



**COMPONENT PROJECT DESIGN DOCUMENT FORM FOR  
SMALL-SCALE COMPONENT PROJECT ACTIVITIES (F-CDM-SSC-CPA-DD)  
Version 02.0**

**COMPONENT PROJECT ACTIVITIES DESIGN DOCUMENT (CPA-DD)**

**SECTION A. General description of CPA**

**A.1. Title of the proposed or registered PoA**

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Empowering DRC communities through the use of Improved Cook Stoves

**A.2. Title of the CPA**

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Empowering DRC communities through the use of Improved Cook Stoves – CPA 001  
Version 01, 07/02/2014

**A.3. Description of the CPA**

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The purpose of this small-scale CDM Component project activity (CPA) is the dissemination of improved biomass (fuelwood and charcoal) cook stoves (ICS) to urban, peri-urban, and rural users (households, communities and SMEs) in the Democratic Republic of Congo (DRC), replacing the inefficient traditional stoves and cooking devices, thus reducing the fuel (wood and charcoal) consumption. The CPA is submitted for validation together with the PoA “Empowering DRC communities through the use of Improved Cook Stoves”. The CME of the proposed PoA is Climate Corporation Emissions Trading GmbH (further on referred to as “Climate Corporation”).

Several greenhouse gases (GHG), including carbon dioxide, are produced as a result of the combustion of non-renewable biomass as used in cooking stoves. ICS improve heat transfer efficiency as compared to the baseline conventional stoves, thereby reducing both the amount of wood fuel used by unit appliance implemented. Since the forestry practices in DRC are not sustainable, the CPA will reduce use of non-renewable biomass and thus as well the greenhouse gases accountable to it.

The CPA will improve the quality of life of communities via making the ICS available to the users:

- *Livelihood of the poor:* the circumstances of poor families will be improved since the stoves reduce fuel cost. Reduction in wood consumption implies relief from drudgery and more opportunity for productive activity, arising from less time spent collecting fuel.
- *Access to energy services:* The improved stoves require less fuel, which in many areas, is a scarce resource or very expensive to buy. Users have also found improved stoves more convenient, shortening the cooking time.
- *Health:* Reduction of indoor air pollution (carbon monoxide and particulate matter), reducing exposition for children and mothers, reducing children pneumonia, respiratory diseases, and cancer. In addition, risks associated with open fire cooking are reduced.
- *Air quality:* Air pollution from charcoal production for project users will be reduced, as well as indoor air pollution from indoor cooking with solid fuels.

#### A.4. Entity/individual responsible for CPA

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The CPA is implemented by company Tai Com Congo SPRL, which is an SME based in Kinshasa, Democratic Republic of Congo.

#### A.5. Technical description of the CPA

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A typical CPA will replace traditional biomass stoves (three-stone-fire, non-efficient wood and charcoal stoves) with an improved cookstove with higher efficiency, at minimum 20%.

The CPA may implement various cookstoves from various producers during the CPA lifetime, unless the efficiency is at minimum 20%.

However, the first and the most spread ICS a rocket stove, with metal case and ceramic (clay) liner which serves as insulation and heat conservation.

A rocket stove achieves efficient combustion of the fuel at a high temperature by ensuring a good air draft into the fire,

controlled use of fuel, complete combustion of volatiles, and efficient use of the resultant heat.

A rocket stove's main components are:

- Fuel magazine: Into which the unburned fuel is placed and from which it feeds into the combustion chamber
- Combustion chamber: At the end of the fuel magazine, where the fuel burns
- Chimney: A vertical chimney above the combustion chamber to provide the updraft needed to maintain combustion

The fuel magazine can be horizontal, with additional fuel added manually, or vertical, with fuel automatically fed.

As the fuel burns in the combustion chamber, convection draws new air into the combustion chamber from below, ensuring that any smoke from smoldering wood near the fire is also drawn into the fire and up the chimney. The chimney can be insulated to increase the temperature and improve combustion; according to studies this can increase efficiency by up to two percent.

For cooking purposes, the design keeps the cooking vessel in contact with the fire over the largest possible surface area. A pot skirt can be used to create a narrow channel that forces hot air and gas to flow along the bottom and sides of the cooking vessel. Optional baffles guide hot air and flame up the sides of the pot.

The design of the rocket stove allows it to operate on about half as much fuel as a traditional open fire, and it can use smaller-diameter wood.

If the stove is insulated and raised from the floor, the danger of children burning themselves is reduced.

Charcoal rocket stove “ECO-JIKO”

The stove is currently produced in Kenya and will be imported to DRC. Local production is foreseen for the future, too.

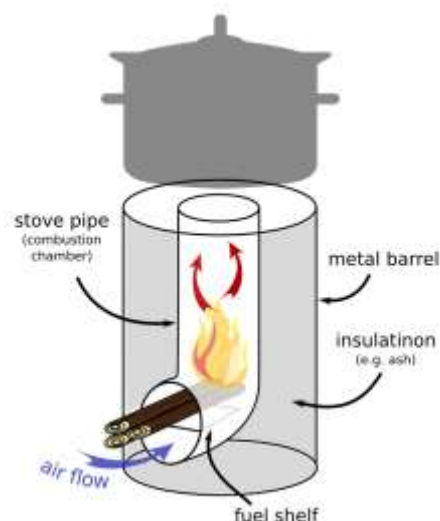
The parameters of charcoal ECO-JIKO are:

Weight 8 kg

Size (external dimensions):

Diameter 250 mm

Figure 1 - Principle of a rocket cookstove



- Height 300 mm
- Material & internal dimensions:
  - Trimmed edge square liner: 50 mm with polished wall.
  - Clay ash filter: diameter: 225 mm  
thickness: 25 mm with perforation
  - Clay paste Wall lining: 40 mm
  - Thermal efficiency: 22-24.2%

**Figure 2 - Picture of charcoal ECO-JIKO cookstove**



The minimum thermal efficiency of the stove is 22%. The manufacturer’s information on efficiency of the charcoal ECO-JIKO is substantiated by results of the testing performed at Kenyatta University Nairobi, Kenya. The cookstoves has been tested according to the Water Boiling Test protocol, with average hardwood charcoal as fuel, and no wind conditions, with following results:

High power test (hot start)	Unit	Test 1	Test 2	Test 3	Average	Std deviation
Time to boil pot 1	min	18	17	26	20.4	5.1
Temp corrected time to boil pot 1	min	18	17	26	20.3	5.2
Boiling rate	g/min	21	18	11	16.6	5.0
Thermal efficiency	%	23.4%	24.2%	22.0%	23.2%	3%
Specific fuel consumption	g/liter	165	133	127	141.4	20.6
Temp corrected specific consumption	g/liter	162	133	127	140.3	18.8
Fire power	Watts	6381	5543	3380	5102	1548.7

Wood rocket stove “KONSAVA”

The stove is currently produced in Kenya and will be imported to DRC. Local production is foreseen for the future, too.

