



Monitoring report form for CDM programme of activities (version 01.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form for CDM programme of activities" at the end of this form.

MONITORING REPORT

Title of the programme of activities (PoA)	Improved Cooking Stoves Programme of Activities in Africa	
UNFCCC reference number of the PoA	5341	
Version number(s) of the PoA-DD(s) applicable to this monitoring report	Version 3.2 dated 27/11/2012	
Coordinating/managing entity (CME)	Envirofit International Limited	
Version number of this monitoring report	Version 1.0	
Completion date of this monitoring report	23/05/2017	
Monitoring period number and dates covered by this monitoring report	Monitoring Period: 03 Dates: 01/01/2016 - 31/12/2016, Both days inclusive	
Monitoring report number for this monitoring period	01	
Host Party(ies)	Host Party(ies) of the PoA	Is this a host Party to a specific-case CPA covered in this monitoring report?(yes/no)
	Kenya	Yes
	South Africa	No
Sectoral scope(s)	Sectoral Scope 3: Energy Demand	
Selected methodology(ies)	AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass, version 03.0	
Selected standardized baseline(s)	Not applicable	
Total amount of GHG emission reductions or net GHG removals by sinks for all specific-case CPAs in the PoA covered in this monitoring report	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0 tCO ₂	120,388 tCO ₂

PART I - Programme of activities

SECTION A. Description of PoA

A.1. Brief description of the PoA

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The purpose of the Programme of Activities (PoA) is dissemination of high efficiency improved cook stoves (ICS) in Kenya and South Africa. The PoA promotes improved cookstove (ICS) technologies that replace existing, less efficient cooking stoves using woody-biomass (charcoal or wood-fuel).

The ICS distributed under the PoA are portable and use charcoal or woodfuel as fuel. These ICSs are more efficient in transferring heat from the fuel to the pot, thus saving charcoal/woodfuel compared to the traditional charcoal/woodfuel stoves currently used by the project households. Furthermore, these ICSs have been designed not only to increase heat transfer, but also to match traditional utensils and cooking habits of project households.

In accordance with version 3.0 of the small-scale CDM methodology AMS-II.G, in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs. Therefore, by reducing the amount of fuel required for cooking and thus the use of non-renewable woody biomass, the replacement of less efficient stoves with more efficient ICS reduces the amount of greenhouse gases (GHG) emitted into the atmosphere.

Envirofit International Ltd (Envirofit) is the coordinating/managing entity (CME) for this PoA and coordinates the efforts of different Distribution Organizations (DOs) who are involved in distribution of ICS within the boundary of the PoA and comply with the requirements of this PoA. Each DO sells ICSs either directly or through retailers, entrepreneurs or other agents sub-contracted by the DO. The CME provides training and guidance on the correct distribution and monitoring procedures to each DO. Each DO acts individually, implementing the CPA(s) in accordance with local circumstances and the requirements prescribed by CME.

A.1.1. Generic CPA(s)

Title, identification/reference number and/or version number of the generic CPA(s) of the PoA	Sectoral scope(s)	Applied methodology(ies) or combination of methodologies and/or standardized baseline(s)
Title: Improved Cooking Stoves Programme of Activities in Africa – Generic CPA Identification: Generic CPA-DD Reference: https://cdm.unfccc.int/filestorage/q/w/KG72QSRPWVAIC6905XM83LU14HBDNJ.pdf/SSC_Generic_CPA_PDD_rev3.2?t=UDF8bzh2Ymc5fDBYifunecNLPA7z25d83rU- Version: 1.0	Sectoral Scope 3: Energy Demand	AMS-II.G: Energy efficiency measures in thermal applications of non-renewable biomass, version 03.0

A.1.2. Specific-case CPA(s) covered in this monitoring report

Reference number of the specific-case CPA included in the PoA as of the end of this monitoring period	Title, identification/ reference number and version number of the generic CPA to which the specific-case CPA applies	Crediting period dates of the specific-case CPA	Is this specific-case CPA covered in this monitoring report? (yes/no)
5341-0001	Title: Improved Cooking Stoves Programme of Activities in Africa – Generic CPA Identification: Generic CPA-DD Reference: https://cdm.unfccc.int/filestorage/q/w/KG72QSRPWVAIC6905XM83LU14HBDNJ.pdf/SSC_Generic_CPA_PDD_rev3.2?t=U DF8bzh2Ymc5fDBYifunecNLP A7z25d83rU- Version: 1.0	15/12/2012 – 14/12/2022	Yes
5341-0002		01/01/2014 – 31/12/2023	Yes
5341-0003		01/01/2014 – 31/12/2023	Yes
5341-0004		01/04/2014 – 31/03/2024	Yes

A.2. Contact information of the coordinating/managing entity (CME) and/or responsible persons(s)/entity(ies)

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SECTION B. Implementation of PoA**B.1. Implementation of the management system of the PoA**

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Envirofit International Limited is the Coordinating and Managing Entity (CME) for the PoA. The Distributing Organization(DO) for the CPAs included in the PoA are as follows:

CPA	Name of DO	Status of CPA Implementation
5341-0001	East Africa Energy (EAE)	Not implemented
5341-0002	Envirofit Kenya	Implemented
5341-0003	Envirofit Kenya	Implemented
5341-0004	Envirofit Kenya	Implemented

Envirofit Kenya Ltd. is the DO for the CPAs that have been implemented under the PoA so far and has subcontracted retailers/entrepreneurs (referred as dealers) for dissemination of project stoves. The implemented CPAs (5341-0002, 5341-0003 and 5341-0004) follow the same management system as follows:

1. Envirofit provided instructions to various dealers to collect the end user information at the time of sales to make the stove eligible under the PoA. Envirofit made them aware of requirements of end user data collection. Guidance was provided to them on the correct procedures to be followed during distribution.

