



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

MONITORING REPORT

Title of the PoA	Madagascar Improved Cookstove Project by KCM	
UNFCCC reference number of the PoA	10443	
Version numbers of the PoA-DD applicable to this monitoring report	04 (dated 15/10/2018)	
Version number of this monitoring report	03.1	
Completion date of this monitoring report	14/05/2020	
Monitoring period number	01	
Duration of this monitoring period	01/01/2019 to 31/05/2019 (both the date are inclusive)	
Monitoring report number for this monitoring period	10443-MP1-MRP1	
Coordinating/managing entity	Korea Carbon Management Ltd.	
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)
	Republic of Madagascar	Yes
Applied methodologies and standardized baselines	Applied Methodology: AMS II.G "Energy efficiency measures in thermal applications of non-renewable biomass" Version-09.0 Reference: EB 97 Annex-11, valid from 01/11/2017	
Sectoral scopes	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
	0	16,365 ¹
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	47,005 ¹	

¹ The CPA wise detailed calculation is submitted in the final ER excel sheet. For ex-ante estimated value for current monitoring period, the sum of the values estimated for all the three CPAs has been considered.

PART I Monitoring of programme of activities (PoA)

SECTION A. Description of PoA

A.1. General description of PoA

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Madagascar Improved Cookstove Project by KCM, a SSC CDM Program of Activities (PoA) is an initiative to be implemented by Korea Carbon Management Limited (herein after referred as KCM as well). The main objective of this PoA is the dissemination of the efficient improved cooking stove (ICS) to the rural and urban household of Madagascar resulting in the reduction of firewood consumption leading to climate change mitigation in a sustainable manner. Overall objectives are reduction of greenhouse gases, conservation of forests and woodlands as well as improved health conditions of ICS users due to improved indoor air quality.

Korea Carbon Management Ltd. (KCM) is the coordinating/managing entity ("CME") for this PoA. Korea Carbon Management Ltd. is a company registered in the Republic of Korea with company registration number 142-81-56603. KCM will purchase ICS for distribution to households in Madagascar. The PoA facilitates the dissemination of ICS manufactured by appropriate ICS manufacturers or technology suppliers meeting CPA eligibility criteria free of cost to the end user. Carbon revenues will be used to fund ICS purchases, distribution, and cover monitoring costs which are being incurred by KCM at present.

Currently, three CPAs have been included to the PoA to fulfil the objective as mentioned above. A particular type of wood based cook stove, known as "Soarehitra stoves" is being distributed under these CPAs. The details are provided in the subsequent sections of this document.

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
Madagascar Improved Cookstove Project by KCM-Wood (Ref. CPA-W-XXX)	04	03	Applied Methodology: AMS II.G "Energy efficiency measures in thermal applications of non-renewable biomass" Version-09.0 (EB 97 Annex-11, valid from 01/11/2017) Standardized baseline: NA

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)
Madagascar Improved Cookstove Project by KCM-Wood#CPA-W- 001 (Ref. CPA 10443-P1-0001-CP1)	04	Madagascar Improved Cookstove Project by KCM-Wood CPA-W-XXX (Ref. CPA-W-XXX)	10 years 00 months.(Fixed) Starting from 01/01/2019, The lifetime of the proposed ICS under CPA is 5.5 years, hence the crediting period will be 5.5 years in case no redistribution of ICS to end users	Yes

Madagascar Improved Cookstove Project by KCM- Wood#CPA-W-002 (Ref. CPA 10443- P1-0002-CP1)	04	Madagascar Improved Cookstove Project by KCM-Wood CPA-W-XXX (Ref. CPA-W-XXX)	10 years 00 months.(Fixed) Starting from 02/04/2019, The lifetime of the proposed ICS under CPA is 5.5 years, hence the crediting period will be 5.5 years in case no redistribution of ICS to end users	Yes
Madagascar Improved Cookstove Project by KCM- Wood#CPA-W-003 (Ref. CPA 10443- P1-0003-CP1)	04	Madagascar Improved Cookstove Project by KCM-Wood CPA-W-XXX (Ref. CPA-W-XXX)	10 years 00 months. (Fixed) Starting from 02/04/2019, The lifetime of the proposed ICS under CPA is 5.5 years, hence the crediting period will be 5.5 years in case no redistribution of ICS to end users	Yes

A.2. Coordinating/managing entity

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Korea Carbon Management Ltd. (KCM)

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SECTION B. Implementation of PoA

B.1. Description of implemented PoA

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The management system of the PoA is designed to ensure that real, measurable and long term GHG emission reductions for the project activity are monitored and reported. As described in the validated PoA-DD, through a technical review, the CME assesses the competence of potential CPA/CPA implementers to ensure that they fulfil technical and eligibility requirements of potential CPAs and to plan technical and administrative processes to meet PoA requirements and to ensure that each CPA meets all requirements and eligibility criteria before inclusion in the PoA.

The management system is designed as per CDM Project Standard for Programme of Activities (Version 01.0 EB 97 Annex 07) and includes all relevant information as per paragraph 36 & 37 therein.

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

The three CPAs (i.e. UN Ref. CPA 10443-P1-0001-CP1, CPA 10443-P1-0002-CP1 and CPA 10443-P1-0003-CP1) are implemented by KCM in line with the validated management system. CME has been prescribed as nominated entity to adhere to a series of responsibilities as per validated system. The three CPAs were already included into the PoA by adopting required actions as per the responsibility chart.

The responsibility of CPA Manager has been taken up by the CDM professionals associated with CME. Whereas, a local NGO "Tandavanala" is the manufacturer of the project ICS who are locally coordinating and supporting the CME and CPA Managers to implement the projects on ground. The CDM Managers nominated by KCM closely works with the NGO team to ensure adherence to the all responsibilities and requirements prescribed for CPA Manager/Consultant.

Similarly, the ground team of Tandavanala takes care of the operational responsibilities of the team including data collection, field survey, visits etc. under the direct supervision of CDM managers under CME.

2) A record keeping system for each CPA under the PoA

CME centrally manages the overall record keeping system for all the CPAs. The distribution records including user information of the CPAs have been collected and recorded at the point of distribution by the staff of Tandavanala. The information collected from the end-user have been transferred to an electronic database in the form of an excel file, which is being updated regularly.

The distribution record carries all distribution information as per the registered PDD. The CME conducts checks to ensure that appropriate records are maintained for each CPA. Also, the required trainings for the operational team, field personnel etc. were conducted initially before the implementation starts and similar trainings will again be conducted by CME for effective management of the entire system.

The CPA implementation (for all three CPAs) has been under the responsibility of CME, wherein Tandavanala, who is also the stove manufacture, assists CME in the whole process on ground. The CME had conducted independent quality check, field visit, testing of sample etc. at CME's level by deploying Cook Stove and CDM experts for the entire programme.

3) Procedures for technical review of inclusion of CPAs under the PoA

The CME has ensured before the inclusion of the CPAs that they met all the eligibility criteria as per registered PoA DD. The documents related to the CPAs are kept, organized and referred with the

clear manner: the eventually hard copies of the original monitoring documents are also kept with the local NGO Tandavanala.

4) Procedure to avoid double counting of ICS/CPA under the PoA

The CPAs meet the eligibility criteria number 2 of the PoA (“A unique numbering system for ICS will be applied in each CPA, assigning a unique number to each ICS and allowing to clearly identify for each ICS to which CPA it belongs.”) which is evident from the Stove Distribution Database which includes the serial number of each distributed efficient cookstove together with the contact details of the user. In addition, it has been cross-checked if there is any other voluntary carbon activities operating in the same geographic area, and it has been confirmed that there is no other GHG program or project exist in the host country which has ensured that the CPA is not included in any other CDM project activity or voluntary carbon activity.

5) Records and documentation control process for each CPA under the PoA;

CME is maintaining the general database of the CPAs included under the PoA and the separate electronic databases for each CPAs. As prescribed under the registered PoA, CME also confirms that each CPA's database includes only with a cumulative maximum number of ICSs below the small-scale limit. CME also ensures registration process with the end user who gives consent to an agreement that the household formerly used a three stone fire or traditional pot support and is willing to transfer rights to carbon assets created by the ICS to 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.

6) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

Each CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity. As prescribed ‘if each of the independent subsystems/measures included in the CPA (for all the three CPAs) is no larger than 1% of the small-scale thresholds defined by the methodology applied then that CPA of PoA is exempted from performing de-bundling check i.e., considering as not being a de-bundled component of a large scale activity”.

CME has ensured that the cookstove “*Soarehitra*” included under the CPAs meet this condition. In this regard the thermal energy calculation has been performed for each CPA at the time of their inclusion and as per calculation shown in ER sheet *Soarehitra* single pot improved cook stove can generate maximum 0.005973 GWth per year, which is much below the threshold specified by methodology. Hence the CPAs are not a debundled component of larger project activity.

7) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA

CME/CPA implementers have the operational responsibility for implementing and monitoring the CPAs under the PoA. Currently “Tandavanala” is the stove manufacturer and ground assistance for CME to implement the CPAs and both the parties already have engagement and clearly stated that the implementations of CPA activities are subscribed to this PoA.

8) Measures for continuous improvements of the PoA management system

CME is in responsible for the coordination of the monitoring activities of the CPAs, is frequently in contact with the CPA implementers working in the field regarding the stove manufacturing and distribution as well as the monitoring issues to ensure that the work is proceeding and managed

following validated CPA-DDs. For continuous improvement of the system, CME is deploying carbon experts and other professionals who have experience in managing stove program so that any issues, gaps, etc. can be mitigated effectively ensuring a proper program. Also, CME envisages that more awareness building exercises, educational sessions and regular check and balances shall be conducted in near future across the CPAs so that PoA can be driven by a robust system. CME also plans to introduce a new application (mobile app based electronic database system) which enables the stove distribution records / monitoring surveys to be filled directly by using a tablet or mobile phone instead of paper forms. Such systems shall also eliminate any possible human error and also the management of records, data, etc. in effective way.