The parameters of wood stove KONSAVA are:

The stove is composed of an outer iron steel part, and an inside ceramic liner which is made of high quality clay material with about 43% of silica and about 23% of alumina. Firewood is introduced from the bottom of the stove in a combustion chamber; the ceramic liner is designed to have a

rocket (straight) type of the outlet

Size (external dimensions):

Diameter 250 mm  
Height 300 mm

Material & internal dimensions:

Trimmed edge square liner: 50 mm with polished wall.

Clay ash filter: diameter: 225 mm  
thickness: 25 mm with perforation

Clay paste Wall lining: 40 mm

Thermal efficiency: min. 24.3%

(testing following the Water Boiling Test Protocol performed at Kenyatta University Nairobi, Kenya)



**A.6. Party(ies)**

Name of Party involved (host) indicates a host Party	Private and/or public entity(ies) CPA implementer(s) (as applicable)	Indicate if the Party involved wishes to be considered as CPA implementer (Yes/No)
Democratic Republic of Congo (host)	Tai Com Congo SPRL	No
Austria	Climate Corporation Emissions Trading GmbH	No

**A.7. Geographic reference or other means of identification**

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The physical boundary of the CPA is determined by the physical locations of installed ICSs. Proposed CPA is implemented within geographic boundary of Democratic Republic of Congo, in the region of South Kivu.



Figure 1: Map of DRC showing administrative boundaries (Districts)

## A.8. Duration of the CPA

### A.8.1. Start date of the CPA

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Start date of the CPA is on 01/07/2014, or the date of purchase of the first batch of imported ICS, whichever occurs later.

Start date of the CPA is after the start date of the PoA (which is the date of publication of the PoA-DD for global stakeholder consultation).

The CME hereby confirms that no ICS have been sold under this CPA before the start date of the PoA.

### A.8.2. Expected operational lifetime of the CPA

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21 years.

## A.9. Choice of the crediting period and related information

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7 years, twice renewable.

### A.9.1. Start date of the crediting period

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01/07/2014 or date of registration of the PoA, whichever is later.

**A.9.2. Length of the crediting period**

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7 years, twice renewable.

**A.10. Estimated amount of GHG emission reductions**

Emission reductions during the crediting period	
Years	Annual GHG emission reductions (in tonnes of CO <sub>2</sub> e) for each year
2014	2,125.29
2015	9,428.21
2016	16,731.12
2017	24,034.04
2018	31,336.96
2019	38,639.87
2020	45,939.80
<b>Total number of crediting years</b>	<b>7</b>
<b>Annual average GHG emission reductions over the crediting period</b>	<b>24,033.61</b>
<b>Total estimated reductions (tonnes of CO<sub>2</sub>e)</b>	<b>168,235.30</b>

**A.11. Public funding of the CPA**

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Tai Com as the CPA implementer confirms hereby that no public funding from Annex 1 countries is involved in financing of the CPA.

Thus there is no risk of ODA diversion.

**A.12. Debundling of small-scale component project activities**

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In accordance with eligibility criterion (I) “De-bundling” of the PoA, proposed CPA demonstrated that it each of the independent subsystems/measures included in the CPA of a PoA is no larger than 1% of the small-scale thresholds defined by the methodology applied, as follows:

The 1% of SSC threshold represents:	1.8	GWh <sub>th</sub>	
Actual outputs/capacities of the ICS are:			
Output <sub>new, wood ICS</sub> =	0.02	GWh <sub>th</sub>	< 1.8 GWh <sub>th</sub>
Output <sub>new, charcoal ICS</sub> =	0.01	GWh <sub>th</sub>	< 1.8 GWh <sub>th</sub>

Each ICS will replace an existing biomass cookstove used by households or by communities or SMEs with cookstoves similar to households. Energy use of the existing cookstove is therefore calculated based on the average national values for fuel wood and charcoal consumption by households.

The calculation<sup>1</sup> shows that domestic and similar stoves do not exceed 1% of the SSC threshold, and that therefore the CPA is exempted from the de-bundling check.

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<sup>1</sup> Details of the calculation are in the attached excel sheet.

**A.13. Confirmation for CPA**

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Tai Com as the CPA implementer confirms hereby that the CPA is not and will not be registered as a separate CDM project activity or as a part of another registered PoA.

**SECTION B. Environmental analysis****B.1. Analysis of the environmental impacts**

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The Environmental Impact Analysis is established at the PoA level, as described in section E of the PoA-DD.

No significant negative impacts are expected as a result of the CPA. The proposed CPA will have a positive contribution to the environment through the reduction of consumption of NRB which will lead to lower air pollution and deforestation.

**SECTION C. Local stakeholder comments****C.1. Solicitation of comments from local stakeholders**

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Stakeholder consultation is done at PoA level, as described in section F of the PoA-DD.

**C.2. Summary of comments received**

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This information is provided at the PoA level.

**C.3. Report on consideration of comments received**

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This information is provided at the PoA level.

**SECTION D. Eligibility of CPA and Estimation of emissions reductions****D.1. Title and reference of the approved baseline and monitoring methodology(ies) selected:**

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As prescribed in the PoA-DD, proposed CPA applies the methodology: AMS-II.G “Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass”, Version 05.0.

Reference: <http://cdm.unfccc.int/methodologies/DB/REQC2MYZJJ6I7BC9SKCS32T2K87AOW>

**D.2. Application of methodology(ies)**

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A single methodology is applied across the PoA. Therefore the methodology measures established in the PoA-DD, Part I, section B.3 constitutes the justification for the choice and applicability of the selected methodology.

This CPA meets the applicability criteria of AMS-II.G as follows:

<b>Methodology Requirement</b>	<b>CPA Compliance</b>
<i>“This category comprises appliances involving the efficiency improvements in the thermal applications of non-renewable biomass.”</i>	Proposed CPA implements ICS with efficiency of 20% or higher; mostly the “ECO-JIKO” charcoal cookstove, with efficiency of 22%. New ICS will displace existing cooking systems using non-renewable biomass. This will be ensured by recording the fuel used prior to ICS installation and baseline stove type of all ICS purchasers.



