken between 9:00 AM to 5:00 PM thus enabling surveyors to conduct the survey at a time when most of the households would be preparing for major meals. The respondents were asked to make bundles of firewood that they consume during cooking all meals in a day. This bundle was measured. For households where respondents were found using only project stove, this bundle represented the amount of wood used in the project stove in a day. However, for households where a baseline stove was used, the respondents were further asked to separate from the bundle, the wood that they use on project stove. Measuring the second bundle gave the amount of wood that was used on project stove. The same method was used for measuring consumption of woody biomass in project stoves in the first monitoring period.		
QA/QC procedures	Standard calibrated scales were used by trained staff to carry out the measurements.		
Purpose of data/parameter	Baseline emission calculation		
Additional comments	none		

Data/Parameter	$B_{y,savings,i,a}$
Unit	t/annum/device
Description	Quantity of woody biomass that is saved in tonnes per cook stove device of type <i>i</i> and age <i>a</i> in year <i>y</i>
Measured/calculated/default	calculated
Source of data	Calculated from $B_{y=1,new,i,survey}$

¹⁴ For SSM S32-13 stoves in Lao PDR CPA, this parameter was monitored in the first year of installation and reported in the first monitoring period. The same results are replicated here.

¹⁵ For SSM S32-13 stoves in Cambodia CPA, this parameter was monitored in the first year of installation and reported in the first monitoring period. The same results are replicated here.

¹⁶ For Kuniokoa stoves in Cambodia CPA, this parameter was monitored during first year of its installation and reported in second monitoring report. The same results are replicated here.

Value(s) of monitored parameter	Model	CPA	
		10030-P1-0003-CP1	10030-P1-0004-CP1
	SSM S32-13 (age=1)	3.159	3.093
	SSM S32-13 (age=2)	3.143	3.101
	SSM S32-13 (age=3)	3.157	na
	Kuniokoa	na	4.283
Monitoring equipment	Not applicable		
Measuring/reading/recording frequency	Calculated annually		
Calculation method (if applicable)	$B_{y,savings,i,a} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,i,a=1} \times \Delta \eta_{y,i,a}}{\eta_{old}} - 1 \right)$		
QA/QC procedures	Calculated parameter based on results of $B_{y=1,new,i,survey}$ survey and cook stove efficiency testing		
Purpose of data/parameter	Baseline emission calculation		
Additional comments	none		

Data/Parameter	$\mu_{y,i}$		
Unit	Days		
Description	Number of days of utilization of the cook stove device of type i during the year y		
Measured/calculated/default	measured		
Source of data	Sample survey		
Value(s) of monitored parameter	Model	CPA	
		10030-P1-0003-CP1	10030-P1-0004-CP1
	SSM S32-13	341	342
	Kuniokoa	na	344
	$\mu_{y,i}/365$		
	Model	CPA	
	10030-P1-0003-CP1	10030-P1-0004-CP1	
SSM S32-13	0.94	0.93	
Kuniokoa	na	0.94	
Monitoring equipment	Not applicable		
Measuring/reading/recording frequency	Annually		
Calculation method (if applicable)	The survey was designed to capture cooking habits and stove usage of households by formulating questions to determine the frequency of usage of both the project devices and baseline devices. Respondents were questioned on the use of project as well as baseline device for cooking meals in households on an everyday as well as weekly basis and same was used for determining the number of days of project stove utilization.		
QA/QC procedures	Sampling was conducted by applying the 95/10 confidence precision for the sample size calculation.		
Purpose of data/parameter	Baseline emission calculation		
Additional comments	In line with clarification SSC_786, value of $\mu_{y,i}$ is considered as 365 for first year of project stove installation and in subsequent year, result of survey has been used to determine this value.		

E.3. Implementation of sampling plan

>>

(a) Sampling Design

Due to the large number of ICSs distributed as part of the CPA, it was not economically feasible to monitor each individual ICS distributed. Therefore, representative sampling was undertaken as part of a SSC-CPA-wide Sampling Plan that is designed in line with the requirements of the “Standard for sampling and surveys for CDM project activities and programme of activities” from EB86, Annex 3 (the *Sampling standard*). Therefore separate sampling was conducted for both the CPAs that is 10030-P1-0003-CP1 and 10030-P1-0004-CP1.

(i) Objective and Reliability Requirements:

The objective was to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period, and with 95/10 confidence/prevision.