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

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NA

B.2.2. Inclusion of monitoring plan

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NA

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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NA

B.2.4. Changes to programme design

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NA

B.2.5. Changes specific to afforestation or reforestation activities

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NA

PART II Monitoring of CPAs

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SECTION C. Implementation of CPAs

C.1. Description of implemented CPAs

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Following description is applicable to all the three CPAs (hereinafter also referred to as CPA-0001, 0002 and 0003):

The main objective of the CPAs is dissemination of the efficient improved cooking stove woody biomass-based ICS to the rural household of Madagascar, which will result in reduced firewood consumption leading to climate change mitigation in a sustainable manner. Overall objectives are reduction of greenhouse gases, conservation of forests and woodlands as well as improved health conditions of ICS users due to improved indoor air quality.

Proposed ICS is a single pot improved cookstove made of clay liner baked to high standards and insulated with outer metal sheet, which are commonly available in Host Country. It's joined with a mortar of high quality, which holds together the clay liner and metal sheet. In particular, the design made have higher pressure than the atmosphere, hence raising the airflow rate in the improved cook stove tunnel, as it is heated at the bottom. This way, the top point of the improved cook stove experiences more pressure and heat.

The project activity targets households in rural communities with no previous ICS access. The geographical boundary is the Country of Madagascar. ICS are distributed free of cost to users. The CME, Korea Carbon Management (KCM) financed the implementation of the CPAs in full.

The CPAs apply Type II small-scale methodology AMS-II.G Version 09.0. The CPAs are therefore Type II CPAs. The CPAs qualify as Type II small-scale CPA. The implemented CPAs help in achieving following co-benefits, which will contribute in sustainable development in host country as envisaged in the registered POA-DD.

Description of the technology employed:

The model type of ICS implemented under the three CPAs is the **SoaRehitra improved Cookstove**. The particular type of stove is a single pot improved cookstove made of clay liner baked to high standards and insulated with outer metal sheet, which are commonly available in Host Country. It's joined with a mortar of high quality, which holds together the clay liner and metal sheet. In particular, the design made have higher pressure than the atmosphere, hence raising the airflow rate in the improved cook stove tunnel, as it is heated at the bottom. This way, the top point of the improved cook stove experiences more pressure and heat. As per water boiling test conducted by National Agency i.e. National Industrial and Technical Research Center the SoaRehitra stove is projected to have a lifespan of at least 5.5 years and thermal efficiency of 32.2% (ex-ante estimated value at the time of validation).

SoaRehitra stoves is being manufactured by trained artisans and the processes will be managed by representative who have experience in working with clay and manufacturing different types of cook stoves. It is anticipated that the stove manufacturing process will create significant employment to the artisan and increase income. The *SoaRehitra* stove allows for significant savings of firewood compared to traditional stoves and is especially suitable for the cooking habits of the people in the target region. Its design ensures efficient combustion of fuel and cleaner fire and therefore uses considerably less fuel as compare to traditional stoves. This means speedy cooking, time and fuel savings, cleaner pans, kitchen walls and indoor atmosphere.

Improved *SoaRehitra* stove has nominal power of around 5kW and delivers the same energy output as thermal energy supplied in the baseline scenario with traditional stone fire. As per the research from Aprovecho Research Centre, a three stone stove (open fire) has an output of 7.5kW a 5L Portable rocket stove with skirt (improved cook stove) has an output of 5.0kW, which is well below the threshold.



Energy flows from conventional woody biomass to households are therefore maintained, but the same amount of energy as used in the baseline scenario is gained from a relatively smaller amount of biomass. The baseline scenario is equal to the current practice i.e. in absence of the proposed project activity the equivalent amount of thermal energy generated using firewood to meet cooking energy demand.

Relevant dates for the specific-case CPAs:

CPA:	Steps:	Timeline:
10443-0001	Inclusion under the PoA	24/12/2018
	Start date of 'Crediting Period'	01/01/2019
	Project start date (i.e. stove distribution start)	09/10/2018
	Monitoring activities / Usage Surveys	24/04/2019 to 02/05/2019
	Monitoring activities / WBT	24/04/2019 to 02/05/2019
	Implementation status as on 31/05/2019	Completed
10443-0002	Inclusion under the PoA	02/04/2019
	Start date of 'Crediting Period'	02/04/2019
	Project start date (i.e. stove distribution start)	15/03/2019
	Monitoring activities / Usage Surveys	24/04/2019 to 02/05/2019
	Monitoring activities / WBT	24/04/2019 to 02/05/2019
	Implementation status as on 31/05/2019	Partially completed
10443-0003	Inclusion under the PoA	02/04/2019
	Start date of 'Crediting Period'	02/04/2019
	Project start date (i.e. stove distribution start)	23/03/2019
	Monitoring activities / Usage Surveys	24/04/2019 to 02/05/2019
	Monitoring activities / WBT	24/04/2019 to 02/05/2019
	Implementation status as on 31/05/2019	Partially completed

Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period for the specific-case CPAs, including information on how double counting is avoided.

During the period, 01/01/2019 – 31/05/2019 (inclusive of both the dates), a total emission reductions² of 16,365 tCO₂e has been achieved. The double counting is avoided as each energy efficient stove included under this project has a unique identification number which has been recorded on the project database to demonstrate that the stove is a part of the project activity.

² This is the total ER for the three CPAs. The CPA wise ER breakup is provided in the section F.5.

C.2. Location of CPAs

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All the CPAs are implemented within the national boundary of the host country, Madagascar.

CPA 1:

Madagascar Improved Cookstove Project by KCM-Wood#CPA-W- 001
(Ref. CPA 10443-P1-0001-CP1)

The ICS (*Soarehitra* stoves) under this CPA have been implemented in several villages and households in the region of Haute Matsiatra, Madagascar.

The coordinates of the Chief town of the Region: Latitude: 21°27'24.22"S Longitude: 47° 5'4.05"E.

CPA 2:

Madagascar Improved Cookstove Project by KCM-Wood#CPA-W-002
(Ref. CPA 10443-P1-0002-CP1)

The ICS (*Soarehitra* stoves) under this CPA have been implemented in several villages and commune of Districts Ambalavo and Lalangina in the region of Haute Matsiatra, Madagascar.

The coordinates of the Chief town of the Region: Latitude: 21° 23' 35.20"S Longitude : 47° 14' 42.72"E

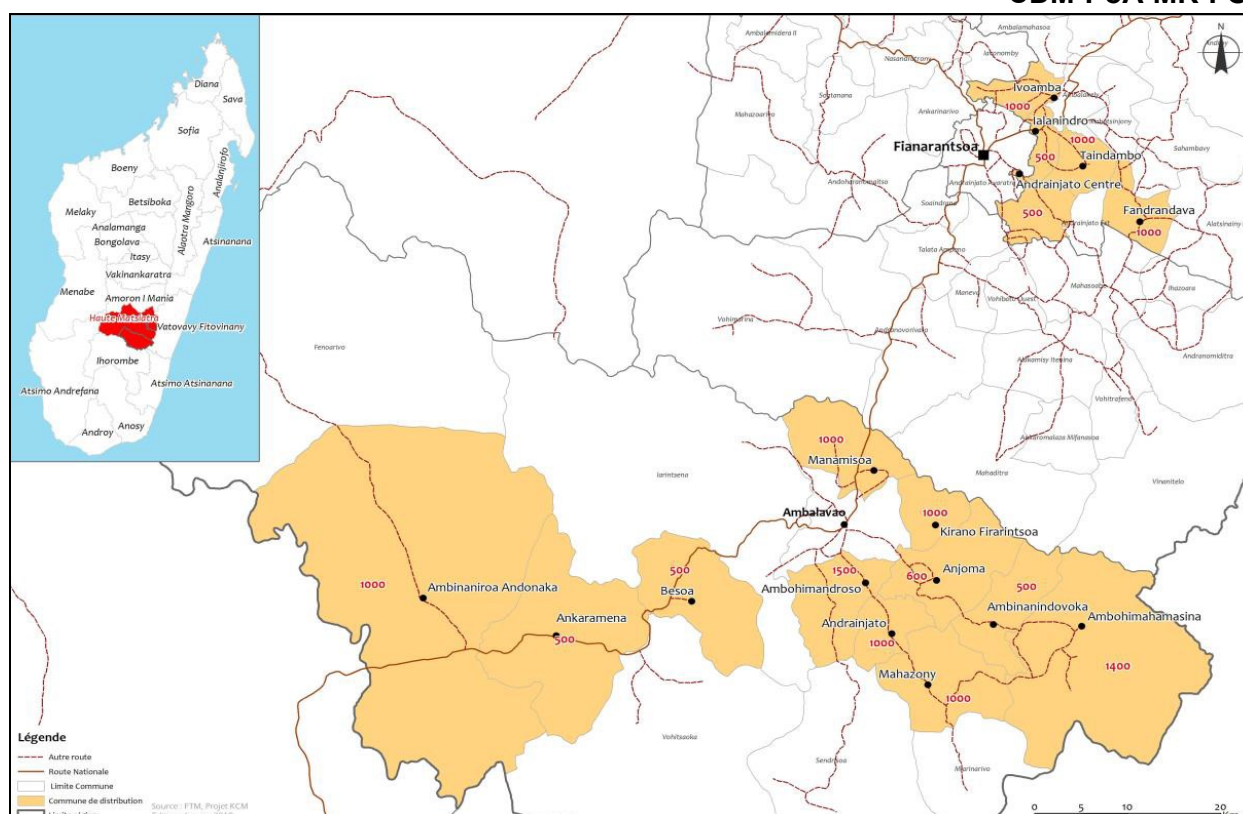
CPA 3:

Madagascar Improved Cookstove Project by KCM-Wood#CPA-W-003
(Ref. CPA 10443-P1-0003-CP1)

The ICS (*Soarehitra* stoves) under this CPA have been implemented in several villages and commune of Districts Vohibato in the region of Haute Matsiatra, Madagascar.