	Any ICSs replacing stoves using fossil fuels (such as kerosene and LPG) will not be recorded in the CPA database.
<i>“The project participants are able to show that non-renewable biomass has been used since 31 Dec 1989, using survey methods or referring to published literature, official reports or statistics.”</i>	Demonstrated at PoA-level, as follows: according to FAO <sup>2</sup> , area of forest and other wooded land in DRC decreased in between years 1990-2005 by 1.07% which is a loss of 357,000 ha.
<i>“The aggregate energy savings of a single project activity shall not exceed the equivalent of 60 GWh per year or 180 GWh thermal per year in fuel input.”</i>	<p>Average energy saving per ICS implemented in the proposed CPA: 0.012 GWh<sub>th</sub>/year for charcoal ICS and 0.013 GWh<sub>th</sub> for wood ICS</p> <p>Maximum number of ICS to be implemented:</p> <ul style="list-style-type: none"> <li>• 13,515 wood ICS,</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• 15,150 charcoal ICS,</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• 700 wood ICS + 14,364 charcoal ICS (as per the tentative implementation plan of the proposed CPA)</li> </ul> <p>This is below the limit for energy saving of 180 GWh<sub>th</sub>/year per CPA<sup>3</sup>.</p> <p>If the number of ICSs in the CPA exceeds the energy limit, the number of ERs shall be capped at those generated by ICSs saving in aggregate a maximum of 180GWh per year. Any additional emission savings will either not be counted in the program or included in another CPA as appropriate.</p>

### D.3. Sources and GHGs

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A description of the sources and gases included in the project boundary is presented below:

	Sources	Gas	Included?	Justification/Explanation
<b>Baseline</b>	Combustion of non-renewable biomass for cooking	CO <sub>2</sub>	Yes	Main source of emissions
		CH <sub>4</sub>	No	Excluded for simplification; in accordance with the methodology.
		N <sub>2</sub> O	No	
<b>Project</b>	Combustion of non-renewable biomass for cooking	CO <sub>2</sub>	Yes	Main source of emissions
		CH <sub>4</sub>	No	Excluded for simplification; in accordance with the methodology.
		N <sub>2</sub> O	No	

### D.4. Description of the baseline scenario

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The proposed CPA consists of the installation of ICS, which by definition are small appliances providing energy efficiency improvements in the thermal applications of non-renewable biomass, in accordance

<sup>3</sup> Details of the calculation are in the attached excel sheet.





with AMS-II.G. In accordance with the methodology, *it is assumed that in the absence of the project activity, the baseline scenario would be the use of fossil fuels for meeting similar thermal energy needs.*

#### D.5. Demonstration of eligibility for a CPA

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The proposed CPA is eligible to be included in the PoA because it meets all the criteria listed in the eligibility criteria for inclusion of a CPA in the PoA in of the PoA-DD:

Ref. to PoA Standard (par. 16)	Eligibility Criteria		Mean of proof / Evidence Document
	Category	Description	
(a)	Geographical Boundary	All stoves listed in the CPAs will be located in DRC.	CPA is being implemented in the region of South Kivu, in Democratic Republic of Congo.
(b)	Double-counting	All CPAs will be checked to prevent double counting and are not registered as a separate CDM project activity, or as part of another registered CDM PoA.	CPA will not be part of another single CDM project activity or CPA under another PoA CPA will implement system of unique identification codes to prevent double-counting of individual cookstoves, as detailed in the monitoring plan. <b><u>Documents/evidence to be checked</u></b> <ul style="list-style-type: none"> <li>UNFCCC website,</li> <li>UNEP Risoe</li> <li>Monitoring plan</li> </ul>
(c)	Technology	Each CPA will implement improved biomass cookstoves with minimum efficiency of 20%.	<b><u>Documents/evidence to be checked</u></b> <ul style="list-style-type: none"> <li>ECO-JIKO specification</li> <li>KONSAVA specification</li> </ul>
(d)	Start date	Start date of the PoA is date of publication of the PoA-DD for global stakeholder consultation; expected date is 07/02/2014. All CPAs will state very clearly their start date, and evidence that their start date is not prior to the start date of the PoA.	Start date of the CPA is on 01/07/2014 or the date of the purchase of the first batch of imported ICS, whichever occurs later. Start date of the CPA is after the start date of the PoA (which is the date of publication of the PoA-DD for global stakeholder consultation). <b><u>Documents/evidence to be checked</u></b> <ul style="list-style-type: none"> <li>The CME hereby confirms that no ICS have been sold under this CPA before the start date of the PoA.</li> </ul>
(e)	Methodology	Each CPA will comply with the methodology used for this PoA, i.e. AMS-II.G (Energy efficiency measures in thermal applications of non renewable biomass), Version 05.0. <u>Applicability criteria of the methodology are:</u> 1. Small scale: Aggregate energy savings by a single project activity: shall not	Proposed CPA will comply with the methodology used in the PoA, as described in . <b><u>Documents/evidence to be checked</u></b> <ul style="list-style-type: none"> <li>The tentative numbers of ICS to be implemented: 700 wood ICS and 14,364 charcoal ICS.</li> </ul>



		<p>exceed the equivalent of 60 GWh per year or 180 GW<sub>th</sub> per year in fuel output</p> <p>2. Technology: deploy appliances involving the efficiency improvements in the thermal applications of non-renewable biomass</p> <p>3. Non-renewable biomass: Demonstrate that non-renewable biomass has been used since 31 December 1989, using survey methods or referring to published literature, official reports, or statistics. (Demonstrated at the PoA-level)</p>	<p>These will achieve total energy savings 179.99 GW<sub>th</sub>.<sup>4</sup></p> <p>Actual numbers can be checked through the electronic CPA database during verification</p>
(f)	Additionality	<p>Additionality for all CPAs is demonstrated according to “<i>Standard for Demonstration of Additionality, Development of Eligibility Criteria and application of multiple methodologies for Programme of Activities</i>”, and “<i>Guidelines for the demonstration of additionality of small scale project activities</i>”.</p> <p>CPAs having the following characteristics are thus automatically additional:</p> <ul style="list-style-type: none"> <li>• The improved cook stoves disseminated under each CPA would be isolated units</li> <li>• The users of the stoves would be households, or communities or SMEs</li> <li>• The size of the each unit will be no larger than 5% of the small-scale CDM thresholds.</li> </ul>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>• Technology specification to confirm that each ICS is not larger than 5% of the small scale CDM thresholds</li> <li>• Contract of CPA implementer with CME</li> </ul>
(g1)	Stakeholder meeting	<p>Stakeholder consultation is done at PoA level, as described in section F of the PoA-DD. No further action needed at CPA level to satisfy this eligibility criterion.</p>	<p>N/A</p> <p>Stakeholder consultation is carried out on PoA level.</p>
(g2)	Environmental Impact Analysis	<p>The EIA is established at the PoA level as described in section E of the PoA-DD. No further action needed at the CPA level to satisfy this eligibility criterion.</p>	<p>N/A</p> <p>Environmental Impact Analysis is carried out on PoA level.</p>
(g3)	Monitoring	<p>As per the methodology, “monitoring shall</p> <ul style="list-style-type: none"> <li>• consist of checking of all devices or a representative sample thereof, at least once every two years (biennial) to determine if they are still operating; those devices that have been replaced by an equivalent in-service device can be counted as operating.</li> <li>• consist of checking the efficiency</li> </ul>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>• Electronic CPA database and paper records of sales at the time of verification</li> </ul>

<sup>4</sup> Details of the calculation are in the attached excel sheet.



