Programme of activities design document form
(Version 09.0)

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

BASIC INFORMATION	
Title of the PoA	Distribution of fuel-efficient improved cooking stoves in Nigeria
Version number of the PoA-DD	15
Completion date of the PoA-DD	01/07/2020
Coordinating/managing entity	C-Quest Capital LLC
Host Parties	Nigeria
Applied methodologies and standardized baselines	AMS II.G, version 11, Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass
Sectoral scopes	Sectoral Scope 3- Energy Demand

PART I. Programme of activities (PoA)

SECTION A. Description of PoA

A.1. Purpose and general description of PoA

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The following information shall be included here:

1. General operating and implementing framework of PoA

This programme of activities is a non- A/R activity and involves the promotion, distribution and sale of fuel-efficient improved cooking stoves (ICS) in Nigeria. The ICS disseminated through this programme will replace the prevailing inefficient three-stone fires or equivalent with stoves which combust wood more efficiently, and improve thermal transfer to pots, hence saving fuel and lowering greenhouse gas emissions.

The SSC-PoA will be coordinated by C-Quest Capital LLC (CQC) ICS will be sold on a commercial basis. Carbon finance will be used to facilitate the purchase, distribution and marketing of stoves, without which the activities would not take place.

Sales information will be gathered directly from customers and stored on a database. Registration of stoves will also constitute an informed agreement to transfer CERs generated to CQC.

2. Policy/measure or stated goal of the SSC-PoA

The goal of this SSC-PoA is to introduce cleaner, more efficient improved cooking stoves (ICS) to many peri-urban and rural households across Nigeria who, at present, use rudimentary stoves or three-stone fires which are inefficient and smoky. In turn, this will reduce global greenhouse gas emissions by increasing the efficiency of cooking and reducing the quantity of non-renewable biomass consumed. ICS will also reduce indoor air pollution levels and the various health risks associated with breathing polluted air; and result in a range of social and economic benefits to users.

3. Confirmation that the proposed SSC-PoA is a voluntary action by the coordinating/managing entity.

There are no laws, policies or mandatory requirements in Nigeria stipulating or encouraging the adoption of ICS by households. Indeed, this is acknowledged as a neglected policy area[1].

This SSC-PoA is a voluntary action by the coordinating and managing entity CQC.

4. Contribution of the proposed SSC-PoA to sustainable development

79.6%[2] of the population in Nigeria use wood for cooking, amounting to around 20 million households. There is a very low prevalence of improved technologies for combusting wood cleanly and efficiently. Majority of people use three-stone fires with three stones to support pots, or simple locally-fabricated metal pot supports.

[1] Sesan, T. 2010. Energy without the Dirt? Making a Case for Integration of Biomass into Energy Policy. *Boiling Point*, no. 57.

[2] National Bureau of Statistics. 2009. Social Statistics in Nigeria. Table 2.9.

The use of inefficient wood burning stoves and three-stone fires in homes has been found to cause considerable disease and death, particularly among women and children. The World Health Organisation[3] has found that 40% of all childhood pneumonia can be attributed to exposure to smoke from fires in homes, and exposure to smoke has been found to cause chronic lung disease in women. Approximately 1.5 million people die from smoke inhalation each year; most are women and children in low-income countries. Ill health can result in loss of productivity and costs associated with health care.

In many parts of Africa wood collection is a time-consuming burden that falls mainly on women[4]. Where wood is purchased (particularly in peri-urban areas in Nigeria) it poses a significant financial burden on families. Average annual incomes in Nigeria are said to be around US$330[5], while average household weekly fuel expenditure in Kaduna State is around ₦709 (US4.43)[6]. This equates to 70% of an individual income being devoted to fuel purchase.

The inefficient use of wood also places considerable and unnecessary pressure on local ecosystems and biomass resources, including forests. Reducing consumption of firewood can reduce this pressure.