The coordinates of the Chief town of the Region: Latitude: 21° 31' 0.06"S Longitude : 47° 16' 23.13"E





Location maps for the three CPAs (i.e. CPA-0001, 0002 & 0003).

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

NA

C.3.2. Corrections

NA

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

NA

C.3.4. Inclusion of monitoring plan

NA

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

NA

C.3.6. Changes to project design

NA

C.3.7. Changes specific to afforestation or reforestation CPA

NA

SECTION D. Description of monitoring system of CPAs

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The Monitoring Plan applied in the PoA involves a number of key elements that ensure that the CME have high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Certified Emission Reductions (CERs) following AMS-II.G. version 09.0 on the basis of the amount of non-renewable biomass saved by the ICS in the project activity.

The key elements are the following:

Project database management

Spot Checks of ICS

Sample Plan for the Monitoring Survey

Data Quality, Consistency and Duplication Checks

Monitoring Reporting

The monitoring plan is designed to monitor the parameters listed in Section B.5.1. of the respective CPA-DD, which are required for calculation of the actual GHG emission reduction achieved by the CPAs using ex post sampling survey. The share of operating stoves and the continued use of pre-project devices will be determined based on sampling procedures. The CME will be responsible for conducting the sampling surveys and maintaining a database with all operating stoves.

The current practice of distribution and database management:

ICS are distributed free of cost to the users. The CME, Korea Carbon Management (KCM) financed the implementation of the CPAs in full. The information related to stove distribution are collected by the local team deployed by CME and the records are stored in the electronic database available with CME. The ground team verifies the accuracy and completeness of data and confirms that there is no double entry of serial numbers in the database. All technical staff of the ground team is responsible for installation and maintenance of the stoves.

Since the stove distribution database is recorded in electronic database (current in excel format) backed by hard copies of distribution record forms, the uniqueness of serial numbers can be easily cross checked. Also, as per prescribed procedure of 'General operating and implementing framework of the PoA', a default beneficiary agreement for end users including the provision that emission reductions generated by the stove are owned by the CME is signed at the point of distribution of each stove. A copy of this agreement (i.e. a registration card along with stove user manual and other relevant information) is available with each end user (i.e. beneficiary of the stove) and back up references are available with the ground team in the form of both hard copies and scanned PDF files³.

Further, the trained field staff regularly visits randomly selected households from the database and cross-checks the information on the database with the actual details of the stove at household. The objective of such spot check visit is to identify any probable inconsistencies (e.g. change in the address of a user, whether ICSs are in use, any wear and tear, etc.) so that such inconsistency can be clearly marked and excluded from emission reductions calculations. However, during the current monitoring period no such inconsistency observed and also stoves are found to be operational with good conditions (as can be cross checked from the sampling survey, WBT test and also from the on site verification by DOE).

³ Few sample copies of the beneficiary agreements and registration cards are attached under the Appendix 01 of the MR. The electronic database, beneficiary agreements etc. for all the stoves distributed under the CPAs (CPA wise) were made available to assessment team during the on site verification and scanned copies were also submitted.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

The following parameters and the respective values are applicable to all the three CPAs:

Data/Parameter	$B_{old,i}$
Unit	tonne/year
Description	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type i and batch j
Source of data	Survey report conducted by CEDII (Regional Center of Documentation and Information)
Value(s) applied	4.39
Choice of data or measurement methods and procedures	The annual quantity of wood that would have been consumed in absence of the project activity will be calculated as below: $B_{old,i,j} = B_{old,HH} / N_{d,HH}$ Where, $B_{old,HH}$ is determined through survey and $N_{d,HH}$ is a monitoring parameter
Purpose of data/parameter	Calculation of Baseline Emissions
Additional comments	Assessments, information and results established in this CPAs may be used in subsequent CPAs in lieu of conducting fresh assessments at each CPA level in absence of new data. Further as CME plans distribution of only one ICS per households hence $B_{old,i,j}$ equals $B_{old,HH}$

Data/Parameter	$B_{old,HH}$
Unit	tones/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	Survey report conducted by CEDII (Regional Center of Documentation and Information)
Value(s) applied	4.39
Choice of data or measurement methods and procedures	Combination of literature and/or field survey by a dedicated expert team/third party survey will be used to determine the annual quantity of woody biomass have been used per person in absence of the project activity. If survey conducted should refer the AMS-II.G non-binding survey questionnaire for baseline fuel consumption pattern.
Purpose of data/parameter	Baseline emission calculation
Additional comments	The value is fixed ex-ante. Assessments, information and results established in this CPAs may be used in subsequent CPAs in lieu of conducting fresh assessments at each CPA level in absence of new data.

Data/Parameter	η_{old}
Unit	%
Description	Efficiency of the system being replaced (Traditional Cooking Stoves)
Source of data	Default value as per applied methodology AMS-II.G version 09.0
Value(s) applied	10

Choice of data or measurement methods and procedures	The default value of 0.10 is used, as the replaced system is a three stone fire, or a conventional device with no improved combustion air supply or flue gas ventilation, i.e. without a grate or a chimney.
Purpose of data/parameter	Calculation of Quantity of woody biomass that is saved in tonnes per device
Additional comments	The value is 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 as per applied methodology AMS-II.G version 09.0
Value(s) applied	0.0156
Choice of data or measurement methods and procedures	Default value as per applied methodology AMS-II.G version 09.0
Purpose of data/parameter	For calculation of emission reduction
Additional comments	The value is fixed ex-ante

Data/Parameter	EF_{projected_fossilfuel}
Unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable woody biomass by similar consumers
Source of data	Default value as per applied methodology AMS-II.G version 09.0
Value(s) applied	63.7
Choice of data or measurement methods and procedures	This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. The value is calculated, based on the global average ratio of cooking fuels (the normalized ratio of kerosene and liquefied petroleum gas (LPG) excluding coal), i.e. 9 per cent for kerosene (71.5 t CO ₂ /TJ) and 91 per cent for LPG (63.0 t CO ₂ /TJ)
Purpose of data/parameter	For calculation of emission reduction
Additional comments	The value is fixed ex-ante

Data/Parameter	L_y
Unit	Fraction
Description	Leakage adjustment factor
Source of data	Default value as per applied methodology AMS-II.G version 09.0
Value(s) applied	0.95
Choice of data or measurement methods and procedures	As per the methodology AMS-II.G version 09.0, <i>B_{old,i,j}</i> can be 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	For calculation of emission reduction
Additional comments	The value is fixed ex-ante

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	Sub national survey report conducted by "The Regional Center of Documentation and Information (CEDII)"
Value(s) applied	0.966
Choice of data or measurement methods and procedures	<p>The f_{NRB} calculation has been referred in line with the para 39(a) of the applied methodology which prescribes that "conduct local studies to determine the local f_{NRB} value (sub national values) as per the methodological tool "Calculation of fraction of non-renewable biomass". Thus, the value has been established from sub national survey report conducted for the project region in which specific CPA(s) implemented and this value will be fixed ex-ante. The f_{NRB} value has been calculated using the equation 1, 3, 5 & 6 of the methodological tool 30: "calculation of fraction of non-renewable biomass" Version 01. The calculation of the f_{NRB} value has been submitted in an excel sheet and also reported under the Appendix 3 of the MR.</p> <p>The survey had been conducted and values & calculations are reported by an independent third party (CEDII) which was further approved by the host country DNA. The supporting documents are submitted to DOE.</p>
Purpose of data/parameter	For calculation of emission reduction
Additional comments	<p>The value is fixed ex-ante.</p> <p>The DNA approved survey report confirms that the calculated f_{NRB} value, i.e. 96.6% is applicable in the regional and sub-national level across the administrative regions in the Province of Fianarantsoa including: Haute Matsiatra, Atsimo Atsinanana, Vatovavy Fitovinany and Amoron'i Mania. The three CPAs included under the PoA are within these regions, hence f_{NRB} value used for ER calculation is applicable.</p>

Data/Parameter	Life span
Unit	Number of years
Description	The operating lifetime of the project device
Source of data	Lab test report by National Agency
Value(s) applied	5.5
Choice of data or measurement methods and procedures	The value is taken from third party test report conducted for Soarehitra wood biomass stove by THE NATIONAL CENTER OF THE INDUSTRIAL AND TECHNOLOGICAL RESEARCH.
Purpose of data/parameter	For calculation of baseline emission
Additional comments	The value is fixed ex-ante

E.2. Data and parameters monitored

Data/Parameter	N _{y,i,j}
Unit	Number
Description	Number of project devices of type <i>i</i> and batch <i>j</i> operating during year <i>y</i>
Measured/calculated/ Default	<p>The total number of appliances by type and age deployed during period <i>y</i> is tracked in the Project Database of the specific CPAs, which is updated regularly. All appliances distributed will be recorded for installation date and recipient /location. The distribution date for each appliance listed in the Project Database of each CPA signifies the start of operation for each appliance type.</p> <p>Sampling Frame: Project Database of each CPA (or combined PoA database in case of PoA level sampling) as defined by distribution date, appliance type, serial number, and end-user information.</p> <p>Sample Size and Desired Precision: it refers to the PoA-DD, Part II, Section I.7.2.</p> <p>Sample Method: it refers to the PoA-DD, Part II, Section I.7.2.</p> <p>The number of stoves still operating will be determined based on representative sampling. The total number of operational stoves shall be calculated as the fraction of stoves of type <i>i</i> and age <i>a</i> found operational in the sampling survey multiplied by total number of stoves of type <i>i</i> and age <i>a</i> in the project database.</p>
Source of data	Stove distribution database and Survey records
Value(s) of monitored parameter	22,563 ⁴
Monitoring equipment	Based on sampling survey
Measuring/reading/recording frequency	At least once every two years
Calculation method (if applicable)	As per sampling method.
QA/QC procedures	<p>For each CPA CME shall maintain a distribution record to calculate this parameter. The CME supervises the activities of each CPA implementer (when not the CME itself), and provides training, guidelines and templates to facilitate accurate testing and record keeping.</p> <p>In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of stoves of type <i>i</i> and age <i>a</i>.</p>
Purpose of data/parameter	Calculation of baseline emission
Additional comments	All data sources will be transparent and verifiable. At the CPA-level, it is assumed ex-ante that there is only one project stove being used per household for calculating B _{old,i} , therefore, ex-post sampling based monitoring shall also include assessment of presence of multiple operational project stoves in a sampled household. The number of project stoves in the CPA shall be adjusted accordingly to claim emissions reduction only for one operational project stove per household to ensure equivalence with the baseline established.