		<p>of all devices or a representative sample thereof annually</p> <ul style="list-style-type: none"> <li>include data on the amount of woody biomass saved under the project activity that is used by non-project households/users (who previously used renewable energy sources)</li> <li>ensure that either: <ul style="list-style-type: none"> <li>a) The replaced low efficiency devices are disposed of and not used within the boundary or within the region; or</li> <li>b) If baseline stoves continue to be used, monitoring shall ensure that the fuel-wood consumption of those stoves is excluded from <math>B_{old}</math>.</li> </ul> </li> </ul> <p>Each CPA has procedures in place to track the distribution of stoves.</p>	
(g4)	Approval of CPA by CME	<p>Each CPA has a project implementer that is either the Coordinating Entity or another entity that has signed a contractual agreement with the CME. Those agreements include all rights and responsibilities of both parties, e.g. approval procedures by the CME, monitoring requirements, carbon credit rights transfer. This eligibility criterion is not necessary if the CPA implementer is the CME.</p>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>Contractual agreement between Tai Com as the CPA implementer and Climate Corporation as the Coordinating/Managing Entity</li> </ul>
(g5)	Inclusion of CPA	<p>Each CPA inclusion by CME shall be reviewed/approved by a DOE (except of the first CPA submitted with PoA for validation)</p>	<p>N/A Proposed CPA is the first CPA submitted with PoA for validation.</p>
(g6)	CER rights transfer	<p>The users purchasing the ICS shall sign an agreement with the CME to transfer the carbon credit rights of these cookstoves.</p>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>CER right transfer agreement clause in the ICS sale documents, available at verification</li> </ul>
(h1)	Funding from Annex I countries	<p>Each CPA will state clearly in the CPA-DD the source of public funding, if any.</p>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>Statement of the CPA implementer.</li> </ul>
(h2)	No diversion of ODA	<p>If public funding is used for any CPA, the relevant Annex I party will confirm that the funding is not a diversion of ODA for that CPA.</p>	<p>N/A No public funding is used.</p>
(i)	Target Group and distribution mechanism	<p>The CME serves households, communities or SMEs either in urban, peri-urban or rural areas, and distributes the stoves through adequate distribution channels.</p>	<p>The target group are rural, peri-urban, and urban households, communities and SMEs. Distribution mechanism is via retailers/sales points.</p>

(j)	Sampling	<p>Provide a sampling method (e.g. in the monitoring plan and baseline studies) that follows the “Standard For Sampling And Surveys for CDM Projects and Programmes of Activities</p> <p>The sampling plan contains information relating to: (a) sampling design; (b) data to be collected; and (c) implementation plan.</p> <p>The CPA complies with the following confidence interval and error requirement:</p> <ul style="list-style-type: none"> <li>When biennial inspection is chosen a 95% confidence interval and a 10% margin of error requirement for the sampling parameter. When annual inspection is used, a 90% confidence interval and a 10% margin of error requirement is achieved for the sampled parameters. In cases where survey results indicate that 90/10 precision or 95/10 precision (above) is not achieved, the lower bound of a 90% or 95% confidence interval of the parameter value is chosen as an alternative to repeating the survey efforts to achieve the 90/10 or 95/10 precision.</li> </ul> <p>If required, leakages are estimated and accounted for on a sample basis using a 90/30 precision for the selection of samples.</p>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>The sampling plan is described in the monitoring plan below</li> </ul>
(k)	SSC Limit for CPA	<p>The CPA shows annual energy savings data that demonstrate that the CPA does not exceed the small-scale threshold of maximum output 180 GWh<sub>th</sub>/year, for each year of the CPA crediting period.</p>	<p>CPA estimates maximum number of ICS to be implemented in the CPA-DD:</p> <p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>Actual numbers will be in the ER calculation sheet at the time of verification</li> </ul>
(l)	De-bundling	<p>As per “Guidelines on assessment of debundling for SSC project activities<sup>5</sup>” Part II, paragraph 10: “<i>If each of the independent subsystems/measures (e.g., biogas digester, solar home system) included in the CPA of a PoA 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</i>”.</p>	<p><b><u>Documents/evidence to be checked</u></b></p> <ul style="list-style-type: none"> <li>Actual output of the wood ICS: 0.02 GWh<sub>th</sub></li> <li>Actual output of the charcoal ICS: 0.01 GWh<sub>th</sub></li> </ul> <p>Both types of devices are below 1% of the SSC threshold</p>

<sup>5</sup> [http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC\\_guid17.pdf](http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17.pdf)

## D.6. Estimation of emission reductions

### D.6.1. Explanation of methodological choices

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$$ER_y = B_{y,savings} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossilfuel} \times N_{y,i} \quad \text{Equation (1)}$$

Where:

$ER_y$	Emissions reductions during the year $y$ (tCO <sub>2</sub> e)
$B_{y,savings}$	Quantity of woody biomass that is saved in tonnes per device
$N_{y,i}$	Number of project devices of the type $i$ operating in year $y$ , determined as per paragraph 22 of the methodology
$f_{NRB,y}$	Fraction of woody biomass used in the absence of the project activity in year $y$ that can be established as non renewable biomass using nationally approved methods or government data or approved default country specific fraction of non-renewable woody biomass ( $f_{NRB}$ ) values available on the CDM website <sup>6</sup>
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for wood fuel: 0.015 TJ/tonne, wet basis)
$EF_{projected\_fossilfuel}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. (81.6 t CO <sub>2</sub> /TJ <sup>7</sup> )

#### Determining $B_{y,savings}$ :

The methodology provides three options for determining  $B_{y,savings}$  – the quantity of woody biomass saved by the project activity:

- Option 1: kitchen performance test (KPT)

$$B_{y,savings} = B_{old} - B_{y,new,KPT} \quad \text{Equation (2)}$$

- Option 2: water boiling test (WBT)

$$B_{y,savings} = B_{old} \times \left(1 - \frac{\eta_{old}}{\eta_{new,y}}\right) \quad \text{Equation (3)}$$

OR

$$B_{y,savings} = B_{y,new,survey} \times \left(\frac{\eta_{new,y}}{\eta_{old}} - 1\right) \quad \text{Equation (4)}$$

- Option 3: controlled cooking test (CCT)

$$B_{y,savings} = B_{old} \times \left(1 - \frac{SC_{new,y}}{SC_{old}}\right) \quad \text{Equation (5)}$$

Due to the data availability, proposed CPAs will use Option 2, Equation (3) as follows:

$B_{y,savings}$  Option 2

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<sup>6</sup> Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/DNA/fNRB/index.html>.