2. Envirofit maintains a PoA Distribution and Monitoring database. This database is a compilation of CPA distribution records. The database includes CPA wise list of stoves sales, based on following information, received from various dealers, collected at the time of sale, in CPA distribution record form:
 - a. Name of customer
 - b. Address / location of the customer
 - c. Stove unique serial ID number
 - d. Stove Model
 - e. Stove distribution date
 - f. Type of old stove replaced by ICS i.e. the fuel type used in the baseline – wood or charcoal.
3. Envirofit performed cross-checks on the ICS sales information received from the dealers via CPA distribution records. The CME's logo is clearly displayed on the CPA Distribution Record, with a copy retained by Envirofit. A unique stove id is punched on each stove and the same serial ID is mentioned on the CPA distribution record. Therefore, it is possible to identify each stove in the PoA with its unique serial ID number. The unique serial number linked to each stove and its association with a unique CPA bearing a CPA ID number eliminates any risk of double-counting of ICSs between CPAs.
4. Envirofit obtained the customer's approval during distribution to exclusively assign carbon rights to the CME as per the disclaimer specified on stove boxes / CPA distribution records.
5. Envirofit coordinated all ex-post monitoring activities in the PoA. In addition the Envirofit;
 - a. Implemented the monitoring plan,
 - b. Determined the sample size as per sampling plan and identified the samples to be monitored
 - c. Ensured the quality of monitoring data obtained through QA/QC
 - d. Used this data for emissions reduction calculations.
6. Envirofit checked and recorded the following key parameters in a CPA Monitoring Record. Key monitored parameters were:
 - a. Efficiency of project stoves (η_{new})
 - b. Check if project stoves are operational and in use (SOF)
 - c. Check fraction of end users continuing to use baseline stoves (f_{old})
 - d. If baseline stoves are being used, the consumption accounted for by the old stoves (μ_{old})
7. Calculated of emission reductions based on monitoring data collected and preparation of monitoring report

Thus, by carrying out the aforesaid, Envirofit ensured that the PoA Operational and Management plan as given in section A.4.4.1 of registered PoA-DD is duly implemented for concerned CPAs.

B.2. Implementation of single sampling plan(s)

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a) List of CPAs to which the single sampling was applied

The eligible stoves distributed under the CPAs included in the PoA are as follows:

Table 1: CPA and Stove Installation

CPA	Scale	Type of Project stoves eligible under CPA	Total number of stoves in the CPA	CPA monitoring period covered under this PoA monitoring period
5341-0001	micro	Charcoal	0	01/01/2016 – 31/12/2016

5341-0002	Small	Charcoal	21,044 ^{1,2}	01/01/2016 – 31/12/2016
5341-0003	Small	Woodfuel	17,754	01/01/2016 – 31/12/2016
5341-0004	Small	Charcoal and Woodfuel	18,157	01/01/2016 – 31/12/2016

No eligible stoves were distributed in CPA 5341-0001 till the end of monitoring period. Hence, no ERs are being claimed for CPA 5341-0001 for this entire monitoring period. CPA 5341-0002, 5341-0003 and 5341-0004 have been monitored under single sampling plan for this monitoring period.

b) Description of implemented single sampling design;

Due to the large number of ICS distributed under the PoA it was not economically feasible to monitor each individual ICS unit distributed. Therefore, representative sampling was undertaken as part of a PoA-wide Sampling Plan. The sampling plan consisted of monitoring the following four parameters mentioned in section D.2.:

Parameter	Description of parameter
η_{new}	The thermal efficiency of the ICS distributed (%)
SOF	The Stove Operating Fraction, i.e. the fraction of users using the ICS
f_{old}	The fraction of stove users still using baseline (replaced) stoves
μ_{old}	The amount of woody biomass that continues to be used in the replaced stoves (kg)

Based on the registered PoA-DD and CPA-DDs for CPA 5341-0002, 5341-0003 and 5341-0004, 95/10 reliability level was selected for cross-CPA sampling for the four parameters mentioned above.

As per page 43 of the PoA-DD (PoA sampling plan), for the parameter η_{new} , the population of each stove model shall be deemed homogeneous across CPAs as the stoves have been designed to meet stringent efficiency specifications and are manufactured in factories to specification. Hence the sample size was calculated for η_{new} considering each stove model as separate population.

As per page 47 of the PoA-DD, for other parameters (SOF, f_{old} , μ_{old}), the homogeneity of the population is demonstrated in compliance with the following conditions;

Homogeneity condition	Characteristic of Population	Status of population
Country	all units have been distributed in the same geographical area, i.e. Kenya	homogeneous
Fuel Type – charcoal / wood fuel	There are two fuel type in the population: Charcoal and woodfuel.	Charcoal stoves have been considered as one sampling frame and wood fuel stoves have been considered as other sampling frame.

¹ Section A.2, page 2 of the registered CPA-DD for CPA 5341-0002, clearly mentions, “CPA will have a maximum energy saving of less than or equal to 60/180 GWh_{th}/year, thus staying within the micro/small-scale threshold. Based on the estimated energy savings, it is envisaged that 18,500 number of stoves will be distributed under the CPA.” It must be noted that the CPA-DD does not restrict or set a limit on the number of stoves that may be implemented under the CPA and the number of stoves mentioned in respective CPA-DD is only an indicative number. As long as the micro/small-scale threshold is respected, the number of cookstoves under the CPA can change ex-post during the crediting period based on monitored performance. Refer ER calculator, worksheet ‘ER calculations’ where it has been demonstrated that even 21,044 stoves are contributing to only 87% of the methodology threshold of 180 GWh_{th}/year

² Total number of eligible stoves implemented under the CPA is 24,783. Out of these, CH6600 stoves are not being considered for emission reduction calculations, hence the total stoves specified in table above is 21,044.

End user – domestic / small-medium enterprises / community	all units are for domestic (household) usage as per their design	Homogeneous within each sampling frame
Stove Type - efficiencies are in a similar range defined as being within +/-10% of each other and they have other common design features	the stove models disseminated have efficiencies within +/-10% of each other	Homogeneous within each sampling frame

The initial target population were the stoves distributed and recorded under CPA 5341-0002, 5341-0003 and 5341-0004. The population was divided into two sampling frames based on fuel type. Simple Random Sampling approach was applied in each sampling frame separately to monitor the three parameters i.e. stove operation (SOF), fraction of traditional stoves still in operation (f_{old}) and amount of woody biomass that continues to be used by the replaced stoves (μ_{old}). Thus, the sample size calculations for parameters SOF, f_{old} , μ_{old} were calculated considering PoA population under two sampling frames.