⁴ Considered total numbers of stove distributed as on 15th May 2019. Details are provided in ER sheet.

Data/Parameter	$\eta_{\text{new},i,j}$
Unit	%
Description	Efficiency of the device of each type <i>i</i> and batch <i>j</i> implemented as part of the project activity
Measured/calculated/Default	Measured and calculated
Source of data	Water Boiling Test (WBT) results on sampling monitoring method
Value(s) of monitored parameter	31.5% (average value considered)
Monitoring equipment	Based on sampling survey (thermometer, weighing scales, moisture content meters)
Measuring/reading/recording frequency	At least once in a year (Recorded annually (as confidence interval meets 95/10))
Calculation method (if applicable)	Water Boiling Test (WBT) on 13 randomly selected Households (from the three CPAs)
QA/QC procedures	In case margin of error is more than 10%, lower bound value of the 95% confidence limit shall be used instead of repeating the sampling test / survey.
Purpose of data/parameter	Calculation of baseline emission
Additional comments	<p>If any sample stove is found to be operating below the 20% efficiency, the proportionate number of stoves of that type included in the CPA will be considered to be non-operational and not accounted for ER calculation.</p> <p>However, current monitoring period is the first and immediate after the distribution, and stoves are found to be operational with almost an average efficiency of 31.5% (as measured and calculated from the sampling WBT)</p>

Data/Parameter	Date of commissioning of batch <i>j</i>
Unit	Date
Description	To establish the date of commissioning, the Project Participant opted to group the devices in "batches" and the latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch
Measured/calculated/Default	Measured
Source of data	Stove distribution database
Value(s) of monitored parameter	To be referred from the ER calculation sheet
Monitoring equipment	NA
Measuring/reading/recording frequency	Recorded at the time of commissioning/distribution of first ICS of the batch
Calculation method (if applicable)	As per sampling method.
QA/QC procedures	NA
Purpose of data/parameter	Start Date

Additional comments	<p>The record to be kept for crediting period + 2 years.</p> <p>In order to be conservative in emission reduction calculation, CME has considered the last date of distribution of a particular month as the date of complete commissioning of the stove batch distributed for that particular month (here a batch is referred to as total numbers of stoves distributed in a particular month). Therefore, start date of accounting of emission reductions for stoves distributed in a particular month has been considered as the next day of the last date of stove distribution for that month. This is also a conservative approach. The details related to date of accounting of stoves are of provided in the ER calculation sheet.</p> <p>In the current monitoring period, the total numbers of stoves included are the stoves distributed till 15th May 2019.</p>
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Data/Parameter	$\mu_{y,i,j}$
Unit	Fraction
Description	Adjustment to account for any continued use of pre-project devices during the year y
Measured/calculated/Default	Measured
Source of data	Stove distribution database and Sample Survey Records
Value(s) of monitored parameter	0.9676
Monitoring equipment	NA
Measuring/reading/recording frequency	At least once in two year
Calculation method (if applicable)	<p>As per sampling method.</p> <p>A sampling monitoring survey has been conducted on calculated sample size as per the sample plan and in line with the provision given under the page 14 of the applied methodology to record usages consumption level in lieu of continued baseline stoves. The option 2 of the page 14 of the methodology has been referred while conducting the sampling survey as baseline devices are three stone fire across all the households. As per the methodological requirements, the survey was designed to capture the cooking habits and stove usage of households for the identified samples, including quantification of use of baseline devices. Thus, number of meals cooked with project ICS, fulfilment of cooking needs, etc. were captured and also in case of samples where baseline stoves were identified their usages detail were recorded.</p> <p>Since this parameter is a fraction, the sampling result has been expressed as a fractional value. Thus, the fraction derived based on sampling survey has been considered as "μ" and the value has been used in the main equation (eq 1) for required adjustment to account number of baseline stoves still operating. Please refer to the sampling survey sheet (version 03, dated 12 May 2020) for the estimated value from the sampling and supporting justifications; and also refer to the ER sheet for application of the value.</p>
QA/QC procedures	In the case the desired precision is not met, lower bound values shall be used against repeating the survey to determine the operational fraction of stoves of type <i>i</i>
Purpose of data/parameter	To calculate baseline emission

Additional comments	<p>(i) The Sampling Precision is found to be outside the desired range. Therefore, the upper bound value has been considered, which is found to be the most conservative value (ref. "Monitoring Survey-μ" spreadsheet of the Sampling Sheet, version 03). This is in line with the para 17(b)(i) of the Sampling Standard, version 07.</p> <p>(ii) The survey captured cooking habits both in terms of meals per day for regular cooking needs and also firewood consumption (kg/day) at baseline device in cases where baseline device was found to exist during survey.</p> <p>The cases where baseline stove was found to exist, these are only kept as backup for use during specific conditions such as extra meals during house gathering or during festivity. In emission reduction calculations, the usage of baseline device (kg/day) captured during the survey has been considered to derive the fraction "μ".</p> <p>The details of survey are further reported under the Appendix 4.</p> <p>(iii) All records to be kept for crediting period + 2 years.</p>
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Data/Parameter	N _{d,HH}
Unit	Fraction
Description	Number of project devices distributed per household
Measured/calculated/Default	Measured
Source of data	Stove distribution database records
Value(s) of monitored parameter	1
Monitoring equipment	NA
Measuring/reading/recording frequency	Recorded at the time of commissioning/distribution of project devices
Calculation method (if applicable)	NA
QA/QC procedures	The procedure will be developed in electronic system to record number of ICS provided to particular household in any CPA.
Purpose of data/parameter	To calculate baseline emission
Additional comments	The record to be kept for crediting period + 2 years

E.3. Implementation of sampling plan

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As of now only three CPAs i.e. (CPA 10443-0001, 10443-0002 and 10443-0003) are included and are active under the PoA. The total ICS distributed across all the CPAs is 22,563; the number of ICS distributed under each CPA are as follows:

CPA 1 (Ref. CPA 10443-P1-0001-CP1)	Start date of ER accounting	Total Nos. of Stove distributed
Total stoves distributed as on 31st Dec 2018 =	01-Jan-19	10,000
Total stoves distributed in January 2019 =	31-Jan-19	1,503
Total stoves distributed in February 2019 =	28-Feb-19	2,177
	Total =	13,680

CPA 2 (Ref. CPA 10443-P1-0002-CP1)	Start date of ER accounting	Total Nos. of Stove distributed
Total stoves distributed in March 2019 =	02-Apr-19	2,139
Total stoves distributed in April 2019 =	01-May-19	966
Total stoves distributed in May 2019 =	15-May-19	1,865
	Total =	4,970

CPA 3 (Ref. CPA 10443-P1-0003-CP1)	Start date of ER accounting	Total Nos. of Stove distributed
Total stoves distributed in March 2019 =	02-Apr-19	2,367
Total stoves distributed in April 2019 =	01-May-19	489
Total stoves distributed in May 2019 =	15-May-19	1,057
	Total =	3,913

Current monitoring period is considered as 01 Jan 2019 to 31 May 2019 (both the dates inclusive). Therefore, CME has considered the stoves included under the CPAs as on 15th May 2019 and start date of ER accounting has been considered as per the batch commissioning dates as prescribed under the section E.2 above.

CME has followed the sampling plan as prescribed under the registered PoA-DD, section B.5.2. As per the same, the share of operating stoves and the continued use of pre-project devices will be determined based on sampling procedures. The CME has taken the responsibility of conducting the sampling surveys and maintaining a database with all operating stoves.

As per the Guideline for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 04, the sampling plan is the following:

(a) Sampling Design:

Due to the large number of ICS envisioned to be distributed as part of the CPAs to be included in the PoA, it is not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling will be undertaken as part of a PoA-wide Sampling Plan (by grouping and sampling across CPAs) that is designed in line with the requirements of the "Sampling and surveys for CDM project activities and programme of activities", version 04.

(i) Objective and Reliability Requirements:

The objective is 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/precision for annual and 95/5 for biennial sampling across CPAs (as per Methodology AMS-II.G version 09.0). In case a single CPA is sampled 90/10 confidence/precision for annual and 95/5 confidence/precision shall be required for biennial sampling.

CME has considered 95/10 confidence/precision sampling to consider three CPAs under one sampling. Following are the parameters considered for monitoring via sampling survey:

$N_{y,i,j}$ Number of project devices of type i and batch j operating during year y

$\mu_{y,i,j}$ Adjustment to account for any continued use of pre-project devices during the year y

Also, efficiency of the project ICS ($\eta_{new,i,j}$) is a monitoring parameter, which was calculated based on sampling Water Boiling Tests (WBT).