Monitored Parameters:

Sampling was carried out for individual CPAs for following parameters

Lao PDR- 10030-P1-0003-CP1 Stove Model – SSM S32-13						
Parameter	Sample size-calculated	Minimum size of 30 achieved	Sample size-20% response	Actual sample size		
Number of project devices of type <i>i</i> and age <i>a</i> operating in year <i>y</i>	53	yes	64	62		
Thermal efficiency of the device of type <i>i</i> being deployed as part of the project activity with age ' <i>a</i> ' = 3	3	No. Student's t-distribution was used to calculate the sample size-resulting in 7 samples	9	9		
Thermal efficiency of the device of type <i>i</i> being deployed as part of the project activity in the year of its installation (<i>a</i> =1).	3	No. Student's t-distribution was used to calculate the sample size-resulting in 7 samples	9	9		
Number of days of utilization of the project device during the year ' <i>y</i> '	4	No. A sample size of 62 was used which is more than minimum requirement of 30.	5	62		

Cambodia-10030-P1-0004-CP1
Stove Model- SSm S32-13

Parameter	Sample size-calculated	Minimum size of 30 achieved	Sample size-non response	Actual sample size
Number of project devices of type <i>i</i> and age <i>a</i> operating in year <i>y</i>	53	yes	64	54
Thermal efficiency of the device of type <i>i</i> being deployed as part of the project activity with age 'a' = 2	3	No. Student's t-distribution was used to calculate the sample size-resulting in 7 samples	9	7
Thermal efficiency of the device of type <i>i</i> being deployed as part of the project activity in the year of its installation (a=1).	3	No. Student's t-distribution was used to calculate the sample size-resulting in 7 samples	9	7
Number of days of utilization of the project device during the year 'y'	4	No. A sample size of 54 was used which is more than minimum requirement of 30.	5	54

Cambodia-10030-P1-0004-CP1 Stove Model- Kuniokoa				
Parameter	Sample size-calculated	Minimum size of 30 achieved	Sample size-non response	Actual sample size
Number of project devices of type <i>i</i> and age <i>a</i> operating in year <i>y</i>	40	yes	48	42
Number of days of utilization of the project device during the year 'y'	4	No. A sample size of 42 was used which is more than minimum requirement of 30.	5	42

(ii) Target Populations:

The target population for the parameters stated above is, all ICS recorded in the project database.

(iii) Sampling Frame

Single sample frame was determined for parameters $N_{y,i,a}$, and $\mu_{y,i}$ and separate sampling frames were determined for parameters $\eta_{new,i,a}$ and $\eta_{new,i,a=1}$ each for individual stove models.

(iv) Sampling Method

Considering the homogenous nature of target population, 'Simple Random Sampling' was used in which unbiased random selection of individual households was carried out to ensure that from the many samples which are drawn, the average sample accurately represented the target population.

(v) Sample Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95/10 confidence/precision for annual sampling. Of the five parameters to be monitored, two are proportion/percentage parameters ($N_{y,i,a}$, $\mu_{y,i}$) and two are mean value parameters ($\eta_{new,i,a}$, $\eta_{new,i,a=1}$).

The sample size calculated as per the simple random sampling approach for the required parameters are mentioned in the table below.

10030-P1-0003-CP1 (Lao PDR) SSM S32-13 stoves

Sampling result overview-Lao PDR CPA 0003 SSM S-32				
Proportion Parameters				
Parameters	$N_{y,i,a}$	reference document	$\mu_{y,i}$	reference document
Population size	20130	database	20130	database
expected proportion	0.88	pilot study	0.99	pilot study
confidence/precision	95/10	meth requirement	95/10	meth requirement
calculated sample size (minimum)	53	calculated	4	calculated
actual sample size	62	HH survey sheet	62	HH survey sheet
actual proportion	1.00	HH survey sheet	0.94	HH survey sheet
Relative Precision achieved	0%	calculated	6%	calculated

Sampling result overview-Lao PDR CPA 0003 SSM S-32				
Mean Parameters				
Parameters	$\eta_{new,i,a=1}$ (stove age 1 year)	reference document	$\eta_{new,i,a=3}$ (stove age 3 years)	reference document
Population size	19239	database	851	database
expected mean	37.61%	pilot study	37.61%	pilot study
expected standard deviation	0.0333	pilot study	0.0333	pilot study
confidence/precision	95/10	meth requirement	95/10	meth requirement
calculated sample size (minimum)	7	calculated	7	calculated
actual sample size	9	WBT survey sheet	9	WBT survey sheet
actual mean	0.3859	WBT survey sheet	0.3858	WBT survey sheet
actual SD	0.0014	WBT survey sheet	0.0007	WBT survey sheet
Relative Precision achieved	0.27%	calculated	0.14%	calculated