The following is the number of samples covered during the monitoring activity. Refer ER calculator worksheet 'Sampling plan' for more details on calculation of sample size for each parameter. The expected parameter values (mean, standard deviation and proportion) have been determined based on project developer's knowledge and experience as per para 12(b) and 12(c) of the Sampling and surveys for CDM project activities and programmes of activities, Version 05.0 available at:

https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20151023110717966/meth_stan05.pdf

Parameter	Total population (N)	Expected results	Reliability	Sample Size (n) required ³	Samples covered during monitoring
η_{new} (CH2200)	4082	30.0% (mean); 3.1% (SD)	95/10	7	8
η_{new} (CH4400)	12149	30.0% (mean); 3.0% (SD)	95/10	7	10
η_{new} (CH5200)	7377	31.0% (mean); 3.1% (SD)	95/10	7	12
η_{new} (CH5300)	777	32.0% (mean); 3.2% (SD)	95/10	7	10
η_{new} (ECCL)	2003	30.0% (mean); 3.0% (SD)	95/10	7	10
η_{new} (M5000)	30567	29.0% (mean); 2.9% (SD)	95/10	7	7
SOF _{charcoal}	26388	0.90 (proportion)	95/10	43	103
SOF _{wood}	30567	0.90 (proportion)	95/10	43	123
f_{old} - charcoal	23749	0.15 (proportion), $f_{non\ old} - charcoal = 0.85$	95/10	68	99
f_{old} - wood	27510	0.15 (proportion), $f_{non\ old} - wood = 0.85$	95/10	68	116
μ_{old} - Charcoal	3562	1780 kg/year (mean); 178.0 (SD)	95/10	7	8
μ_{old} - Wood	4127	2088 kg/year (mean); 208.8 (SD)	95/10	7	10

The stoves were selected by randomly assigning a number to each stove and sorting in increasing order from lower to higher number. Random numbers were generated using online random number generator and the numbers obtained were used to identify the samples from the population. A higher number of samples were monitored than that required to ensure that the desired precision / confidence is achieved as well as have sufficient number of samples that use both ICS and baseline stove for determining μ_{old}

³ In case of mean parameters, the sample size has been adjusted using Student T-distribution, as applicable, in accordance with para 13 of Sampling and surveys for CDM project activities and programmes of activities, Version 05.0

c) Collected data (electronic spreadsheets may be attached and referenced);

Data was collected for SOF, f_{old} and μ_{old} following a specially design survey form. The information collected was introduced into an electronic database, the CPA Monitoring Record. This survey form was design in a way that would allow the surveyor first to check the validity of the records from the CPA Distribution Records, and secondly to collect the necessary information form field visit for the ER calculations. In order to achieve the 95/10 reliability level for cross-CPA sampling few additional stoves were sampled from the database than that required (as mentioned in the table above) to cover for non-responses, if any.

As for the thermal efficiency of the stoves, water boiling tests were conducted using WBT protocol by PCIA as available on GACC website. A total of 58 WBT tests were conducted, distributed across various models as specified in the table above. Refer ER calculator worksheet "Survey Summary" and "WBT Test Results" for details on data collected during monitoring.

The monitoring suryes and WBTs were conducted from February 2017 – April 2017

d) Analysis of the collected data;

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

Parameter	Results
Efficiency _{new} CH2200	29.23%
Efficiency _{new} CH4400	29.11%
Efficiency _{new} CH5200	30.40%
Efficiency _{new} CH5300	31.79%
Efficiency _{new} ECCL	29.07%
Efficiency _{new} M5000	29.39%
SOF _{charcoal}	0.961
SOF _{wood}	0.943
f_{old} - charcoal	0.081
f_{old} - wood	0.086
μ_{old} - Charcoal	1113
μ_{old} - Wood	1288

e) Demonstration of whether the required confidence/precision has been met;

The following tables demonstrate the status of precision/confidence for each of the monitored parameters:

SOF_{charcoal}	0.961	Fraction
Population Size	26388	number
Sample Size	103	number
Proportion for SOF _{charcoal}	0.961	fraction
Standard error of proportion for SOF _{charcoal}	1.90%	%
Precision for SOF _{charcoal}	3.87%	%
Result for SOF _{charcoal}	ok, acceptable	--

f_{old}_{charcoal}	0.081	Fraction
Population Size	25363	number
Sample Size	99	number
Proportion for f_{old} _{charcoal}	0.919	fraction

Standard error of proportion for $f_{\text{non old}_{\text{charcoal}}}$	2.73%	%
Precision for $f_{\text{non old}_{\text{charcoal}}}$	5.83%	%
Result for $f_{\text{non old}_{\text{charcoal}}}$	ok, acceptable	--

$\mu_{\text{old}_{\text{charcoal}}}$	1.113	tonnes/y
Population Size	2050	number
Sample Size	8	number
Mean for $\mu_{\text{old}_{\text{charcoal}}}$	1.113	tonnes/y
Standard Deviation $\mu_{\text{old}_{\text{charcoal}}}$	0.14	tonnes/y
Standard error of mean $\mu_{\text{old}_{\text{charcoal}}}$	4.85%	%
Precision for $\mu_{\text{old}_{\text{charcoal}}}$	8.54%	%
Result for $\mu_{\text{old}_{\text{charcoal}}}$	ok, acceptable	--