A.2. Physical/geographical boundary of PoA

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Definition of the boundary for the SSC-PoA in terms of a geographical area (e.g., municipality, region within a country, country or several countries) within which all small-scale CDM programme activities (SSC-CPAs) included in the SSC-PoA will be implemented, taking into consideration the requirement that all applicable national and/or sectoral policies and regulations of each host country within that chosen boundary;

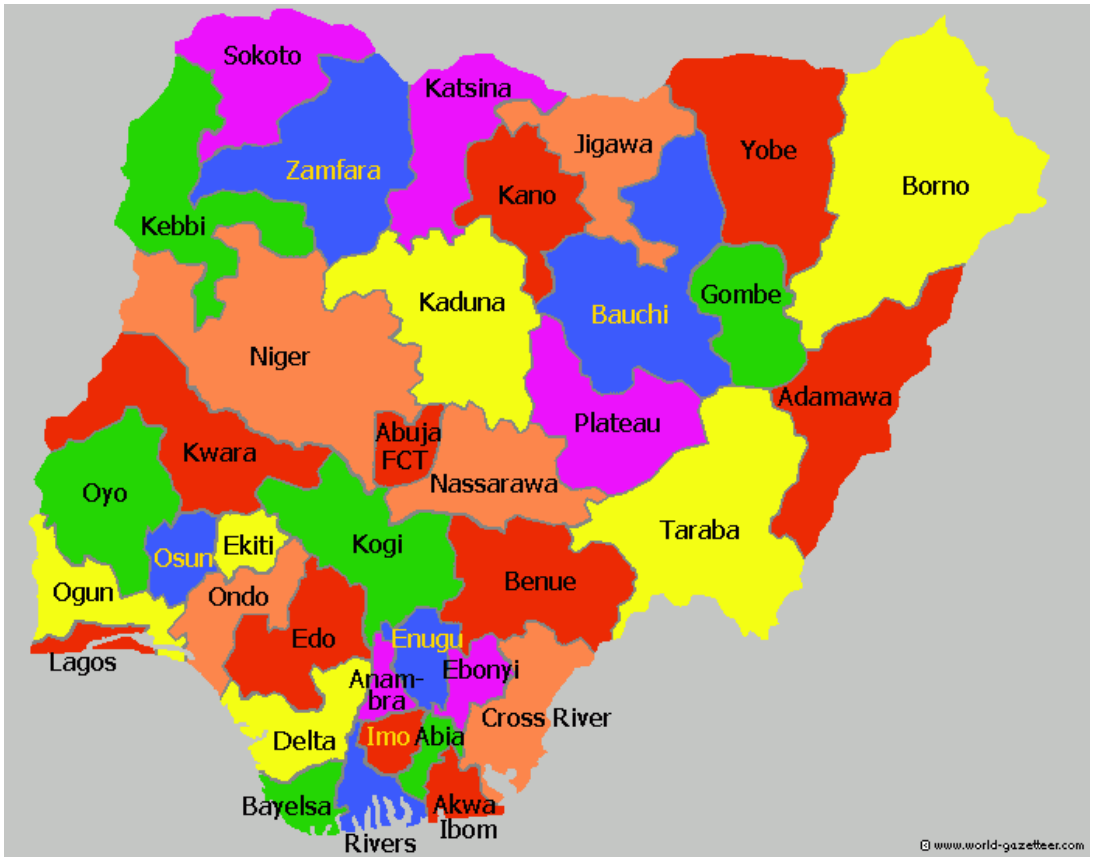
All SSC-CPAs included in this SSC-PoA will be implemented within the geographical boundary of Nigeria, indicated in the map below and includes all areas (rural, peri-urban and urban).