<sup>7</sup> This value represents the emission factor of the substitution fuels likely to be used by similar users, on a weighted average basis. It is assumed that the mix of present and future fuels used would consist of a solid fossil fuel (lowest in the ladder of fuel choices), a liquid fossil fuel (represents a progression over solid fuel in the ladder of fuel use choices), and a gaseous fuel (represents a progression over liquid fuel in the ladder of fuel use choices). Thus a 50% weight is assigned to coal as the alternative solid fossil fuel (96 t CO<sub>2</sub>/TJ) and a 25% weight is assigned to both liquid and gaseous fuels (71.5 t CO<sub>2</sub>/TJ for kerosene and 63.0 t CO<sub>2</sub>/TJ for liquefied petroleum gas (LPG)).

$$B_{y,savings} = B_{old} \times \left(1 - \frac{\eta_{old}}{\eta_{new,y}}\right) \quad \text{Equation (3)}$$

Where:

$B_{old}$  Quantity of woody biomass used in the absence of the project activity in tonnes per device

$\eta_{old}$  1. Efficiency of the system being replaced, measured using representative sampling methods or based on referenced literature values (fraction), use weighted average values if more than one type of system is being replaced;  
2. A default value of 0.10 may be optionally used if the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney; for other types of systems a default value of 0.2 may be optionally used

$\eta_{new,y}$  Efficiency of the system being deployed as part of the project activity (fraction), as determined annually<sup>8</sup> using the Water Boiling Test (WBT) protocol carried out in accordance with national standards (if available) or international standards or guidelines<sup>9</sup>. Use weighted average values if more than one type of system is being introduced by the project activity.

#### Determining $B_{old}$ :

The methodology provides two options for determining  $B_{old}$ – the quantity of woody biomass used in the absence of the project activity (in tonnes per device).

Due to the data availability, proposed CPAs will use option (a), as follows:

- a) Calculated as the product of the number of devices multiplied by the estimated average annual consumption of woody biomass per device (tonnes/year). This may be derived from historical data or a survey of local usage;

OR

- b) Calculated from the thermal energy generated in the project activity as:

$$B_{old} = \frac{HG_{p,y}}{NCV_{biomass} \times \eta_{old}} \quad \text{Equation (6)}$$

#### Since the CPA involves both the wood and charcoal cookstoves:

The quantity of woody biomass will be determined according to option (b), as follows:

- b) Alternatively, credible local conversion factors determined from a field study or literature may be applied.

Then:

$$B_{y,savings(charcoal)} = B_{y,savings} \times CF \quad \text{Equation (7)}$$

Where:

$CF$  Conversion factor wood to charcoal

#### Determination of $N_{y,i}$ :

Not all the ICS will be in use from the 1<sup>st</sup> day of any year. Dissemination will be ongoing and ICS will be added every day.  $N_{y,i}$  will be also adjusted for cookstoves that are operational for less than a year, in pro rata basis. Number of ICS operational for one year (N) included in the monitoring period will be calculated with the following formula:

$$N_{y,i} = \sum_{d=1}^n Nd \times \frac{D_{y,i}}{365} \quad \text{Equation (8)}$$

<sup>8</sup> Biennial monitoring (i.e. monitoring once every two years) may be chosen, if the project proponents are able to demonstrate that the efficiency of the cook stove does not drop significantly as compared to the initial efficiency of the new device, over a time period of two years of typical usage.

<sup>9</sup> In all cases the testing protocol shall be the same for both the device being replaced and the device being deployed.

Where:

- $N_d$  Number of devices operating for „D“ days during the monitoring period  
 $D$  Number of days of operation of the device in year  $y$   
 $D = 1, 2, 3, \dots$

Accounting for the leakage:

- The CPA will apply approach when  $B_{old}$  is multiplied by a net to gross adjustment factor of 0.95 to account for leakages

**D.6.2. Data and parameters that are to be reported ex-ante**

<b>Data / Parameter</b>	$f_{NRB,y}$
<b>Unit</b>	fraction
<b>Description</b>	Fraction of woody biomass saved by the project activity in year $y$ that can be established as non renewable biomass
<b>Source of data</b>	UNFCCC national default value for DRC <a href="http://cdm.unfccc.int/DNA/fNRB/index.html">http://cdm.unfccc.int/DNA/fNRB/index.html</a>
<b>Value(s) applied</b>	0.9
<b>Choice of data or Measurement methods and procedures</b>	default
<b>Purpose of data</b>	Calculation of baseline and project emissions
<b>Additional comment</b>	The parameter is prescribed by the methodology as monitored. However, since the nationally approved default value is available, it can be reported ex-ante.

<b>Data / Parameter</b>	$B_{old}$
<b>Unit</b>	tonnes/year
<b>Description</b>	estimated average annual consumption of woody biomass per device
<b>Source of data</b>	Historical data (details in the attached calculation sheet)
<b>Value(s) applied</b>	wood: 7.69 Charcoal: 0.61
<b>Choice of data or Measurement methods and procedures</b>	
<b>Purpose of data</b>	Calculation of baseline emissions
<b>Additional comment</b>	If option (a) is used to determine $B_{old}$

<b>Data / Parameter</b>	<i>CF</i>
<b>Unit</b>	Number
<b>Description</b>	conversion factor charcoal to wood
<b>Source of data</b>	local conversion factor as per study “ <i>Étude de préfaisabilité sur les potentialités de développement des filières agroforesterie et bois-énergie dans le bassin de Kinshasa; Volet Bois Energie</i> ”, November 2012 ; ONF International & Novacel SPRL
<b>Value(s) applied</b>	8
<b>Choice of data or Measurement methods and procedures</b>	
<b>Purpose of data</b>	Calculation of baseline emissions
<b>Additional comment</b>	To be used for charcoal cookstoves

### D.6.3. Ex-ante calculation of emission reductions

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Since the CPA may include both the wood and the charcoal cookstoves, the emission reductions of the CPA are the sum of emission reductions achieved by each type of the cookstove, and accounting for the leakage emissions:

$$ER_{y,CPA} = \sum ER_{y,wood} + ER_{y,charcoal} - LE_y$$

1. Emission reductions achieved by ICS using fuel wood are calculated, as follows:

$$ER_{y,wood} = B_{y,savings,wood} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_{fossilfuel}} \times N_{y,i} \quad \text{Equation (1)}$$

Where:

$ER_{y,wood}$	Emissions reductions during the year $y$ (tCO <sub>2</sub> e)	Value: Calculated below
$B_{y,savings,wood}$	Quantity of woody biomass that is saved in tonnes per device	Calculated below
$N_{y,i}$	Number of project devices of the type $i$ operating in year $y$	
$f_{NRB,y}$	Fraction of woody biomass used in the absence of the project activity in year $y$ that can be established as non renewable biomass	0.9 <sup>10</sup>
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted – wood, wet basis	0.015 TJ/tonne
$EF_{projected_{fossilfuel}}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers.	81.6 t CO <sub>2</sub> /TJ

$B_{y,savings}$  Option 2:

$$B_{y,savings} = B_{old} \times \left( 1 - \frac{\eta_{old}}{\eta_{new,y}} \right) \quad \text{Equation (3)}$$

Where:

$B_{old,wood}$	Quantity of woody biomass used in the absence of the project activity in tonnes per device	Value: Calculated below
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<sup>10</sup> Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/DNA/fNRB/index.html>.