All the samplers and testers were hired locally and spoke the local language which enabled fully understanding of any responses given by users.

(ii) Target Populations:

The target population for the proportion of ICS still in operation ($N_{y,i,j}$) of this POA are all households in the POA database which are using fuel wood in ICS distributed under the POA for cooking.

The target population for continued use of pre-project appliances ($\mu_{y,i,j}$) is the set of households under the POA database with old stoves still in use.

(iii) Sampling Frame

The CPAs involve distribution of same ICS technology (i.e. Saorehitra) throughout the project area thereby replacing traditional cookstoves. The population is homogeneous in nature i.e. common technology with similar operating characteristics, as stoves distributed to rural populations.

a) Sampling frame for proportion of ICS in operation ($N_{y,i,j}$):

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the Registration Process for newly distributed/installed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the PoA. The detailed information collected from Registration Process is used to populate the stoves Database and the Monitoring Survey follows "Sampling and Surveys for CDM Project Activities and Programme of Activities", version 04.

b) Adjustment to account for any continued use of pre-project devices during the year ($\mu_{y,i,j}$)

In line with applied approved methodology AMS-II.G version 09.0, as installing data logger is not practical and if any use of pre project device can be monitored in a common survey with other monitoring parameters; therefore, a random sub-sample within the common survey can be taken to determine continued use of old cookstoves and its proportional usage by including suitable questionnaire.

As prescribed under the registered monitoring plan, CPAs shall be grouped together to create a Primary Sampling Unit, which is homogenous. As per EB 86 Annex 04, Appendix-2, paragraph 1, for the use of a single sampling plan covering a group of CPAs, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation, a 95/10 confidence/precision is applied for annual sampling. As per Methodology AMS-II.G version 09.0 para 40, a 95/5 confidence/precision shall be achieved for biennial sampling. In case a single CPA is sampled, 90/10 confidence/precision for annual and 95/5 confidence/precision shall be required for biennial sampling.

All the three CPAs implemented by CME. Since all the three CPAs have homogenous population and distributed ICS are of same technology, therefore CPAs are grouped and a primary sample unit has been considered. Thus, the total stove database for all the three CPAs is considered to be a primary sample unit and sample size has been calculated based on the same.

(iv) Sampling Method

As per registered monitoring plan, the sampling method for monitored parameters $N_{y,i,j}$ and $\mu_{y,i,j}$ is "Simple Random Sampling" and samples will be randomly selected from the primary sampling units as illustrated above.

To ensure a random selection of ICS, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its unique ID number. Applying the random number generators (online platform), the ICS numbers are randomly chosen from the defined population up

to the required sample size as calculated by the CME. The details of the selected samples are provided in the sample survey sheet along with the stove database.

To determine the parameters, sampling survey has been involved the following approaches (outcome in brackets):

$N_{y,i,j}$: Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No)

$\mu_{y,i,j}$: Pre project device only is in use then fraction to be used to calculate total number, however if pre project device is used along with project ICS, proportion of usage of each will be determined by cooking habits evaluated by survey questionnaire during the monitoring period.

Using the formulas as given in the section “Sample Size” below, the CME has randomly sampled the required number of ICS from the primary sampling units.

(v) Sample Size

In line with the registered sampling plan, for the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has been calculated based on 95/10 confidence/precision which will suffice for biennial sampling.

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using, a 95 per cent confidence level, and a 10 per cent margin of error, random samples will be selected from each Primary Sampling Unit.

There are two parameters for survey that are estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($N_{y,i,j}$), and the continued use of old stoves, ($\mu_{y,i,j}$). In line with AMS-II.G version 09.0, both can be sampled in a single survey with a random sample of households using the above described confidence/precision levels depending on annual or biennial monitoring frequency.

Moreover, the WBT is a monitoring parameter and WBT testing has also been performed based on simple random sampling.

To estimate the sample size for parameters $N_{y,i,j}$ the following equation is used:

$$n \geq \frac{1.96^2 N \times p (1-p)}{(N - 1) \times 0.1^2 \times p^2 + 1.96^2 \times p (1 - p)}$$

Where:

n = Sample size

N = Population size (Total number of households/ICS)

p = Expected proportion

1.96 = Represents the 95% confidence required

(In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

Based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated for the total population size, which comes out to be:

$$n \geq 42.55$$

$$n = 43$$

Therefore, in this case a sample size of 43 is supposed to be sampled from the primary sampling unit. However, since the total population is combination of three CPAs, therefore the sample size of the sample frame is proportionately distributed for each CPA and rounded up values have been considered which resulted a total sample size of 44, wherein 34 samples accounted from CPA 1 and 5 samples accounted from each of CPA 2 and 3.

Parameter $\mu_{y,i,j}$:

For the purposes of determining sample size in the first monitoring period, the percentage use of old cookstoves will vary. To estimate the sample size for parameter $\mu_{y,i,j}$ the following equation is used:

$$n \geq \frac{1.96^2 NV}{(N-1) \times 0.1^2 + 1.96^2 \times V}$$

Where,

$V = (SD/\text{mean})^2$
 n = Sample size
 N = Population size (Total number of households/ICS)
Mean= Expected mean of ICS thermal efficiency
SD = Expected standard deviation
1.96 = Represents the 95% confidence required

Based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated for the total population size, which comes out to be:

$$n \geq 4$$

$$n = 4.$$

Since the calculated sample size was found to be less than 30, therefore, CME has applied tDistribution to have an adjusted sample size. After applying the tDistribution, the adjusted sample size is found to be 11. Therefore, in this case a sample size of 11 is supposed to be sampled from the primary sampling unit. However, since the total population is combination of three CPAs, therefore the sample size of the sample frame is proportionately distributed for CPAs and rounded up values have been considered which resulted a total sample size of 13, wherein 9 samples accounted from CPA 1 and 2 samples accounted each from CPA 2 and 3. For details please refer the sample survey sheet.

Similarly, a sample size calculation has been conducted for the parameter, η_{new} . Since sample size calculated was below 30, so tDistribution has been applied to adjust the sample which has resulted into a sample size of 13, wherein 9 samples accounted from CPA 1 and 2 samples accounted each from CPA 2 and CPA 3. For details please refer the sample survey sheet.

Thus, the sample size finalized for all the three parameters are as follows:

Parameter [#]	Sample size calculated
$N_y (= N_{y,i,j})$	44
$\mu_y (= \mu_{y,i,j})$	13
$\eta_{\text{new}} (= \eta_{\text{new},i,j})$	13

[#] Here, only single type of ICS technology selected and batches are also homogeneous, no year batch is applicable for the current verification hence i, j both the nominations same and hence simplified nomenclature has been used for the parameters.

Additionally, as per registered sampling plan, it's recommended that the CME may choose to use the same samples to monitor more than one parameter, where parameters have same units. Sampling more than one parameter within the same sample (household) helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of samples for every parameter. Also, oversampling is strongly encouraged, not only to compensate for any attrition, outliers or nonresponse associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved and additional sampling efforts would be required. The sample size shown above will be adjusted upwards to account for non-responses, CME shall determine the appropriate non-responses rate based on previous experience.

Therefore, even though the particular parameters are surveyed and tested based on the above samples sizes and selected randomly from the stove database, CME had interviewed all sampled households (i.e. samples selected for N_y) to check for the presence of baseline devices (i.e. additional check for the parameter μ_y for backup reference purposes). Therefore, over and above the 13 samples where the monitoring survey data for μ_y has been collected, the survey interview was designed to check baseline device for the 44 samples also which were selected for parameters N_y and vice versa. Thus, for these two monitoring survey parameters (N_y & μ_y), data collection was done for total 57 randomly selected samples. However, results are calculated and presented for 44 and 13 selected samples respectively, to be in line with the primary sampling method and sample size estimated as there was no case of non-response in the selected samples.

The results derived from the sampling survey for all the three monitoring parameters are as follows:

Parameter	Results	Reliability Check / Precession Achieved
$N_y (= N_{y,i,j})$	100%	Yes
$\mu_y (= \mu_{y,i,j})$	96.76%	No, 'Upper bound value' has been used being the most conservative value.
$\eta_{new} (= \eta_{new,i,j})$	31.50%	Yes

The detail calculation are submitted in final Sampling Survey sheet (titled "Sampling Sheet (PoA10443)_1st Ver_revised ver03-Final(May2020)"). The formulae used for calculation and reliability check are also included in the Appendix 2 of the MR below. The details related to sampling survey data, interpretations, results etc. are included under the Appendix 4.

SECTION F. Calculation of emission reductions or net anthropogenic removals

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

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The equations in the methodology do not calculate baseline and project emissions separately; the calculation of baseline emission is described in the following paragraph F.2. together with the calculation of the project emission reductions.

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

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According to paragraph 17 of methodology AMS-II.G, version 09.0, emission reductions would be 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 CO₂e

$ER_{y,i,j}$ = Emission reductions by project device of type i and batch j during year y in t CO₂e

LE_y = Leakage emissions in the year y

In the existing CPAs, only one type of project stove is distributed where there is no year batch wise variation applicable. Hence, nomination of i, j is not considered hereinafter.

Now,

$$ER_y = B_{y,saving} \times N_y \times f_{NRB,y} \times \mu_y \times NCV_{biomass} \times EF_{projected_fossilfuel} \dots\dots\dots (eq 1)$$

Where, parameters used in the formulae are already explained under the section E.1 & E.2.

Determination of $B_{y,savings,i,j}$

In line with para 18 of applied approved methodology AMS-II.G version 09.0, four option given to determine $B_{y,saving,i,j}$. Here CME has chosen option three i.e. Water Boiling Test (WBT) with corresponding formula given below:

$$B_{y,savings,i,j} = (B_{old,i}) * L_y * (1 - \eta_{old} / (\eta_{new,i,j})). \dots\dots\dots (eq 2)$$

The above equation has been used for CPAs as only one stove per household has been distributed, which can be cross checked from the stove distribution database.