SOF_{woodfuel}	0.943	Fraction
Population Size	30567	number
Sample Size	123	number
Proportion for SOF _{woodfuel}	0.943	fraction
Standard error of proportion for SOF _{woodfuel}	2.08%	%
Precision for SOF _{woodfuel}	4.33%	%
Result for SOF _{woodfuel}	ok, acceptable	--

fold_{woodfuel}	0.086	Fraction
Population Size	28827	number
Sample Size	116	number
Proportion for $f_{\text{non old}_{\text{woodfuel}}}$	0.914	fraction
Standard error of proportion for $f_{\text{non old}_{\text{woodfuel}}}$	2.60%	%
Precision for $f_{\text{non old}_{\text{woodfuel}}}$	5.58%	%
Result for $f_{\text{non old}_{\text{woodfuel}}}$	ok, acceptable	--

$\mu_{\text{old}_{\text{woodfuel}}}$	1.288	tonnes/y
Population Size	2485	number
Sample Size	10	number
Mean for $\mu_{\text{old}_{\text{woodfuel}}}$	1.288	tonnes/y
Standard Deviation $\mu_{\text{old}_{\text{woodfuel}}}$	0.168	tonnes/y
Standard error of mean $\mu_{\text{old}_{\text{woodfuel}}}$	5.31%	%
Precision for $\mu_{\text{old}_{\text{woodfuel}}}$	8.08%	%
Result for $\mu_{\text{old}_{\text{woodfuel}}}$	ok, acceptable	--

$\eta_{\text{new CH2200}}$	29.23%	%
total number of stoves	4082	number
Sample Size for ($\eta_{\text{new CH2200}}$)	8	number
Mean	29.23%	%
Standard Deviation	0.35%	%

Standard error of mean ($\eta_{\text{newCH2200}}$)	0.0012	
Precision for $\eta_{\text{newCH2200}}$	0.82%	
Result for $\eta_{\text{newCH2200}}$	ok, acceptable	--

$\eta_{\text{new CH4400}}$	29.11%	%
total number of stoves	12149	number
Sample Size for ($\eta_{\text{newCH4400}}$)	10	number
Mean	29.11%	%
Standard Deviation	0.68%	%
Standard error of mean ($\eta_{\text{newCH4400}}$)	0.0022	
Precision for $\eta_{\text{newCH4400}}$	1.68%	
Result for $\eta_{\text{newCH4400}}$	ok, acceptable	--

$\eta_{\text{new CH5200}}$	30.40%	%
total number of stoves	7377	number
Sample Size for ($\eta_{\text{newCH5200}}$)	12	number
Mean	30.40%	%
Standard Deviation	0.92%	%
Standard error of mean ($\eta_{\text{newCH5200}}$)	0.0026	
Precision for $\eta_{\text{newCH5200}}$	1.91%	
Result for $\eta_{\text{newCH5200}}$	ok, acceptable	--

$\eta_{\text{new CH5300}}$	31.79%	%
total number of stoves	777	number
Sample Size for ($\eta_{\text{newCH5300}}$)	10	number
Mean	31.79%	%
Standard Deviation	0.28%	%
Standard error of mean ($\eta_{\text{newCH5300}}$)	0.0009	
Precision for $\eta_{\text{newCH5300}}$	0.63%	
Result for $\eta_{\text{newCH5300}}$	ok, acceptable	--

$\eta_{\text{new ECCL}}$	29.07%	%
total number of stoves	2003	number
Sample Size for ($\eta_{\text{newCH6600}}$)	10	number
Mean	29.07%	%
Standard Deviation	0.48%	%
Standard error of mean ($\eta_{\text{newCH6600}}$)	0.0015	
Precision for $\eta_{\text{newCH6600}}$	1.18%	
Result for $\eta_{\text{newCH6600}}$	ok, acceptable	--

$\eta_{\text{new M5000}}$	29.39%	%
total number of stoves	30567	number
Sample Size for ($\eta_{\text{newCH6600}}$)	7	number
Mean	29.39%	%

Standard Deviation	0.55%	%
Standard error of mean ($\eta_{\text{newCH6600}}$)	0.0021	
Precision for $\eta_{\text{newCH6600}}$	1.72%	
Result for $\eta_{\text{newCH6600}}$	ok, acceptable	--

For detailed calculations refer ER calculator.

f) *Demonstration of whether the samples were randomly selected and are representative of the population.*

Stoves were selected by randomly after arranging them in chronological order of date of sale and assigning a number to each stove. Random numbers were generated using online random number generator available at <http://stattrek.com/statistics/random-number-generator.aspx> and the random numbers received were selected from sampling frame to identify the samples to the monitored. The approach ensured that the samples picked are random and represent the population.

SECTION C. Post-registration changes to the PoA (including the generic CPA(s))

C.1. Corrections

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NA

C.2. Inclusion of a monitoring plan to the registered PoA-DD (including its generic CPA-DD(s)), if a monitoring plan was not included at the time of registration

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NA

C.3. Permanent changes to the monitoring plan as described in the registered PoA-DD, applied methodology, or applied standardized baseline

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NA

C.4. Changes to the programme design of the registered PoA-DD (including corresponding changes to project design of the generic CPA-DD(s)) and updates to the eligibility criteria for inclusion of specific-case CPAs in the PoA

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NA

C.5. Types of changes specific to afforestation and reforestation activities

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NA

PART II - Specific-case component project activity(ies)

SECTION D. Description of specific-case CPA(s)

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This Monitoring Report covers all the four CPAs included in the concerned monitoring period. These CPAs have the same project boundary and follow a common generic CPA as identified in section A.1.1, Part I of this monitoring report. The following sections therefore represent all these four CPAs

D.1. Brief description of implemented specific-case CPA(s)

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(a) Purpose of the specific-case CPA(s) and the measures taken for GHG emission reductions or net GHG removals by sinks;

The purpose of the CDM Programme Activities (CPAs) is dissemination of improved cooking stoves (ICS) in the Republic of Kenya. The CPAs replace cooking stoves using charcoal / woodfuel with more efficient stoves using charcoal / woodfuel.

The project ICS are more efficient in transferring heat from the fuel to the pot, thus saving fuel compared to the baseline stoves which would have been used in the absence of the project activity. Furthermore, the ICSs applied in these CPAs have been designed not only to increase heat transfer, but also to match traditional utensils and cooking habits of people in Kenya.