$\eta_{old}$	Efficiency of the system being replaced default value of 0.10 since the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney	0.10
$\eta_{new,y,wood}$	Efficiency of the system being deployed as part of the project activity (fraction)	0.22 (for ex-ante)

$B_{old,wood}$  option a): based on historical data

Where: Value:

$B_{old,wood}$  Estimated average annual consumption of woody biomass per device (tonnes/year) 7.69

Applying the above parameters, the emission reductions calculation per one cookstove using fuel wood is:

$$\Rightarrow B_{y,savings,wood} = B_{old,wood} \times \left(1 - \frac{\eta_{old}}{\eta_{new,y,wood}}\right) = 7.69 \times \left(1 - \frac{0.1}{0.22}\right) = 4.20 \text{ ton/year}$$

$$\Rightarrow ER_y = B_{y,savings} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_{fossilfuel}} \times N_{y,i} =$$

$$= 7.69 \text{ ton/year} \times 0.9 \times 0.015 \text{ TJ/tonne} \times 81.6 \text{ tCO}_2/\text{TJ} \times 1$$

**$ER_y = 4.62 \text{ ton/year per 1 wood-fired ICS}$**

2. Emission reductions achieved by ICS using charcoal are calculated, as follows:

$$ER_{y,charcoal} = B_{y,savings,charcoal} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_{fossilfuel}} \times N_{y,i}$$

**Equation (1)**

Where:	Value:
$ER_{y,charcoal}$	Emissions reductions during the year y (tCO <sub>2</sub> e) Calculated below
$B_{y,savings,charcoal}$	Quantity of woody biomass that is saved in tonnes per device Calculated below
$N_{y,i}$	Number of project devices of the type <i>i</i> operating in year y
$f_{NRB,y}$	Fraction of woody biomass used in the absence of the project activity in year y that can be established as non renewable biomass 0.9 <sup>11</sup>
$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted – wood, wet basis 0.015 TJ/tonne
$EF_{projected_{fossilfuel}}$	Emission factor for the substitution of non-renewable woody biomass by similar consumers. 81.6 t CO <sub>2</sub> /TJ

$B_{y,savings}$  Option 2:

$$B_{y,savings,charcoal} = B_{old,charcoal} \times \left(1 - \frac{\eta_{old}}{\eta_{new,y,charcoal}}\right) \times CF$$

**Equation (3)**

Where:	Value:
$B_{old}$	Quantity of woody biomass used in the absence of the project activity in tonnes per device Calculated below
$\eta_{old}$	Efficiency of the system being replaced

<sup>11</sup> Default values endorsed by designated national authorities and approved by the Board are available at <http://cdm.unfccc.int/DNA/fNRB/index.html>.



	default value of 0.10 since the replaced system is a three stone fire, or a conventional system with no improved combustion air supply or flue gas ventilation system, i.e. without a grate or a chimney	0.10
$\eta_{new,y,charcoal}$	Efficiency of the system being deployed as part of the project activity (fraction)	0.243 (for ex-ante)
$CF$	Conversion factor wood to charcoal Based on local data	8

$B_{old,charcoal}$  option a): based on historical data

Where: Value:

$B_{old,charcoal}$  Estimated average annual consumption of charcoal per device (tonnes/year) 0.61

Applying the above parameters, the emission reductions calculation per one cookstove using charcoal is:

$$\begin{aligned} \Rightarrow B_{y,savings,charcoal} &= B_{old,charcoal} \times \left(1 - \frac{\eta_{old}}{\eta_{new,y,charcoal}}\right) \times CF \\ &= 0.61 \times \left(1 - \frac{0.1}{0.243}\right) \times 8 = 2.85 \text{ ton/year} \end{aligned}$$

$$\begin{aligned} \Rightarrow ER_{y,charcoal} &= B_{y,savings,charcoal} \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected_{fossilfuel}} \times N_{y,i} = \\ &= 2.85 \text{ ton/year} \times 0.9 \times 0.015 \text{ TJ/tonne} \times 81.6 \text{ tCO}_2/\text{TJ} \times 1 \end{aligned}$$

**$ER_y = 3.14 \text{ ton/year per 1 charcoal-fired ICS}$**

Determination of  $N_{y,i}$ :

For simplification of the ex-ante estimation of emission reductions the adjustment of number of operating cookstoves is not applied.

Total ER of the proposed CPA are calculated as per tentative implementation plan and accounting for the leakage emissions (using default net to gross adjustment factor 0.95).

Details are in the attached calculation sheet.

**D.6.4. Summary of the ex-ante estimates of emission reduction**

<b>Year</b>	<b>Baseline emissions (t CO<sub>2</sub>e)</b>	<b>Project emissions (t CO<sub>2</sub>e)</b>	<b>Leakage<sup>12</sup> (t CO<sub>2</sub>e)</b>	<b>Emission reductions (t CO<sub>2</sub>e)</b>
2014	2,237.15	0	111.86	2,125.29
2015	9,924.43	0	496.22	9,428.21
2016	17,611.71	0	880.59	16,731.12
2017	25,298.99	0	1,264.95	24,034.04
2018	32,986.27	0	1,649.31	31,336.96
2019	40,673.55	0	2,033.68	38,639.87
2020	48,357.69	0	2,417.88	45,939.80
<b>Total</b>	<b>177,089.79</b>	<b>0</b>	<b>8,854.49</b>	<b>168,235.30</b>
<b>Total number of crediting years</b>	7			
<b>Annual average over the crediting period</b>	25,298.54	0	1,264.93	24,033.61

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<sup>12</sup> For ex-ante estimation of the emission reductions the leakage is considered to be zero.