The baseline saving shall be determined as:

$$B_{old,i,j} = B_{old,HH} / N_{d,HH}$$

(Here $N_{d,HH}$ = Number of project devices per household (number). This value is currently 1 as already demonstrated under the section E.1).

All the three CPAs included under the PoA are based on wood fuel. Therefore, above equation is suitable. The detailed ER calculations are submitted in the final ER sheet.

F.3. Calculation of leakage emissions

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To account for leakage a net to gross adjustment factor of 0.95 has been applied in line with the registered CPA-DD and therefore the B_{old} has been multiplied by a net to gross adjustment factor to account for leakages.

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	Total amount
CPA 10443-P1-0001-CP1	13,721	0	0	0	13,721	13,721
CPA 10443-P1-0002-CP1	1,376	0	0	0	1,376	1,376
CPA 10443-P1-0003-CP1	1,268	0	0	0	1,268	1,268
Total	16,365	0	0	0	16,365	16,365

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)
CPA 10443-P1-0001-CP1	13,721	15,606
CPA 10443-P1-0002-CP1	1,376	15,700
CPA 10443-P1-0003-CP1	1,268	15,700
Total	16,365	47,005 ⁵

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

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The ex-ante estimated emission reductions are calculated for this current monitoring period based on the ex-ante estimation provided in the respective CPA-DD. In order to do that the estimated annual ER for each CPAs are proportionately calculated for the equivalent period of the current monitoring period (i.e. 151 days). The details of the ex-ante estimation for the current monitoring period for each CPA are provided in the ER sheet.

F.6. Remarks on increase in achieved emission reductions

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There is no increase in actually achieved emission reductions. However, there are variations observed as compared to the ex-ante estimation for the equivalent period. The remarks are provided below:

⁵ Here all the ex-ante estimated CER for each CPA has been calculated for the equivalent period of 01/01/2019 to 31/05/2019 (i.e. for 151 days) based on the projected annual CERs. The calculation is show in the final ER sheet.

CPA-0001:

The actual ER achieved is slightly lower (12.08%) than the ex-ante estimated for the equivalent period. This is mainly because the WBT test value derived from the sampling survey testing is lower than the projected value considered at the time of PoA validation or the CPA inclusion. Also, the continued baseline stove use was not envisaged in the ex-ante calculation, whereas the adjustment factor (μ_y) during sampling survey has been estimated and applied in the ER calculation to account continued usage of baseline stove.

CPA-0002 & 0003:

The actual ERs achieved for 2nd CPA & 3rd CPA are much lower (91.24% and 91.92% respectively) than the ex-ante estimated for the equivalent period. This is mainly because the total numbers of ICS distributed so far is less in numbers as compared to the projected numbers under the registered CPAs; also the inclusion date of both the CPAs is much later than the start date of current monitoring period which led to a very small year fraction of CER accounting for the CPAs. Moreover, WBT test value derived from the sampling survey testing is lower than the projected value considered at the time of PoA validation or the CPA inclusion. Also, the continued baseline stove use was not envisaged in the ex-ante calculation, whereas the adjustment factor (μ_y) during sampling survey has been estimated and applied in the ER calculation to account continued usage of baseline stove.

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

The combined scale of the project activities under each CPA (i.e. Ref. CPA 10443-P1-0001-CP1, CPA 10443-P1-0002-CP1 and CPA 10443-P1-0003-CP1) remains under the limit of the type II small scale category under the current monitoring period; and shall remain within the limit in each year throughout the crediting period.

This can be demonstrated from the eligibility criteria given that “the maximum number of ICS estimated is to be defined in the specific CPA-DD. The number of ICS in operation per year will not exceed the ‘ICS installation cap’ established in the specific CPA-DD. This cap in essence will be the maximum number of ICS installed up to the threshold of 180 GWh_{th}/annum thermal energy savings”.

From the distribution records and numbers of stoves included under the CPAs during the current monitoring period, it can be verified that the combined scale of the project activities under each CPA is within the ICS installation cap. The detailed calculation of the type II small scale threshold for each CPA has been demonstrated under the ER sheet⁶.

⁶ Pls refer to the ER sheet, version 04.

Appendix 01:

Sample copies of User's Beneficiary Agreement and Registration Card for reference purpose:

N° 0012963

FIFANARAHANA EO AMIN'NY MPAHAZO
TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")

TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY KCM - Wood#CPA-W-001

Atoa/Ramatoa RAZANATSOA Emilieanne (Mpahazo tombontsoa)
CIN: _____ Tél: _____
Zanatanàna: Tambahohe Fokontany: Tambahohe
Kaominina: Safata
Distrika: Jalanga Faritra: Natnitra Ambony

Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.

Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 1858W01 00302, izay nomena anio, izaho dia :

- 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ;
- 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy;
- 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ;
- 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ;
- 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ;
- 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilana izany;

Mikasika ny "Crédit Carbone":

- 7) Manolotra tanteraka ny zo amin'ny "crédits carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédits carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamorana ny fahazahoana ny fatana mitsitsy.

Ity fifanarahana ity dia fehezin'ny lalàna malagasy

Sonian'ny Mpahazo tombontsoa _____ Sonia amin'ny anaran'ny KCM _____

Daty: 09/10/18 Anaran'ny Tompon'andraikitra: Nirina

"Hoy Jesosy taminy: Tsy voalazako va fa raha hino ianao, dia ho hitanao ny voninahitr'Andriamanitra?" (Jaona 11:40)

Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33/ 020 75 516 58 - Courriel : cmp.fianar@moov.mg - Besorohitra, 301 Fianarantsoa

KOREA CARBON

FIFANARAHANA EO AMIN'NY MPAHAZO TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")

TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY KCM - Wood#CPA-W-001

Atoa/Ramatoa RAZANATSOA Emilieanne (Mpahazo tombontsoa)
CIN: _____ Tél: _____
Zanatanàna: Tambahohe
Kaominina: Safata
Distrika: Jalanga Faritra: Natnitra Ambony

Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.

Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 1858W01 00302, izay nomena anio, izaho dia :

- 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ;
- 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy;
- 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ;
- 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ;
- 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ;
- 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilana izany;

Mikasika ny "Crédit Carbone":

- 7) Manolotra tanteraka ny zo amin'ny "crédits carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédits carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamorana ny fahazahoana ny fatana mitsitsy.

Ity fifanarahana ity dia fehezin'ny lalàna malagasy

Sonian'ny Mpahazo tombontsoa _____ Sonia amin'ny anaran'ny KCM _____

Daty: 09/10/18 Anaran'ny Tompon'andraikitra: Nirina

Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33/ 020 75 516 58 - Courriel : cmp.fianar@moov.mg - Besorohitra, 301 Fianarantsoa

KOREA CARBON

FIFANARAHANA EO AMIN'NY MPAHAZO TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")

TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY KCM - Wood#CPA-W-001

Atoa/Ramatoa RAZANATSOA Emilieanne (Mpahazo tombontsoa)
CIN: _____ Tél: _____
Zanatanàna: Tambahohe
Kaominina: Safata
Distrika: Jalanga Faritra: Natnitra Ambony

Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.

Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 1858W01 00302, izay nomena anio, izaho dia :

- 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ;
- 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy;
- 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ;
- 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ;
- 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ;
- 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilana izany;

Mikasika ny "Crédit Carbone":

- 7) Manolotra tanteraka ny zo amin'ny "crédits carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédits carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamorana ny fahazahoana ny fatana mitsitsy.

Ity fifanarahana ity dia fehezin'ny lalàna malagasy

Sonian'ny Mpahazo tombontsoa _____ Sonia amin'ny anaran'ny KCM _____

Daty: 09/10/18 Anaran'ny Tompon'andraikitra: Nirina

Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33/ 020 75 516 58 - Courriel : cmp.fianar@moov.mg - Besorohitra, 301 Fianarantsoa

N° 0012966

FIFANARAHANA EO AMIN'NY MPAHAZO TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")

KOREA
CARBON

TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY KCM - Wood#CPA-W-001

Atoa/Ramatoa: Sampsony Fela miana Florence (Mpahazo tombontsoa)
 CIN: 205 272 007 119 Tél: 034 20 417 61
 Zanatanàna: Vakitsaoka Fokontany: Saoniaradia
 Kaominina: Vakitsaoka
 Distrika: Amboasoa Faritra: Natantsa Ambony

Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.

Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 17.S.R.009.A.0.006.12 izay nomena anio, izaho dia :

- 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ;
- 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy;
- 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ;
- 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ;
- 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ;
- 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilana izany;

Mikasika ny "Crédit Carbone":

- 7) Manolotra tanteraka ny zo amin'ny "crédits carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédits carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamorana ny fahazahoana ny fatana mitsitsy.

Ity fifanarahana ity dia feheziny ny lalàna malagasy

Sonian'ny Mpahazo tombontsoa

Sonia amin'ny anaran'ny KCM

Florence
 Daty: 25/01/19

Andriamanitra
 Anaran'ny Tompon'andraikitra: Andriamanitra

"Hoy Jesosy taminy: Tsy voalazako va fa raha hino ianao, dia ho hitanao ny voninahitr'Andriamanitra?" (Jaona 11:40)

Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33/ 020 75 516 58 - Courriel : cmp.fianar@moov.mg - Besorahitra, 301 Fianarantsoa

KOREA
CARBON

FIFANARAHANA EO AMIN'NY MPAHAZO TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")

TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY
KCM - Wood#CPA-W-001

Atoa/Ramatoa: Fantasia Florence (Mpahazo tombontsoa)
 CIN: 205 272 007 119
 Zanatanàna: Vakitsaoka
 Fokontany: Saoniaradia
 Kaominina: Vakitsaoka
 Distrika: Amboasoa Faritra: Haute Matsiatra

Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.

Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 17.S.R.009.A.0.006.12 izay nomena anio, izaho dia :

- 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ;
- 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy;
- 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ;
- 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ;
- 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ;
- 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilana izany;

Mikasika ny "Crédit carbone":

- 7) Manolotra tanteraka ny zo amin'ny "crédit carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédit carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamorana ny fahazahoana ny fatana mitsitsy.

Ny etao hoe "Crédit Carbone" dia ny sandid'ny taham-pihen'ny entan'ny izay nahamamirina sy manaraka ny "Fentira Fampandrosana madio" vokatry ny fampiasana ny fatana mitsitsy "SoaRehitra" mandritry ny fahazoan'ny fanamorana azy sy ny ho avy.

Ity fifanarahana ity dia feheziny ny lalàna malagasy

Sonian'ny Mpahazo tombontsoa

Sonia amin'ny anaran'ny KCM

Fantasia
 Daty: 14-05-2019

Andriamanitra
 Anaran'ny Tompon'andraikitra: Andriamanitra

Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33 / 020 75 516 58
 Courriel : cmp.fianar@moov.mg - Besorahitra, 301 Fianarantsoa

KOREA
CARBON

FIFANARAHANA EO AMIN'NY MPAHAZO TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")

TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY
KCM - Wood#CPA-W-001

Atoa/Ramatoa: Andriamanitra (Mpahazo tombontsoa)
 CIN: 205 272 007 119
 Zanatanàna: Vakitsaoka
 Fokontany: Saoniaradia
 Kaominina: Vakitsaoka
 Distrika: Amboasoa Faritra: Haute Matsiatra

Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.

Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 17.S.R.009.A.0.006.12 izay nomena anio, izaho dia :

- 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ;
- 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy;
- 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ;
- 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ;
- 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ;
- 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilana izany;

Mikasika ny "Crédit carbone":

- 7) Manolotra tanteraka ny zo amin'ny "crédit carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédit carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamorana ny fahazahoana ny fatana mitsitsy.

Ny etao hoe "Crédit Carbone" dia ny sandid'ny taham-pihen'ny entan'ny izay nahamamirina sy manaraka ny "Fentira Fampandrosana madio" vokatry ny fampiasana ny fatana mitsitsy "SoaRehitra" mandritry ny fahazoan'ny fanamorana azy sy ny ho avy.

Ity fifanarahana ity dia feheziny ny lalàna malagasy

Sonian'ny Mpahazo tombontsoa

Sonia amin'ny anaran'ny KCM

Andriamanitra
 Daty: 22/05/2019

Andriamanitra
 Anaran'ny Tompon'andraikitra: Andriamanitra

Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33 / 020 75 516 58
 Courriel : cmp.fianar@moov.mg - Besorahitra, 301 Fianarantsoa

FIFANARAHANA EO AMIN'NY MPAHAZO		CARBON	
TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")			
TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY KCM - Wood#CPA-W-003			
Atoa/Ramatoa	RAMAMINIAINA Marie Victoire (Mpahazo tombontsoa)		
CIN:	220.058.008.746	Tél:	
Zanatanàna:	Antelamoni Bongony	Fokontany:	Palazana Ambony
Kaominina:	SORINDRANA	Faritra:	Mabiatra Ambony
Distrika:	VDHI BATAO		
<p>Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.</p> <p>Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 19SRW03...00246..., izay nomena anio, izaho dia :</p> <ol style="list-style-type: none"> 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ; 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy; 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ; 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ; 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ; 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilàna izany; <p>Mikasika ny "Crédit Carbone":</p> <ol style="list-style-type: none"> 7) Manolotra tanteraka ny zo amin'ny "crédits carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédits carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamoràna ny fahazahoana ny fatana mitsitsy. <p>Ity fifanarahana ity dia fehezin'ny lalàna malagasy</p> <p>Sonian'ny Mpahazo tombontsoa Sonia amin'ny anaran'ny KCM</p>			

FIFANARAHANA EO AMIN'NY MPAHAZO		CARBON	
TOMBONTSOA SY NY KOREA CARBON MANAGEMENT LTD ("KCM")			
TETIKASA FATANA MITSITSY ETO MADAGASIKARA MIARAKA AMIN'NY KCM - Wood#CPA-W-002			
Atoa/Ramatoa	Fenilosea Florence (Mpahazo tombontsoa)		
CIN:	220.072.008.922 du 22/03/10 F II	Tél:	
Zanatanàna:	Antelamoni	Fokontany:	Kanomadia
Kaominina:	Tuamala	Faritra:	Mabiatra Ambony
Distrika:	Antelamoni		
<p>Ho fandraisako anjara amin'ny fiarovana ny Tontolo iainana sy ho tombontsoako manokana. Izaho izay mpampiasa fatana mahazatra tsy mitsitsy (na toko telo, na fatana tsy manaraka fenitra ara-teknika) mampiasa hazo fandrehitra na akora sisa tavela avy amin'ny fambolena, dia manapa-kevitra ny hampiasa fatana mitsitsy "SoaRehitra" ao an-tokantranoko.</p> <p>Ho setrin'ny fahazahoako ny fatana mitsitsy Laharana faha N° 19SRW02...00246..., izay nomena anio, izaho dia :</p> <ol style="list-style-type: none"> 1) Hanaraka ireo toromarika fampiasana ny fatana mitsitsy "SoaRehitra" araka ny fenitra ara-teknika omen'ny tekinisianina Ecovision-Tandavanala ; 2) Hampijanona tanteraka ny fampiasana fatana tsy mitsitsy, izay nosoloina fatana mitsitsy; 3) Tsy hivarotra amin'olon- kafa ny fatana mitsitsy "SoaRehitra" ; 4) Hampahafantatra ny Ecovision-Tandavanala raha vantany misy tsy fahatomombanana na fahasimbana eo amin'ny fatana "SoaRehitra" ; 5) Hampahafantatra ny Ecovision-Tandavanala raha nafindra na nomena tokantrano hafa ny fatana mitsitsy "SoaRehitra" ; 6) Hamela malalaka ny Ecovision-Tandavanala sy/na ireo tompon'andraikitra solontenany hanao ny fitsidihana sy fanaraha-maso ny fatana ato amiko, ary hanome ny antontam-baovao izay ilainy raha misy ilàna izany; <p>Mikasika ny "Crédit Carbone":</p> <ol style="list-style-type: none"> 7) Manolotra tanteraka ny zo amin'ny "crédits carbone" izay mety ho ateraky ny fampiasana ny fatana "SoaRehitra" ho an'ny KCM hahafahany miantoka ny fampandehanana ny tetik'asa. Ho setrin'ny fanolorana tanteraka ny zo amin'ny "crédits carbone", ny mpampiasa ny fatana mitsitsy kosa izay mpahazo tombontsoa dia misitraka ny fanamoràna ny fahazahoana ny fatana mitsitsy. <p>Ity fifanarahana ity dia fehezin'ny lalàna malagasy</p> <p>Sonian'ny Mpahazo tombontsoa Sonia amin'ny anaran'ny KCM</p> <p>Daty: 11/05/10 Anaran'ny Tompon'andraikitra: Aina</p> <p>"Hoy Jesosy taminy: Tsy voalazako va fa raha hino ianao, dia ho hitanao ny voninahitr'Andriamanitra?" (Jaona 11:40)</p> <p>Fanazavàna fanampiny : TANDAVANALA : Tél : 034 99 274 33/ 020 75 516 58 - Courriel : cmp.fianar@moov.mg - Besorohitra, 301 Fianarantsoa</p>			

Appendix 02:

Formulae and Equations used in the Sampling Survey Calculation for parameters are in line with Sampling Guidelines and Sampling Standard:

For sample size calculations:

For Parameter N_y :

$$n \geq \frac{1.96^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.96^2 p(1-p)} \dots\dots\dots \text{equation A}$$

where:

n = Sample size

N = Population size (Total number of households/ICS)

p = Expected proportion

1.96 = Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

For Parameter n_{new} and μ_y :

$$n \geq \frac{1.96^2 NV}{(N-1) \times 0.1^2 + 1.96^2 \times V} \dots\dots\dots \text{equation B}$$

$$V = \left(\frac{SD}{\text{mean}} \right)^2 \dots\dots\dots \text{equation C}$$

Where,

n = Sample size

N = Population size (Total number of households/ICS)

mean = Expected mean

SD = Expected standard deviation

1.96 = Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)

0.1 = Represents the 10% relative precision

Equation for t-Distribution application:

$$n = \left(\frac{t_{n-1} \times SD}{0.1 \times \text{mean}} \right)^2 \dots\dots\dots \text{equation D}$$

Where t_{n-1} is the value of the t-distribution for the confidence when the sample size is n .

Equation used for Reliability Check:

$$\frac{\frac{1}{2}\text{width of confidence interval}}{\text{proportion}} \times 100\%$$

.....equation E, this equation gives the precision.

$$p \pm 1.96 \times \sqrt{1 - \frac{n}{N}} \times \sqrt{\frac{p(1-p)}{n}}$$

.....equation F, this equation gives the confidence interval where sample interest is a proportional parameter.

$$\text{Sample Mean} \pm 1.96 \times \sqrt{1 - \frac{n}{N}} \times \frac{SD}{\sqrt{n}}$$

.....equation G, this equation gives the confidence interval where sample interest is a numeric mean value parameter.

Where:

n = Sample size

p = sample proportion

N = Population size

1.96 = Represents 95% confidence required

SD = Standard Deviation

$$\sqrt{1 - \frac{n}{N}} \times \sqrt{\frac{p(1-p)}{n}}$$

&

$$\sqrt{1 - \frac{n}{N}} \times \frac{SD}{\sqrt{n}}$$

both represents “standard error”.