(b) Description of the technology employed and installed equipment and/or infrastructure, including information requested by the eligibility criteria;

The Envirofit stoves have been designed with the specific intention of maximizing thermal efficiency while simultaneously minimizing the production of toxic emissions. While many interrelated factors need to be considered in order to achieve these goals, primary aspects of stove performance were explored during the development of the stoves: 1) fuel and air mixing 2) heat transfer to the pot. In order to maximize temperature, the combustion chamber shape, fuel amount, and air flow through the stove all need to be considered and correctly coordinated. In order to use the available thermal energy in the most efficient manner possible, specific stove geometry and configuration choices were made; including reducing stove thermal mass and minimizing heat flux through the sides and bottom of the stove. In order to minimize emissions, the combustion chamber shape, fuel amount, and air flow rate through the stove all need to be considered and correctly coordinated in order to maintain a proper air to fuel mixture.

The following table details the implementation status of the CPAs along with technology involved:

CPA	Type of Project stoves eligible	Stove models included ⁴	Total number of stoves
5341-0001	Charcoal	--	0
5341-0002	Charcoal	CH2200, CH4400, CH5200	21,044
5341-0003	Woodfuel	M5000	17,754
5341-0004	Charcoal and Woodfuel	CH2200, CH4400, CH5200, CH5300, ECCL, M5000	18,157

The stove models referred above are shown below:

Woodfuel stoves

Figure 1: M5000

⁴ At the end of monitoring period

Charcoal Stoves



Figure 2: CH5200



Figure 3: CH2200



Figure 4: CH4400



Figure 5: CH5300

Figure 6:
EC
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Information required by Eligibility criteria

Eligibility criteria # 3, 4 and 11 that require information related to project technology / infrastructure are discussed below:

No.	Eligibility criteria		Assessment for CPAs	
	Description	Conditions to be met	Means of proof	Confirmation
#3	Applicability of Methodology AMS-II. G - Technology type	The ICS uses one of the following fuel types: <ul style="list-style-type: none"> Wood fuel Charcoal 	Technical specification of ICS provided	Refer D.1 (b) above for the type and number of stoves distributed in the CPAs till the end of the monitoring period. No other fuel type stove has been disseminated.
#4	Applicability of Methodology AMS-II. G – Minimum ICS efficiency/ specifications of technology including the level and type of service	The ICS has a minimum efficiency of 20% (AMS-II.G, V.3, para 1)	Technical specification of ICS provided (either from manufacturer's specifications or test results using the Emissions & Performance Test Protocol (EPTP))	Same as above. For all the stove models the manufacturer certified efficiency is more than 20%
#11	SSC Limit for CPAs	The annual energy savings of each CPA shall not go beyond the limits of 180 GWh _{th} /year	The maximum number of ICS will be determined in each CPA-DD depending on the technology used (excel sheet will	Refer ER calculator, worksheet 'ER Calculations' which demonstrates that CPAs meet 180 GWh _{th} /year energy savings methodology threshold.

		over the entire crediting period. In the case of using option 1 to prove additionality under Eligibility Criteria 7, the limit shall be 60 GWh _{th} /year over the entire crediting period.	be provided to show calculated energy savings). If a CPA exceeds the applicable limit in any year, the claimable emission reduction shall be capped based on the estimated GHG reductions in the CPA-DD).	
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For detailed information on complete list of eligibility criteria refer the CPA-DDs available on UNFCCC website as mentioned in Section A.1.2, Part I of this monitoring report.

(c) **Relevant dates for the specific-case CPA(s) (e.g. construction, commissioning, continued operation periods, etc.);**

CPA	5341-0001	5341-0002	5341-0003	5341-0004
Start Date as per CPA-DD	01/01/2012	16/03/2012	06/09/2013	16/03/2012
Date of sale of first eligible stove included in the CPA	Not applicable	16/03/2012	03/04/2015	08/04/2012
Continued operation period	Not applicable	since 16/03/2012	since 03/04/2015	since 08/04/2012

(d) **Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period for the specific-case CPA(s), including information on how double counting is avoided**

CPA	Emission Reductions tCO ₂ e
5341-0001	0
5341-0002	42,374
5341-0003	34,822
5341-0004	43,192
Total	120,388

Each stove bears a unique serial ID punched on the stove. The same is recorded to trace the stove later and avoid double counting. Further, for each stove included under each CPA, information on the location of the stove has been collected by collecting address of the user at the time of sale in CPA Distribution Record. Thus, location of each stove in CPA distribution database can be traced. Please refer the ER calculator, worksheet 'CPA Distribution data' in which the sales information i.e. Stove unit details and the end user information for each stove is mentioned. The system of recording the unique serial on each stove along with its location serves toward avoiding couple counting of stoves amongst various CPAs.

D.2. Geographical references or other means of identification of the location of the specific-case CPA(s)

>>

All the four CPAs have a common project boundary as follows:

Host Party(ies): Republic of Kenya

The geographical reference of the CPAs is determined by the location of the individual ICS households where the ICSs are distributed which is limited to the territorial area of the host country, Kenya. The capital of Kenya, Nairobi, is located at -1.283249, 36.816663. The distribution commenced in and around Nairobi and has expanded to further regions throughout Kenya.



Further, for each stove under each CPA, information on the location of the stove has been collected by collecting address of the user at the time of sale in CPA Distribution Record. Thus, location of each stove in each of the CPAs can be traced. Please refer the ER calculator, worksheet 'CPA Distribution data' in which the sales information i.e. Stove unit details and the end user information for each stove are mentioned. This also serves toward avoiding couple counting of stoves amongst various CPAs.