10030-P1-0004-CP1 (Cambodia) SSM S32-13 stoves

Sampling result overview-Cambodia CPA 0004 SSM S-32

Proportion Parameters (Stoves of age 1 & 2 years)

Parameters	$N_{y,i,a}$	reference document	$\mu_{y,i}$	reference document
Population size	14304	database	14304	database
expected proportion	0.88	pilot study	0.99	pilot study
confidence/precision	95/10	meth requirement	95/10	meth requirement
calculated sample size (minimum)	53	calculated	4	calculated
actual sample size	54	HH survey sheet	54	HH survey sheet
actual proportion	1.00	HH survey sheet	0.9383	HH survey sheet
Relative Precision achieved	0%	calculated	7%	calculated

Sampling result overview-Cambodia CPA 0004 SSM S-32

Mean Parameters

Parameters	$\eta_{new,i,a=1}$ (stove age = 1 year)	reference document	$\eta_{new,i,a}$ (stove age = 2 years)	reference document
Population size	14109	database	195	database
expected mean	37.61%	pilot study	37.61%	pilot study
expected standard deviation	0.0333	pilot study	0.0333	pilot study
confidence/precision	95/10	meth requirement	95/10	meth requirement
calculated sample size (minimum)	7	calculated	7	calculated
actual sample size	7	WBT survey sheet	7	WBT survey sheet
actual mean	0.3851	WBT survey sheet	0.3859	WBT survey sheet
actual SD	0.0010	WBT survey sheet	0.0007	WBT survey sheet
Relative Precision achieved	0.23%	calculated	0.16%	calculated

10030-P1-0004-CP1 (Cambodia) Kuniokoa stoves

Sampling result overview-Cambodia CPA 0004 Kuniokoa Stoves

Proportion Parameters

Parameters	$N_{y,i,a}$	reference document	$\mu_{y,i}$	reference document
Population size	163	database	163	database
expected proportion	0.88	pilot study	0.99	pilot study
confidence/precision	95/10	meth requirement	95/10	meth requirement
calculated sample size (minimum)	40	calculated	4	calculated
actual sample size	42	HH survey sheet	42	HH survey sheet
actual proportion	1.00	HH survey sheet	0.9444	HH survey sheet

Relative Precision achieved	0%	calculated	6%	calculated

On estimating the sample size, 20% of non-response were considered and thus total of 64 households for 10030-P1-0003-CP1 and 10030-P1-0004-CP1 for model SSM S32-13 stove and 48 households in 10030-P1-0004-CP1 for Kuniokoa model were targeted for estimating parameters $N_{y,i,a}$, and $\mu_{y,i}$ and 9 households each for both the CPAs were targeted for parameter $\eta_{new,i,a}$ and $\eta_{new,i,a=1}$, however the survey was stopped once the number reached 62 for CPA -10030-P1-0003-CP1 and 54 & 42 for CPA- 10030-P1-0004-CP1 for each of the two stove models SSM & Kuniokoa respectively as the minimum sample size for each was achieved. For $\eta_{new,i,a}$, and $\eta_{new,i,a=1}$ as sample size of 7 was the minimum required number hence WBT tests targeting at least 7 samples were conducted and where possible extra stoves were tested.

Information about the precision achieved demonstrates that the required confidence/precision level has been met.

Formulae used in the sampling:

Minimum sample size and overall variance for proportional parameters were calculated based on equations (4&5) and (7&8); minimum sample size and overall variance for mean parameters were calculated based on equations (18) and (13&14) of CDM Guideline “Sampling and surveys for CDM project activities and programmes of activities”, Version 04.0.

(b) Data:

(i) Field Measurements:

The method of collecting data was field surveys and WBT tests of required sample size selected randomly from the database.

The surveys as well as WBT tests were conducted by CPA implementer staff with guidance from the CME, and enumerators were trained prior to conducting surveys and WBT tests. Survey and test results were recorded on paper on the spot and were later transferred into Excel files which was used for further analysis and calculation of CERs to compile reports.