[3] World Health Organisation World Health Report, 2002

[4] Biran, A., J. Abbot, and R. Mace. 2004. Families and firewood: A comparative analysis of the costs and benefits of children in firewood collection and use in two rural communities in Sub-Saharan Africa. *Human Ecology* 32, no. 1: 1-25

[5] Centre for Global Development, https://www.cgdev.org/blog/buyback-resolve-nigerias-debt-problem

[6] Baseline Woodfuel Consumption Survey, Nigeria, Kaduna state: Outline summary and analysis of data. Jonathan Rouse, HED Consulting. For C Quest Capital LLC. August 30 2010



Map of Nigeria

A.3. Technologies/measures

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The activities under the proposed SSC-PoA will promote improved cooking stoves that result in substantially reduced fuel consumption and emissions for conducting cooking and water heating tasks in homes. The ICS used in this SSC-PoA have characteristics that improve the efficiency of combustion and thermal transfer to the pot compared with a traditional stove or three-stone fire. Most do this by incorporating a 'rocket elbow'; a highly-insulated combustion chamber which provides a conducive environment for clean and efficient combustion of wood. ICS substantially reduce woodfuel consumption compared with a three-stone fire. Efficiency of the ICS shall be established by a national standards body or an appropriate certifying agent recognized by it, or alternatively manufacturers' specification shall be used.

Specific stoves types will be described for each SSC-CPA.

A.4. Coordinating/managing entity

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>>The following information shall be included here:

1. Coordinating or managing entity of the SSC-PoA as the entity which communicates with the Board - C-Quest Capital LLC (CQC) will be Coordinating/Managing Entity of this SSC-PoA and is the entity which communicates with the CDM Executive Board.

A.5. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Nigeria (host)	C-Quest Capital LLC (private entity)	No

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Netherlands	C-Quest Capital LLC (private entity)	No
Sweden	Swedish Energy Agency	No

A.6. Public funding of PoA

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No public funding from Annex I parties to the United Nations Framework Convention on Climate Change (UNFCCC) are envisaged to be made available for the proposed SSC-PoA, or any CPA under the proposed SSC-PoA. If public funding from Annex I parties to the UNFCCC is provided, the CME shall confirm that the funding is not diversion of Official Development Assistance (ODA)[7].

SECTION B. Management system

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Description of the operational and management arrangements established by the coordinating/managing entity for the implementation of the SSC-PoA, including:

(a) Definition of roles and responsibilities of personnel involved in the process of inclusion of CPAs, including a review of their competencies;

A clear definition of roles and responsibilities of the parties involved in this SSC-POA has been given in Part II Section H.3The CME shall have the competencies to check the features of potential CPAs and ensure that each CPA meets all requirements and eligibility criteria before inclusion in the SSC-PoA.

CME Competencies:

C-Quest Capital LLC (CQC)

CQC has been the leader in the development of Programme of Activities under the CDM, having developed the CFL lighting scheme - “Bachat Lamp Yojana” PoA (CDM Ref 3223) and implemented more than 4 CPAs under it (at the time of validation of this SSC-PoA).

CQC is currently the CME for five SSC-PoAs:

- POA 1: Improved Cookstoves Program in Zambia
- POA 2: Distribution of ONIL-stoves Mexico
- POA 3: Distribution of ONIL-stoves Guatemala
- POA 4: Distribution of Improved Cook Stoves in Sub-Saharan Africa: CME
- POA 5: Improved Cookstoves Program for Malawi and cross-border regions of Mozambique

CQC staff has over 20 years of experience with ICS, having been involved and leading key operations to provide funding through multiple instruments for improved cook stove distribution in different countries. These operations have proven successful and introduced consumers to the opportunity of ICS. CQC staff has established working relationship with major international stove producers and have been involved in the development of registered methodologies and PDDs and SSC-POAs for ICS.

(b) Records of arrangements for training and capacity development for personnel;

[7] Official development assistance (ODA) is defined in the *OECD Glossary of Statistical Terms* as follows: Flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 percent (using a fixed 10 percent rate of discount). By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ("bilateral ODA") and to multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions (*OECD Glossary of Statistical Terms*)

Key training needs:

- Monitoring: Training, including that of field personnel, is needed to ensure monitoring activities are conducted effectively. This will include spot checking a random sample of homes with ICS to ensure the stoves are continuing to be used, as well as a random sample of homes selected for the stove efficiency tests (efficiency tests will be carried out by a third party or trained CPA Implementer/CME personnel using the Water Boiling Test). The procedures to complete this sampling are described in Part II Section I.7.2 and meet the confidence/precision requirements stated in 'Standard- Sampling and surveys for CDM project activities and programmes of activities'; version 08.