Thus, + & - both will give two values, which will be the upper and lower bound values of the confidence interval.

Now,

$$\text{Sample Mean} \pm t_{(n-1)} \times \sqrt{1 - \frac{n}{N}} \times \frac{SD}{\sqrt{n}}$$

.....equation H

This equation is used to calculate confidence interval when mean value (i.e. ‘sample mean’) and ‘standard deviation’ (SD) are used. Here, $t_{(n-1)}$ represents the relevant value from the t-distribution with (n-1) degrees of freedom that is associated with the confidence.

This equation is more suited when the objective of the sampling relates to a mean value of interest and t-Distribution used for sample size calculation. Thus, for the two parameters (i.e. μ_y & η_{new}) in the sampling, this equation is used.

Moreover, two excel functions “NORMSINV” and “TINV” are applied while deriving the results from the sampling for the monitoring parameters,

The Excel NORMSINV function calculates the inverse of the Standard Normal Cumulative Distribution Function for a supplied probability value. Excel uses an iterative method to calculate the Normsinv function and seeks to find a result, z , such that $\text{NORMSDIST}(z) = \text{probability}$. $\text{NORMSINV}(p)$ gives the z -value that puts probability (area) p to the left of that value of z .

The Excel TINV function calculates the inverse of the two-tailed Student's T Distribution, which is a continuous probability distribution that is frequently used for testing hypotheses on small sample data sets. $\text{TINV}(\text{probability}, \text{degrees_freedom})$ gives the t -value that puts one-half the probability (area) to the right with DF degrees of freedom.

These equations are also included under the "Sample Size Equations" sheet in the sampling survey excel (ref. "Sampling Sheet (PoA10443)_1st Ver_revised ver03-Final(May2020)") and further give references in the respective parameter's sheet. The analysis of results w.r.t. the reliability check has been included under the sheet "Analysis of results" in the Sampling Sheet.

Appendix 03:

Calculation of fraction of non-renewable biomass (fNRB):

CME is submitting the fNRB calculation sheet, which is based on a primary survey conducted by a local Centre for Information & Research named "CEDII", which was further validated and accepted by host country DNA in Madagascar. The Survey Report (June 2018), excel sheet calculation (June 2018), related source documents and the letter from DNA are submitted to DOE for further reference & verification. The documents confirm that the calculated fNRB value, i.e. 96.6% is applicable in the regional and sub-national level across the administrative regions in the Province of Fianarantsoa including: Haute Matsiatra, Atsimo Atsinanana, Vatovavy Fitovinany and Amoron'i Mania. The three CPAs included under the PoA are within these regions, hence fNRB value used for ER calculation is applicable. The calculation and result is included below, the fNRB calculation excel sheet is submitted to DOE for further verification.

Extract from the fNRB calculation sheet (June 2018):

Calculation of NRB fraction from the fNRB survey

	Extent of Forest F forest, i (ha)	Extent of wooded land (F other, j) (ha)	Extent of non accessible area within forest (P forest) (ha)	Extent of non accessible area within other wooded land (P other) (ha)	Volume of wood on the forest (tons)	Mean Annual Increment MAI forest, i (t/yr)	Mean Annual Increment MAI other, j (t/yr)	Renewable biomass RB (t/yr)	Bold, total (t/yr)	NRB (t/year) (Gg)	fNRB = NRB/(NRB+RB)
Value in the sampling of 56 villages	3680.00	2409.00	1601.00	1641.00	161514.26	3.26	1.5	7929.54	2,32,492.00	2,24,562.46	96.6%

Number of Household	52000.00	Number
Household Fuel consumption for cooking	4.471	MT/year
Average Wood consumption by Institution/Furniture	0.00	MT/year

Guideline reference: CDM Methodological tool: Calculation of the fraction of non-renewable biomass

Source of data: CEDII Study report using CDM methodology that includes primary surveys, local focus groups and documentation at regional and national level
2006 IPCC Guidelines for National Greenhouse Gas Inventories, Above-ground net biomass growth in natural forests, p 57

$$fNRB = \frac{NRB}{NRB + RB}$$

$$NRB = B_{old, total} - RB$$

$$RB = \sum (MAI_{forest, j} \times (F_{forest, i} - P_{forest})) + \sum (MAI_{other, j} \times (F_{other, i} - P_{other}))$$



Appendix 04:**Details of the Sampling Survey:****For parameter N_y :**

Sampling Survey was conducted across the randomly selected samples at PoA level, in line with the registered sampling plan. All sample households were interviewed with pre-designed questionnaires to check and record the presence of project ICS, usage pattern, fulfilment of cooking needs with project ICS, etc.

As per calculated sampling size, a total of 44 samples were surveyed for this particular parameter N_y . Additionally, the survey on 13 samples selected for parameter μ_y also included the inspection for N_y by default. All these samples were proportionately selected from the three CPAs to consider a representative and unbiased sample selection to derive the result. The project ICS were found to be operational without any issue, in all the samples surveyed. The regular cooking needs are fulfilled with using the project ICS. There was no case of any non-response.

The results derived from the sampling survey and reliability check are presented below:

Project ICS Usage Rate	100.00%	Fraction
Population Size of the sampling frame	17380	number
Sample Size	44	number
Proportion for Usage Rate	1.00	Fraction
Standard error of proportion for Usage Rate	0.00	%
Precision	0.00	%
Result	Precision achieved.	--

For parameter μ_y :

As per calculated sampling size, a total of 13 samples were surveyed for this particular parameter μ_y . The samples were proportionately selected from the three CPAs to consider a representative and unbiased sample selection to derive the result.

As per applicability of the methodology (version 09), page 14:

- i) If the pre-project devices are decommissioned and no longer used, as determined by the monitoring survey its value is 1.0.
- ii) If both the project devices and pre-project devices are used together, measurement campaigns shall be undertaken.
- iii) Surveys may be conducted if the use of data loggers to record the continued operation of baseline devices is demonstrated to be not practical, for example when the baseline device is the three-stone fire.
- iv) Example - 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 will be 0.75. Where a more precise data is available i.e. the thermal capacity of the project and pre-project devices and respective utilization hours, a weighted average adjustment factor may be used.

In case of the current monitoring period, as confirmed by the survey data & survey report (Survey Report June 2019), the Project ICS is being regularly used in all households to meet daily cooking requirements (i.e. 3 times meal per day, 21 times a week). In 3 samples out of all the samples check, (i.e. in the 3 households identified under the sampling) the baseline device was also found to exist along with project ICS. Therefore, as per methodological guidance (as highlighted above) the survey interviews conducted were designed to capture their cooking habits and wood

consumption pattern. The survey found that in these three samples the regular 3 times meal (i.e. 21 meals per week) are being cooked using only project ICS, whereas baseline stove was kept as back up for specific conditions only, such as during house gathering or during festivity. The details were recorded for these three samples during the survey (both number of meals and wood consumption in kg/day by baseline device) and found that use of baseline device was only for additional meals such as in the event of additional guests, festive gathering etc. which were outside the regular cooking needs/habits.

Since the survey shows that not all baseline stoves were fully decommissioned, the continued use of baseline stoves has been considered in the calculation of parameter μ_y and expressed as a fractional value proportionately against the ex-ante baseline consumption value. As prescribed in the methodology and registered monitoring plan, the parameter μ_y is fractional value to be used in the ER calculation.

The results derived from the sampling survey and reliability check are presented below:

μ_y (Adjustment factor for baseline stove usage)	0.9676	(Upper bound value [#])
Population Size of the sampling frame	17380	Number
Sample Size for μ_y	13	Number
Sample Mean	0.1769	kg/day
Hence, equivalent fraction	0.9853	Fraction
Standard Deviation	0.3516	kg/day
Standard Error	0.0975	-
Precision	21.24%	-
Relative Precision	120.03%	-
Result	Precision Not Achieved	-

Since required precision is not met, therefore the para 17(b)(i) of the Sampling Standard (ver 07) has been applied, which prescribes: "Discounting the emission reduction estimates by - taking the lower or the upper bound, whatever is the more conservative, of the 90 or 95 per cent confidence interval, depending on the type of methodologies applied".

Therefore, the lower and upper bound values of the confidence interval (at 95%) has been calculated (i.e. in numeric value, in kg/day), which is then expressed in fraction. The upper bound value is found to be the most conservative. Hence, this value has been considered for μ_y . Thus, the final result considered for the parameter μ_y is 0.9676. The detailed calculation and analysis can be referred in the "Monitoring Survey- μ " sheet under the final Sampling Sheet (version 03).

For parameter η_{new} :

The WBT was conducted on the selected 13 samples, which were proportionately selected from the three CPA for considering a representative and unbiased sampling. The WBT was conducted by an independent experienced professional in line with the requirements of the WBT protocol.

The result derived from the sampling and reliability check are presented below:

η_{new} (for SoaRehitra ICS)	31.50%	%
Population Size of the sampling frame	17380	Number
Sample Size for (η_{new})	13	Number
Sample Mean	31.50%	%
Standard Deviation	2.54%	%
Standard error of mean (η_{new})	0.007	
Precision	1.54%	
Relative Precision	4.88%	%
Result	Precision achieved.	--

The detailed presentation of sampling frame, sample size calculation, sample selection, sampling data, calculation of results and precision check etc. are demonstrated in the sampling sheet (ref. "Sampling Sheet (PoA10443)_1st Ver_revised ver03-Final(May2020)").

The equations used for all these sampling parameters are listed under the Appendix 2 above. The spreadsheet titled "Analysis of results" included under the Sampling Survey sheet (version 03) also demonstrates application of the equations and cross checking of results based on desired reliability check.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
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..
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		