(ii) Quality Assurance/Quality Control

The required confidence and precision were met for all parameters. The sample size calculation is provided to verifying DOE.

a.Data archiving

Hard copies of the surveys have been maintained and the registration database has a back up. A back-up of the registration database has also been stored in an electronic medium by the CME. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

b.Analysis

Data obtained from the samples were used to estimate proportions and mean values for the parameters described above. The values were then factored into the emissions reduction calculations.

c.Implementation

The sampling was conducted by trained personnel, who were part of the CPA Implementer team. The CPA Implementer is responsible for managing household data collection and entry into the project database. Field personnel received training on how to properly deal with surveying techniques and reduce errors.

SECTION F. Calculation of emission reductions or net anthropogenic removals

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

>>

Emission Reductions

Emission reductions have been calculated as:

$$ER_y = \sum_i ER_{y,i}$$

Where,

- i Indices for the situation where more than one type of project device is introduced to replace the pre-project devices
- ER_y Emission reductions during year y in t CO₂e
- ER_{y,i} Emission reductions by project device of type i during year y in t CO₂e

$$ER_{y,i} = \sum_{a=1}^{a=y} B_{y,savings,i,a} \times N_{y,i,a} \times \frac{\mu_{y,i}}{365} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_fossil\ fuel} - LE_y$$

Where,

- A 'a' is the indices for the age (in years) of the cook stoves that are operating in the year 'y' of the crediting period.
- B_{y,savings,i,a} Quantity of woody biomass that is saved in tonnes per cook stove device of type i and age a in year y
- f_{NRB,y} Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass using survey methods or government data or default country specific fraction of non-renewable woody biomass (f_{NRB}) values available on the CDM website
- NCV_{biomas} Net calorific value of the non-renewable woody biomass that is substituted
- EF_{projected_fossil fuel} Emission factor for the fossil fuels projected to be used for substitution of non-renewable woody biomass by similar consumers
- N_{y,i,a} Number of project devices of type i and age a operating in year y
- μ_{y,i} Number of days of utilization of the project device during the year y
- LE_y Leakage emissions in the year y

In line with paragraph 14 of the methodology, B_{y,savings,i,a} has been estimated using option 2 that is water boiling test (WBT)

Under WBT option, 2 options are given to determine B_{y,savings,i,a}.

Equation 6 has been used for calculating B_{y,savings,i,a}.

$$B_{y,savings,i,a} = B_{y=1,new,i,survey} \times \left(\frac{\eta_{new,i,a=1} \times \Delta \eta_{y,i,a}}{\eta_{old}} - 1 \right)$$

Where,

- B_{y=1,new,i,survey} Annual quantity of woody biomass used by project devices in tonnes per device of type i, determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, y=1) through a sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are

satisfied:

- (a) Pre-project devices have been completely decommissioned and only efficient project devices are exclusively used in the project households;
- (b) If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass.

η_{old} Efficiency of the pre-project device (fraction)

$\eta_{new,i,a=1}$ Thermal efficiency of the device of type *i* being deployed as part of the project activity (fraction), using the WBT protocol carried out in accordance with national standards (if available) or international standards or guidelines, for the initial efficiency determined in the year of its installation (*a*=1).

$\Delta\eta_{y,i,a}$ Factor to consider the efficiency loss of the project device type *i* due to its aging at the year *y*, as expressed as follows:

$$\Delta\eta_{y,i,a} = \frac{\eta_{new,i,a}}{\eta_{new,i,a=1}}$$

where $\eta_{new,i,a}$ is the thermal efficiency of the device '*i*' with age '*a*' determined using the WBT and $\eta_{new,i,a=1}$ is the thermal efficiency of the device at its first year of operation. $\Delta\eta_{y,i,a}$ may be determined through sample surveys of project device type *i* with the same age at each year of the crediting period.