SECTION E. Post-registration changes to specific-case CPA(s)

E.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>>
NA

E.2. Corrections

>>
NA

E.3. Changes to the start date of the crediting period of the specific-case CPA(s)

>>
NA

E.4. Inclusion of a monitoring plan into the specific-case CPA(s) that was not included at registration

>>
NA

E.5. Permanent changes to the monitoring plan as described in the registered specific-case CPA-DD(s), applied methodology or standardized baseline

>>
NA

E.6. Changes to project design of the specific-case CPA(s)

>>
NA

E.7. Types of changes specific to afforestation and reforestation specific-case CPA(s)

>>
NA

SECTION F. Description of the monitoring system of specific-case CPA(s)

>>

Stoves were either distributed to end-users by Envirofit Kenya directly or via dealers sub-contracted by Envirofit. Any such third parties were trained by the Envirofit responsible for ensuring correct procedures according to the PoA are fulfilled.

At the CPA level, the dealers ensured that necessary data was correctly obtained from the customer and recorded in the CPA Distribution Record, firstly to avoid double counting and secondly to enable tracking of the ICS for monitoring purposes. This data captured included:

- a. Name of customer
- b. Address / location of the customer
- c. Stove unique serial ID number
- d. Stove Model
- e. Stove distribution date
- f. Type of old stove replaced by ICS r, i.e. the fuel type used in the baseline – wood or charcoal.

All other monitoring activities have been carried out at the PoA level, single stage sampling plan.

SECTION G. Data and parameters**G.1. Data and parameters fixed ex ante, at registration, inclusion or renewal of crediting period**

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

Data/parameter	Q_{biomass}
Unit	Tonnes/year
Description	Annual average biomass consumption per appliance
Source of data	Historical data from literature, as allowed by the methodology
Value(s) applied	3.56 for charcoal 4.176 for woodfuel
Choice of data or measurement methods and procedures	As per registered CPA-DD for CPA 5341-0002, 5341-0003 and 5341-0004
Purpose of data	Calculation of baseline emissions
Additional comments	Used for calculation of B_{old}

Data/parameter	$f_{\text{NRB},y}$
Unit	Fraction
Description	Fraction of woody biomass saved by the project activity in year y that can be established as non-renewable biomass.
Source of data	FAO and IPCC
Value(s) applied	0.92
Choice of data or measurement methods and procedures	As per registered CPA-DD for CPA 5341-0002, 5341-0003 and 5341-0004
Purpose of data	Calculation of baseline emissions
Additional comments	

Data/parameter	NCV_{biomass}
Unit	TJ/tonne
Description	Net calorific value of the non-renewable biomass that is substituted

Source of data	AMS-II.G version 03
Value(s) applied	0.015
Choice of data or measurement methods and procedures	As per registered CPA-DD for CPA 5341-0002, 5341-0003 and 5341-0004
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter	EF_{projected_fossilfuel}
Unit	tCO ₂ /TJ
Description	Emission factor for the substitution of non-renewable biomass by similar consumers
Source of data	AMS-II.G version 03
Value(s) applied	81.6
Choice of data or measurement methods and procedures	As per registered CPA-DD for CPA 5341-0002, 5341-0003 and 5341-0004
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter	η_{old}
Unit	Efficiency
Description	Efficiency of the system being replaced
Source of data	AMS-II.G version 03
Value(s) applied	0.129 for charcoal stoves 0.108 for firewood stoves
Choice of data or measurement methods and procedures	As per registered CPA-DD for CPA 5341-0002, 5341-0003 and 5341-0004
Purpose of data	Calculation of baseline emissions
Additional comments	

Data/parameter	LAF
Unit	Fraction
Description	Net to gross adjustment factor to account for leakages
Source of data	AMS-II.G version 03
Value(s) applied	0.95
Choice of data or measurement methods and procedures	As per registered CPA-DD for CPA 5341-0002, 5341-0003 and 5341-0004
Purpose of data	Calculation of baseline emissions
Additional comments	-

G.2. Data and parameters monitored

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

Data/parameter	η_{new}
Unit	Efficiency
Description	Efficiency of the system being deployed as part of the project activity

Measured/calculated/default	Measured
Source of data	As determined through sample testing of stoves by performing WBTs
Value(s) of monitored parameter	29.51% for Charcoal stoves in CPA 5341-0002 29.39% for Woodfuel stoves in CPA 5341-0003 29.78% for Charcoal stoves in CPA 5341-0004 29.39% for Woodfuel stoves in CPA 5341-0004
Monitoring equipment	<p>Mini-thermometer: Brand: Omega Model: Omegaette HH308 Type K Accuracy: +/- 0.3% reading +1°C Number of units: 1 S/N: 141203675</p> <p>Mass balance Brand: Brabantia Model: 480744 Accuracy: 1 gm Number of units: 1</p> <p>Moisture Meter Brand: Delmhorst Model: J2000 Accuracy: +/- 0.2% Number of units: 1 S/N: 38784</p> <p>These equipment were either newly purchased thereby not requiring calibration or were auto calibrated at the time of use so measurements were done with the necessary guarantees.</p>
Measuring/reading/recording frequency	WBTs were carried out for a sample of installed ICSs in operation in line with the PoA Sampling Plan on an annual basis.
Calculation method (if applicable)	EPTP Protocol version
QA/QC procedures	WBTs were conducted in line with the guidance provided by the CME
Purpose of data	Calculation of baseline emissions
Additional comments	Weighted average efficiency has been calculated as more than one stove model has been distributed

Data/parameter	N_{all}			
Unit	Number			
Description	Total number of stoves installed			
Measured/calculated/default	Calculated			
Source of data	CPA Distribution Records and logbooks			
Value(s) of monitored parameter	Parameter	5341-0002	5341-0003	5341-0004
	N _{all} - Charcoal	21,044	0	5,344
	N _{all} - Wood	0	17,754	12,813
Monitoring equipment	n/a			

Measuring/reading/recording frequency	The CPA Distribution Records which provided the data used to calculate this parameter. This data was uploaded to the PoA Distribution and Monitoring Database maintained by the CME. The recording of the sales was done in a regular basis during the crediting period and the monitoring in a yearly basis.
Calculation method (if applicable)	Sum of all stove records in the CPA Distribution Database.
QA/QC procedures	
Purpose of data	Calculation of baseline emissions
Additional comments	No samples were found using more than than one stove.