**D.7. Application of the monitoring methodology and description of the monitoring plan**
**D.7.1. Data and parameters to be monitored**

<b>Data / Parameter</b>	$N_{y,i}$																								
<b>Unit</b>	Number																								
<b>Description</b>	Number of project devices $i$ that are operating in year $y$																								
<b>Source of data</b>	CPA database																								
<b>Value(s) applied</b>	<p>-</p> <p>For the ex-ante estimation, the cumulative numbers have been used according to the preliminary distribution plan:</p> <table border="1"> <thead> <tr> <th></th> <th>Wood ICS</th> <th>Charcoal ICS</th> </tr> </thead> <tbody> <tr> <td>Year 1</td> <td>100</td> <td>565</td> </tr> <tr> <td>Year 2</td> <td>200</td> <td>2,865</td> </tr> <tr> <td>Year 3</td> <td>300</td> <td>5,165</td> </tr> <tr> <td>Year 4</td> <td>400</td> <td>7,465</td> </tr> <tr> <td>Year 5</td> <td>500</td> <td>9,765</td> </tr> <tr> <td>Year 6</td> <td>600</td> <td>12,065</td> </tr> <tr> <td>Year 7</td> <td>700</td> <td>14,364</td> </tr> </tbody> </table>		Wood ICS	Charcoal ICS	Year 1	100	565	Year 2	200	2,865	Year 3	300	5,165	Year 4	400	7,465	Year 5	500	9,765	Year 6	600	12,065	Year 7	700	14,364
	Wood ICS	Charcoal ICS																							
Year 1	100	565																							
Year 2	200	2,865																							
Year 3	300	5,165																							
Year 4	400	7,465																							
Year 5	500	9,765																							
Year 6	600	12,065																							
Year 7	700	14,364																							
<b>Measurement methods and procedures</b>	<p>As per paragraph 22 of the methodology: Monitoring shall consist of checking of all devices or a representative sample thereof, at least once every two years (biennial) to determine if they are still operating; those devices that have been replaced by an equivalent in-service device can be counted as operating.</p> <p>Primary data collection, for each cookstove type</p>																								
<b>Monitoring frequency</b>	at least once every two years (biennial)																								
<b>QA/QC procedures</b>	-																								
<b>Purpose of data</b>	Calculation of emissions reductions																								
<b>Additional comment</b>	$N_y$ is adjusted according to actual operational days $D$ during a given monitoring period $y$ . The sales date for each appliance listed in the CPA database signifies the start of operation for each appliance type. The operational days of each appliance is divided by the total number of days of the current monitoring period to determine the adjusted $N_y$ number of appliances in operation.																								



<b>Data / Parameter</b>	$\eta_{new,y}$
<b>Unit</b>	fraction
<b>Description</b>	Efficiency of the device being deployed as part of the project activity in year y
<b>Source of data</b>	Primary data collection - WBT
<b>Value(s) applied</b>	- For the ex-ante estimation of emission reductions: <ul style="list-style-type: none"> <li>• for charcoal ICS Eco-Jiko: 22%</li> <li>• for wood ICS KONSAVA: 24.3%</li> </ul>
<b>Measurement methods and procedures</b>	Water Boiling Test Weighted average values if more than one type of system is being introduced by the project activity In all cases the testing protocol shall be the same for both the device being replaced and the device being deployed.
<b>Monitoring frequency</b>	Annually or biennially Biennial monitoring may be chosen, if it can be demonstrated that the efficiency of the cook stove does not drop significantly as compared to the initial efficiency of the new device, over a time period of two years of typical usage.
<b>QA/QC procedures</b>	WBT protocol shall be carried out in accordance with national standards (if available) or international standards or guidelines.
<b>Purpose of data</b>	Calculation of emissions reductions
<b>Additional comment</b>	If option 2 is used to determine $B_{y,savings}$

<b>Data / Parameter</b>	$D$
<b>Unit</b>	number
<b>Description</b>	number of days that the ICS are in use during the monitoring period
<b>Source of data</b>	sales record and database
<b>Value(s) applied</b>	(M=1,2,3, .....n)
<b>Measurement methods and procedures</b>	Not all the ICS will be sold on 1 <sup>st</sup> day of any year. Every day, sales will be added. Construction will be ongoing and plants will be added every month. The database contains the information on sales date sourced from the sales receipt.
<b>Monitoring frequency</b>	Continuously
<b>QA/QC procedures</b>	-
<b>Purpose of data</b>	Calculation of Emission Reductions
<b>Additional comments</b>	Not applied in the ex-ante estimation, for simplification



<b>Data / Parameter</b>	<i>LE</i>
<b>Unit</b>	-
<b>Description</b>	Leakage related to the non-renewable woody biomass saved by the project activity - due to the use/diversion of non-renewable woody biomass saved under the project activity by non-project households/users that previously used renewable energy sources
<b>Source of data</b>	default as per methodology
<b>Value(s) applied</b>	0.95
<b>Measurement methods and procedures</b>	
<b>Monitoring frequency</b>	-
<b>QA/QC procedures</b>	-
<b>Purpose of data</b>	Calculation of emission reductions
<b>Additional comments</b>	Adjustment of B <sub>old</sub>

### D.7.2. Description of the monitoring plan

>>

Tai Com as the CPA will follow the same monitoring methodology as described in this PoA-DD. The CME oversees the monitoring process:

1. Data on the cookstoves are recorded in the field by Tai Com's personnel and/or contracted partners (e.g. sales points), and reported to Tai Com. Tai Com keeps the records and enters the data to the CPA database. CPA database is established with assistance from the CME to ensure that data is collected correctly and organized in a useable fashion.

Minimum data to be collected include:

- Name of the customer and contact details (phone number, if available)
- Address, location
- Replaced stove type and fuel
- ICS type and size
- Date of sale
- Unique identification code of the cookstove engraved on the side:

The identification code is generated, as follows:

ECO-abbreviation of CPA implementer-number of CPA-wood or charcoal-serial Nr.  
E.g. ECO-TCC-001-W-12345

2. Tai Com will maintain records on end user contact information, cookstove data, and other inventory information in a manner that enables the CME and DOE to verify that dissemination is indeed occurring and ICS are being used by users within the border of the host country that results in a decrease in greenhouse gas emissions.
  - Before recording the ICS into the CPA database, the identification code will be cross-referenced to guarantee that no double counting has occurred.
  - In order to confirm the displacement of non-renewable woody biomass, only the ICS where the household was using non-renewable woody biomass for cooking in the baseline situation will be included in the CPA. This will be confirmed in sales form by each of the users.
3. Tai Com will keep the CPA database up-to-date at least annually by checking all the cookstoves or a representative sample thereof.
4. If sampling is applied, it will be in accordance with eligibility criterion (j) of the PoA. The CPA database will serve as a basis for sampling, if sampling is applied
5. Tai Com will report the data to CME as per conditions set in the contractual agreement.

Tai Com will be assisted by the CME in monitoring as needed. Monitoring activities might be carried out partly by external, specialised consultants reporting to the CME/CPA implementers.

### Quality Assurance and Quality Control

The CME is responsible to supervise all monitoring activities. A database will be developed by the CME to store the data collected from the household survey.

All field personnel involved in distribution will be trained in the proper installation, use, and maintenance of the appliances, and will be provided with sufficient training to introduce recipient households to the proper operation and maintenance of the device, as well as contact information for the CME.