For CPA 10030-0003 (Lao PDR)

Parameter	Description	Value Stove age=1yr	Value Stove age = 2yr	Value Stove age = 3yr	Unit	Source
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year <i>y</i> that can be established as non-renewable biomass	0.88	0.88	0.88	Fraction	Registered PoA DD
$NCV_{biomass}$	Net Calorific Value of biomass	0.015	0.015	0.015	TJ/tonne	Default from AMS.II-G version 6
$EF_{projected_fossilfuel}$	Emission factor of the fossil fuel most likely to be adopted	81.6	81.6	81.6	tCO ₂ e/TJ	Default from AMS.II-G version 6
<i>L</i>	Leakage adjustment factor	0.95	0.95	0.95	Fraction	Default from AMS.II-G version 6
η_{old}	Efficiency of the system being replaced	0.10	0.10	0.10	Fraction	Default from AMS.II-G version 6
$\eta_{new,i,a=1}$	Thermal efficiency of project device in the year of its installation (age=1)	0.3859	0.3843	0.3850	Fraction	<ul style="list-style-type: none"> • Calculated from results of sampled survey for stoves of age = 1 year. • For Stoves of age =3 and 2 years - Replicated from first & Second monitoring survey respectively.
$\eta_{new,i,a}$	Thermal efficiency of the project cookstove of age ' <i>a</i> '	0.3859	0.3845	0.3858	Fraction	<ul style="list-style-type: none"> • The Stoves have been installed in

CDM-PoA-MR-FORM

						current year hence same as $\eta_{new,i,a}=1$ for stove age = 1. •For stove age=2 years, it is calculated from the efficiency loss of oldest batch of stoves i.e age 3 stoves (loss for this batch between 1st and 2nd year was 0.02%). •For stove age =3 years it has been calculated from survey
$\Delta\eta_{y,i,a}$	Factor to consider the efficiency loss of the project stove due to its aging at the year y	1	1.001	1.002	Fraction	calculated
$N_{y,i,a}$	Number of stoves still in operation during the monitoring period	1	1	1	Quantity	
$\mu_{y,i}$	Number of days of utilization of the cook stove device during the year	341	341	341	days	Calculated from survey
$B_{y=1,new,i,survey}$	Annual quantity of woody biomass used during the project activity in tonnes per cookstove	1.163	1.163	1.163	Tonnes/yr	Calculated from results of sampling survey
$B_{y,savings}$	Quantity of woody biomass that is saved	3.159	3.143	3.157	Tonnes/yr	Calculated
ER_y	Emission reductions for 1 stove in year y in tCO ₂ e	3.170	3.160	3.170	tCO ₂ e/yr/device	Calculated
$ER_{y,monitoring\ period}$	Emission reduction for operational days of monitoring period	14,204	53	1123	tCO ₂ e	Calculated
Total			15380 tons CO2 in the current monitoring period			

For CPA 10030-0004-Cambodia (SSM S32-13)

Parameter	Description	Value Stove age=1yr	Value Stove age = 2yr	Unit	Source
$f_{NR,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass	0.97	0.97	Fraction	Registered PoA DD
$NCV_{biomass}$	Net Calorific Value of biomass	0.015	0.015	TJ/tonne	Default from AMS.II-G version 6
$EF_{projected_fossilfuel}$	Emission factor of the fossil fuel most likely to	81.6	81.6	tCO ₂ e/TJ	Default from AMS.II-G version 6

	be adopted				
L	Leakage adjustment factor	0.95	0.95	Fraction	Default from AMS.II-G version 6
η_{old}	Efficiency of the system being replaced	0.10	0.10	Fraction	Default from AMS.II-G version 6
$\eta_{new,i,a=1}$	Thermal efficiency of project device in the year of its installation (age=1)	0.3851	0.3851	Fraction	Calculated from results of sampling survey carried out in 1 st year of installation
$\eta_{new,i,a}$	Thermal efficiency of the project cookstove of age 'a'	0.3851	0.3859	Fraction	Calculated from results of sampling survey
$\Delta\eta_{y,i,a}$	Factor to consider the efficiency loss of the project stove due to its aging at the year y	1.00	1.002	Fraction	calculated
$N_{y,i,a}$	Number of stoves still in operation during the monitoring period	1	1	Quantity	
$\mu_{y,i}$	Number of days of utilization of the cook stove device during the year	342	342	days	calculated from results of survey
$B_{y=1,new,i,survey}$	Annual quantity of woody biomass used during the project activity in tonnes per cookstove	1.142	1.142	Tonnes/yr	Calculated from results of sampling survey
$B_{y,savings}$	Quantity of woody biomass that is saved	3.093	3.101	Tonnes/yr	Calculated
ER_y	Emission reductions by 1 stove during the year y in tCO ₂ e	3.44	3.45	tCO₂e/yr/ device	Calculated
$ER_{y,monitoring\ period}$	Emission reduction for operational days in monitoring period	16,621	281	tCO₂e	Calculated
Total		16,901 tons CO2 in the current monitoring period			