Data/parameter	SOF					
Unit	Fraction					
Description	Stove Operation Fraction – used to determine the share of distributed stoves that are still operating, measured ex-post through sampling					
Measured/calculated/default	Measured					
Source of data	Survey of end user behaviour as part of the PoA Sampling Plan					
Value(s) of monitored parameter	<table><tr><td>SOF_{charcoal}</td><td>0.961</td></tr><tr><td>SOF_{wood}</td><td>0.943</td></tr></table>	SOF _{charcoal}	0.961	SOF _{wood}	0.943	
SOF _{charcoal}	0.961					
SOF _{wood}	0.943					
Monitoring equipment	Parameter determined through monitoring survey using a questionnaire, no monitoring equipment has been used					
Measuring/reading/recording frequency	Measured ex-post by investigation of the number of operational ICS installations within the sampled ICS. This was done on an annual basis as per the PoA monitoring requirements					
Calculation method (if applicable)	99 out of 103 charcoal stoves were found to be in operation 116 out of 123 woodfuel stoves were found to be in operation					
QA/QC procedures	The CME provided training, guidelines and monitoring templates to ensure that the Monitoring Organization responsible for monitoring followed appropriate procedures.					
Purpose of data	Calculation of baseline emissions					
Additional comments	-					

Data/parameter	μ_{old}
Unit	kg/year
Description	The amount of woody biomass consumption that is consumed through the continued use of old stoves
Measured/calculated/default	Measured as per option A of CPA-DD for CPA 5341-0002 and CPA 5341-0004,
Source of data	Data from survey of end user behaviour as part of PoA Sampling Plan combined with the same source of data as for Q _{biomass}
Value(s) of monitored parameter	1113 kg/year for charcoal stoves 1288 kg/year for woodfuel stoves
Monitoring equipment	Parameter determined through monitoring survey using a questionnaire, no monitoring equipment has been used

Measuring/reading/recording frequency	<p>Measured ex-post by a representative sample of end users using the deployed ICS, as conducted in line with the PoA Sampling Plan. During the survey, the interviewer conducted an interview with the end user to identify how much the baseline (replaced) stove is being used. The value of μ_{old} has been determined by comparing the number of meals cooked on traditional cookstove before and after ICS distribution multiplied with the baseline fuel consumption ($Q_{biomass}$).</p> <p>This was done on an annual basis as per the PoA monitoring requirements</p>
Calculation method (if applicable)	Based on the registered CPA-DD for CPA 5341-0002 and CPA 5341-0004, this parameter has been calculated by multiplying the baseline Fuel Consumption, $Q_{biomass}$, by the ratio of meals cooked by the traditional stove in operation before and after purchasing the Envirofit Stove as reported by households with continued usage of baseline stoves.
QA/QC procedures	The CME provided training, guidelines and monitoring templates to ensure that the Monitoring Organization responsible for monitoring followed appropriate procedures
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter	f_{old}
Unit	Fraction
Description	The fraction of end users that are still using baseline (replaced) stoves
Measured/calculated/default	Measured
Source of data	Survey data of end user behaviour as part of the PoA Sampling Plan
Value(s) of monitored parameter	0.081 for charcoal stoves 0.086 for woodfuel stoves
Monitoring equipment	Parameter determined through monitoring survey using a questionnaire, no monitoring equipment has been used
Measuring/reading/recording frequency	<p>Measured ex-post by estimation of a representative sample of end users using the deployed ICS, as conducted in line with the PoA Sampling Plan. Sampling estimated the value of this parameter through monitoring the fraction of end users not using baseline stoves ($f_{non\ old}$).</p> <p>This was done on an annual basis as per the PoA monitoring requirements</p>
Calculation method (if applicable)	<p>Based on the registered CPA-DD for CPA 5341-0002, the fraction of users not using the baseline stoves ($f_{non\ old}$) has been monitored. Then f_{old} has been calculated as $f_{old} = 1 - f_{non\ old}$</p> <p>The higher confidence interval of $f_{non\ old}$ has been selected since precision level has not been achieved.</p>
QA/QC procedures	The CME provided training, guidelines and monitoring templates to ensure that the Monitoring Organization responsible for monitoring followed appropriate procedures.
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter	Stove _{year}			
Unit	Year			
Description	Calculated average stove year in the monitoring period.			
Measured/calculated/default	Calculated			
Source of data	PoA Distribution and Monitoring Database			
Value(s) of monitored parameter	Parameter	5341-0002	5341-0003	5341-0004
	STOVE _{year} - Charcoal	1.00		0.91
	STOVE _{year} - Wood		0.76	1.00
Monitoring equipment	Not applicable			
Measuring/reading/recording frequency	Each ICS entered into the PoA Distribution and Monitoring Database was linked to a distribution date (recorded during distribution). Thus for any monitoring period it is possible to calculate the fraction of year covered by stoves for that monitoring period. The recording of the sales date was done in a regular basis during the crediting period and the monitoring on an annual basis.			
Calculation method (if applicable)	Average of stove year of all stoves included in CPA Distribution database.			
QA/QC procedures	The CME was responsible for overseeing the collection of data by DOs during distribution, training the DOs in correct data recording practices, maintaining a secure Database, and back up of files contained in the Database.			
Purpose of data	Calculation of baseline emissions			
Additional comments	-			

G.3. Implementation of specific-case CPA level sampling plan

>>

A single sampling plan covering all specific-case CPAs covered in this monitoring report has been undertaken to estimate parameter values, therefore, this section is not applicable. Refer Section B.2 and the ER calculation spreadsheet.