A sample of cook stoves installed in the first year of the crediting period shall be selected for measurement of their thermal efficiency. The testing shall be done using the WBT protocol carried out in accordance with national or international standards / guidelines by an authorized agency.

### Sampling Plan

#### Sampling Plan:

In accordance with the Guideline: Sampling and surveys for CDM project activities and programmes of activities Version 04.0, the sampling plan has been organized as follows:

#### A. Sampling design

##### i. Objectives and reliability requirements

The sampling objective is to determine via survey the mean or proportional value for each monitoring parameter. For each type of cook stove the sampling will be conducted separately.

Enumerators, coordinated by the CME, will be trained on the basic concept of the programme and administering of the developed questionnaire before sending to the field. They will also fill questionnaires during the training process and problems faced during the test filling will be shared and discussed to avoid similar problems in the actual survey. Customized data entry software will be developed and all the filled questionnaires of the household survey will be recorded in the software. The CME will check the quality of the data entered into the electronic database system.

##### ii. Target population

The target population will be the complete set of appliances deployed under the PoA.

##### iii. Sampling method

Simple random sampling will be used to select the sample appliances for each respective cook stove type from the PoA level database.

##### iv. Sample size

Number of appliances operational during the monitoring period will be sourced from the completed survey forms.

The sample size for each of the type of cook stove distributed is determined using the Standard: Sampling and surveys for CDM project activities and programmes of activities Version 04.0. As required for annual surveys, the level of precision will be 90/10. (90% confidence interval and 10% margin of error).

The minimum sample size to obtain operational appliances is calculated using the equation for simplified random sampling as per the Guideline: Sampling and surveys for CDM project activities and programmes of activities Version 04.0, as follows:

$$n \geq \frac{1.645^2 N \times p \times (1 - p)}{(N - 1) \times 0.1^2 \times p^2 + 1.645^2 p \times (1 - p)}$$

Where:

- n sample size  
N Total number of appliances *per technology type (varying across CPA and monitoring periods)*  
p expected proportion (varying across CPAs, depending on their performance)<sup>13</sup>  
1.645 representing 90% confidence interval  
0.1 representing 10% relative precision

Example sample size calculation for wood ICS based on the following assumption:

N = 700

p = 0.9 usage rate

n = 28.87

In order to anticipate any low response rate and answers bias, 10% oversampling will be applied, giving a minimum sample size of **33** retained for the monitoring surveys.

Example sample size calculation for charcoal ICS based on the following assumption:

N = 14,364

p = 0.9 usage rate

n = 30.01

In order to anticipate any low response rate and answers bias, 10% oversampling will be applied, giving a minimum sample size of **33** retained for the monitoring surveys.

Each appliance installed will have a unique identification number and a database will be maintained at the CME office. The schedule for implementing the sampling and household survey will be set out by the CME.

v. Sampling frame

The total number of appliances installed and operated per type of technology in that monitoring period will be the total sampling frame per distributed technology. Out of these appliances samples will be selected for the respective appliance type.

B. Data to be collected

i. Field measurements

The variables to be measured, as well as their frequency and method of measurement have been defined in the section above. Samples will be selected with stratified random sampling design to get the best representative samples from the population. Enumerators will be trained and supervised to minimize the bias. In order to anticipate any low response rate and answers bias, 10% oversampling will be applied, giving a minimum sample size of retained for the monitoring surveys.

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<sup>13</sup> Using existing data or a small pilot survey, the expected proportion can be estimated for purposes of determining the minimum sample size.



The following table describes the monitoring plan:

Data to be monitored	Description	Frequency	Data Source
Number of appliances per cook stove type deployed up to the monitoring period	Cumulative number of appliances per cook stove type operational during the monitoring period under each CPA will be obtained from project database.	Annually	Equipment Purchase Contract
Operational percentage of appliances per cook stove type distributed in the monitoring period	Operational percentage of the appliances per type in the monitoring period will be estimated from the survey forms. The number of operating appliances will be checked annually. For this purpose, a household survey will be conducted for the representative samples annually. Operational appliances will be identified by asking the sample households if the appliance installed in his/her house is in use regularly or not. Enumerators will also physically check the operational status of the respective appliances during the user survey.	Annually	Annual Household Survey
Number of persons served by the appliance	The number of persons in a household that are served by the cook stove in the monitoring period will be estimated from the survey forms.	Annually	Annual Household Survey
NRB displaced or substituted	An operational appliance means reduced wood fuel usage. In each CPA, the participating households using improved cook stoves for cooking will use less NRB than in the baseline. Only non-efficient stoves (confirmed by the user upon purchase of stove) and households with operational appliances (confirmed through the annual household surveys) will be considered for emission reductions.	Annually	Programme database Annual Household Survey

ii. Quality assurance/Quality control

As described above, all field personnel will be trained in order to collect high quality and consistent data. While conducting the user survey, the CME will double check randomly selected 5% of the forms completed by enumerators for quality assurance of the survey. In the event that outliers are identified, a root cause analysis will be conducted to determine whether the value is the result of human error. If an error is identified, the value will be removed. The CPA implementer will maintain records of all QA/QC activities, including the treatment of outliers, and will provide these to the CME for analysis by the DOE during verification.

iii. Analysis

Emission reductions will be calculated using the results of the most recent survey data. The surveys and tests will provide updated values for parameters specific to the CPA.



C. Implementation plan

i. Implementation plan

Sampling of surveyed data will be done on an annual basis and will follow the approach described above. All personnel conducting surveys will receive the training to collect high quality and consistent data. Records of all trainings will be kept for 2 years beyond the lifetime of the PoA. On-going monitoring shall be conducted for each parameter according to the frequency identified above.

All monitored data 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 this programme, whichever occurs later.

**SECTION E. Approval and authorization**

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An application is being submitted to the Designated National Authority of Democratic Republic of Congo, Designated National Authority for providing its Letter of Approval.

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## Appendix 1: Contact information on entity/individual responsible for the CPA

<b>Organization</b>	Climate Corporation Emissions Trading GmbH
<b>Street/P.O. Box</b>	Guntramsdorfer Street 103
<b>Building</b>	-
<b>City</b>	Moedling
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### Appendix 2: Affirmation regarding public funding

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### Appendix 3: Applicability of the selected methodology(ies)

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### Appendix 4: Further background information on ex ante calculation of emission reductions

See attached excel sheet.

### Appendix 5: Further background information on monitoring plan

Details of the monitoring plan are described in the CPA-DD section D.7.

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#### History of the document

<b>Version</b>	<b>Date</b>	<b>Nature of revision(s)</b>
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the component project design document form for small-scale component project activities" (EB 66, Annex 17).
01	EB33, Annex44 27 July 2007	Initial adoption.
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