For CPA 10030-0004-Cambodia (Kuniokoa)

Parameter	Description	Value Stove age=1yr	Unit	Source
$f_{NRB,y}$	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass	0.97	Fraction	Registered PoA DD
$NCV_{biomass}$	Net Calorific Value of biomass	0.015	TJ/tonne	Default from AMS.II-G version 6
$EF_{projected_fossilfuel}$	Emission factor of the fossil fuel most likely to be adopted	81.6	tCO ₂ e/TJ	Default from AMS.II-G version 6
L	Leakage adjustment factor	0.95	Fraction	Default from AMS.II-G version 6
η_{old}	Efficiency of the system being replaced	0.10	Fraction	Default from AMS.II-G version 6
$\eta_{new,i,a=1}$	Thermal efficiency of project device in the year of its installation (age=1)	0.4159	Fraction	Calculated from results of sampling survey
$\eta_{new,i,a}$	Thermal efficiency of the project cookstove of age 'a'	0.4159	Fraction	Calculated from results of sampling survey
$\Delta\eta_{y,i,a}$	Factor to consider the efficiency loss of the project stove due to its aging at the year y	1	Fraction	calculated
$N_{y,i,a}$	Number of stoves still in operation during the monitoring period	1	Quantity	

$\mu_{y,i}$	Number of days of utilization of the cook stove device during the year	344	days	Calculated from results of survey
$B_{y=1,new,i,survey}$	Annual quantity of woody biomass used during the project activity in tonnes per cookstove	1.427	Tonnes/yr	Calculated from results of sampling survey
$B_{y,savings}$	Quantity of woody biomass that is saved	4.283	Tonnes/yr	Calculated
ER_y	Emission reductions for 1 stove during the year y in tCO ₂ e	4.792	tCO₂e/yr/device	Calculated
$ER_{y,monitoring\ period}$	Emission reduction for operational days in monitoring period	326	tCO₂e	Calculated
Total		326 tons CO2 in the current monitoring period		

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

>>
Not applicable

F.3. Calculation of leakage emissions

>>
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 ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
10030-P1-0003-CP1	15,380	0	0	0	15,380	0	15,380
10030-P1-0004-CP1	17,227	0	0	0	17,227	0	17,227
Total	32,607	0	0	0	32,607	0	32,607

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 ₂ e)	Amount estimated ex ante for this monitoring period in the CPA-DD (t CO ₂ e)
10030-P1-0003-CP1	15,380	48,894
10030-P1-0004-CP1	17,227	56,813
Total	32,607	105,707

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

>>
The following change is observed between ex-ante emission reduction calculated value and the value calculated for the current monitoring period.

1.CPA-Lao PDR-SSM S-32 stoves

Emission reduction calculated ex ante for a single stove - 5tCO₂/stove/year

Emission reduction calculated in this monitoring period- 3.170t CO₂/stove/year for age 1 stoves, 3.160 t CO₂/stove/year for age 2 stoves and 3.170 t CO₂/stove/year for age 3 stoves.

2.CPA-Cambodia- SSM S-32 stoves

Emission reduction calculated ex ante for a single stove - 9t CO₂/stove/year

Emission reduction calculated in this monitoring period- 3.44 t CO₂/stove/year for age 1 stoves and 3.45 t CO₂/stove/year for age 2 stoves

3.CPA-Cambodia- Kuniokoa Stoves

Emission reduction calculated ex ante for a single stove – 10 tCO₂/stove/year

Emission reduction calculated in this monitoring period- 4.792 t CO₂/stove/year

	Projected ICS	tCO ₂ e/year as per CPA DD	Actual ICS installed	tCO ₂ e/year as per actual ICS installed	No. of days (for comparable period)	tCO ₂ e
10030-P1-0003-CP1	50,000	291,630	20,130	117,410	153	48,894
10030-P1-0004-CP1	100,000	470,933	14,467	136,426	153	56,813

F.6. Remarks on increase in achieved emission reductions

>>

Decrease in achieved emission reduction is due to difference in the value of $B_{y=1,new,i,survey}$.

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

>>

N/A

Document information

Version	Date	Description
05.0	8 October 2021	Revision to: <ul style="list-style-type: none"> Ensure consistency with version 03.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN).
04.0	6 April 2021	Revision to: <ul style="list-style-type: none"> Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> 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.

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	7 June 2017	Revision to: <ul style="list-style-type: none">• 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.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report, programme of activities