SECTION H. Calculation of GHG emission reductions or net GHG removals by sinks

H.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

$$ER_y = B_{y,savings} \cdot f_{NRB} \cdot NCV_{biomass} \cdot EF_{projected\ fossil_fuel}$$

Where:

Data Ex Ante	Value	Unit	Source		
Q _{biomass} (charcoal)	3.56	tonne/year	Ex-ante, CPA-DD		
Q _{biomass} (firewood)	4.176	tonne/year	Ex-ante, CPA-DD		
f _{NRB}	0.92	fraction	Ex-ante, CPA-DD		
NCV _{biomass}	0.015	TJ/tonne	Ex-ante, CPA-DD		
EF _{fossil_fuel}	81.6	tCO ₂ /TJ	Ex-ante, CPA-DD		
Efficiency _{old} (charcoal)	0.129	fraction	Ex-ante, CPA-DD		
Efficiency _{old} (firewood)	0.108	fraction	Ex-ante, CPA-DD		
LAF	0.95	fraction	Ex-ante, CPA-DD		
Data Ex Post	Value	Unit	Source		
Monitored					
Efficiency _{newCH2200}	29.23%	%	WBTSummary		
Efficiency _{newCH4400}	29.11%	%	WBTSummary		
Efficiency _{newCH5200}	30.40%	%	WBTSummary		
Efficiency _{newCH5300}	31.79%	%	WBTSummary		
Efficiency _{newECCL}	29.07%	%	WBTSummary		
Efficiency _{newM5000}	29.39%	%	WBTSummary		
SOF _{charcoal}	0.961	fraction	SurveySummary		
SOF _{wood}	0.943	fraction	SurveySummary		
f _{old} charcoal	0.081	fraction	SurveySummary		
f _{old} wood	0.086	fraction	SurveySummary		
U _{old} charcoal	1113	kg/year	SurveySummary		
U _{old} wood	1288	kg/year	SurveySummary		
Data Ex Post	5341-0002	5341-0003	5341-0004	Unit	Source
N _{CH2200}	4060	0	22	number	Monitored CPA Database
N _{CH4400}	10889	0	1260	number	Monitored CPA Database
N _{CH5200}	6095	0	1282	number	Monitored CPA Database
N _{CH5300}	0	0	777	number	Monitored CPA Database
N _{ECCL}	0	0	2003	number	Monitored CPA Database
N _{M5000}	0	17754	12813	number	Monitored CPA Database
N _{all} charcoal	21044	0	5344	stoves	Calculated
N _{all} fuelwood	0	17754	12813	stoves	Calculated
STOVE _{year} charcoal	1.00		0.91	fraction	Calculated
STOVE _{year} fuelwood		0.76	1.00	fraction	Calculated
Efficiency _{new} charcoal	29.51%		29.79%	%	Calculated
Efficiency _{new} fuelwood		29.39%	29.39%	%	Calculated
B _{old} charcoal	66862.13	0.00	15442.16	t biomass	Calculated
B _{old} fuelwood	0.00	48885.18	46792.48	t biomass	Calculated
B _{savings} charcoal	37,629.8		8,756.0	t biomass	Calculated
B _{savings} fuelwood		30,924.1	29,600.3	t biomass	Calculated
B _{savings} TOTAL	37,629.8	30,924.1	38,356.3	t biomass	Calculated
Total Annual Energy Savings	156.79	128.85	159.81	GWh	Calculated
Scale?	Small	Small	Small	-scale	
Capacity Utilization	87%	72%	89%	%	Calculated
ER _u	2,374	34,822	33,192	tCO ₂ e	Calculated

H.2. Calculation of project emissions or actual net GHG removals by sinks

>>

As explained above, the methodology directly provides equation for emission reductions; without separate baseline, project or leakage emission reduction equations. Calculation of Emission Reductions has already been explained above as per the methodology. Thus, this section is not applicable.

H.3. Calculation of leakage

>>

As explained above, the methodology directly provides equation for emission reductions; without separate baseline, project or leakage emission reduction equations. Calculation of Emission Reductions has already been explained above as per the methodology. A net to gross adjustment factor of 0.95 to account for leakage has already been applied to B_{old} in accordance with paragraph 13(a) of methodology. Thus, this section is not applicable.

H.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

Specific-case CPA reference number	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	GHG emission reductions or net GHG removals by sinks (tCO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
5341-001	0	0	0	0	0	0
5341-002	42,374	0	0	0	42,374	42,374
5341-003	34,822	0	0	0	34,822	34,822
5341-004	43,192	0	0	0	43,192	43,192
Total	120,388	0	0	0	120,388	120,388

H.5. Comparison of GHG emission reductions or net GHG removals by sinks with estimates in the included CPA-DD(s)

Specific-case CPA reference number	Value estimated in ex ante calculation in the included CPA-DD(s)	Actual values achieved by the specific-case CPA(s) during this monitoring period
5341-0001	13,556	0
5341-0002	43,063	42,374
5341-0003	42,811	34,822
5341-0004	43,384	43,192
Total	142,814	120,388

H.6. Remarks on difference from the estimated value in the included CPA-DD(s)

>>

There is no increase in the GHG emission reductions or net GHG removals by sinks achieved during this monitoring period for the PoA.

Appendix 1. Contact information of coordinating/managing entity and/or responsible persons/entities

Coordinating/managing entity and/or responsible person/entity	<input checked="" type="checkbox"/> Coordinating/managing entity <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Envirofit International Ltd.
Street/P.O. Box	109 N Colleege Ave Suite 200
Building	-
City	Fort Collins
State/Region	Colorado
Postcode	CO 80524
Country	United States of America
Telephone	-
Fax	+1 970 221-1550
E-mail	-
Website	www.envirofit.org
Contact person	Nathan Lorenz
Title	Vice-president - Engineering
Salutation	-
Last name	Lorenz
Middle name	-
First name	Nathan
Department	-
Mobile	-
Direct fax	+1 970 221-2874
Direct tel.	+1 970 372-2874
Personal e-mail	nathan.lorenz@envirofit.org

Coordinating/managing entity and/or responsible person/entity	<input type="checkbox"/> Coordinating/managing entity <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Envirofit International Ltd.
Street/P.O. Box	109 N Colleege Ave Suite 200
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City	Fort Collins
State/Region	Colorado
Postcode	CO 80524
Country	United States of America
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Fax	+1 970 221-1550
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Website	
Contact person	Rohit Lohia
Title	Carbon Project Development Manager
Salutation	Mr

Last name	Lohia
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