- ICS distribution: CPA Implementers shall provide evidence of their ability to train technicians on ICS assembly and distribution in accordance with the type of stove implemented under its CPA.

(c) Procedures for technical review of inclusion of CPAs.
The CME will undertake the following activities to ensure proper eligibility of the CPAs before they are uploaded for official inclusion into the SSC-PoA:

- CME will review each CPA document and methodically go through each and every eligibility/applicability criterion of the SSC-PoA to ensure the CPA meets each requirement with certainty. In cases where there is doubt, the CME will not upload the CPA document until the requirements are met to the CME's satisfaction.
- CME will review each of the ICS models that are proposed for distribution under each CPA. CME will review database/registration procedures to ensure proper recording of the ICS data collection and management in line with the methodology and SSC-PoA eligibility criteria.
- CME will review all proposed CPA Implementer's monitoring procedures to ensure they conform with the Monitoring Plan in the SSC-PoA (as per Part II Section I.7of the SSC-PoA-DD), including stove efficiency testing and procedures such as visual inspection and WBT test (efficiency of stove) to check that ICS are still in operation and at what efficiency.
- During implementation of the CPA, and as necessary, the CME personnel will visit each CPA region to ensure all procedures outlined in the SSC-PoA are being followed, particularly on stove registration and database updating.

(d) A procedure to avoid double counting (e.g. to avoid the case of including a new CPA that has already been registered either as a CDM project activity or as a CPA of another SSC-PoA);

Each ICS in each SSC-CPA included in this SSC-PoA will be identified by a specific geographical location and customer name, as well as the unique serial number. Each serial number will be associated with a specific CPA. The serial number will start with an identifier to be able to separate the stoves from this SSC-PoA with those of other potential SSC-PoAs. The identifier that will precede each serial number will be "CQC..." or three letters representing the stove model. Each stove's serial number will be entered into a database that will keep track of which stoves are in which CPAs. As each CPA will have a database that consist of name of the customer, address/ description of location, contact telephone number(s) and unique serial number for every stove so a project participant or verifier can easily determine that any stove identified in any household is affiliated with one – and only one – CPA. By simply referring to the database, a person can see in which CPA a particular stove is categorized.

Any households found to be using another project's stove will be removed from the project database. Emission reductions will be similarly adjusted if the sample reveals a certain number of stoves have been removed or counted in another SSC-PoA. The percentage of household found to be missing a stove or using another project's stove will be linearly applied across the database and exclude those users. In other words, if 1 out of 100 stoves sampled turned out to be missing or in

another SSC-PoA, then the project participants would discount 1% for the entire population sampled, whether that population covered just one CPA or the entire SSC-PoA.

Double registrations of ICS will be flagged and removed from the database, so avoiding the risk of double counting within a single CPA, as well as across the SSC-PoA.

(e) Records and documentation control process for each CPA under the SSC-PoA:

(i) A record keeping system for each CPA under the SSC-PoA,

Sales information and carbon asset ownership
Detailed sales information will be collected for each customer, either using electronic or paper-based means. On electronic means, the data will be collected by SMS (i.e. mobile phone 'short message service' text) or Information and Communication Technologies ('ICT' – such as PDAs). On paper-based means, a registration card will be provided to each stove customer with instructions on how to text registration information to a data management system. The SMS will include the name of the customer, address/ description of location, contact telephone number(s), unique serial number of the stove, retailer ID, and date of purchase. Alternatively, the customer may complete the registration card and return it to CQC for manual entry into the sales database. The SMS/ICT or completed registration card will also constitute an agreement that the household formerly used wood predominantly on a three-stone fire or traditional pot-support/ stove, and is willing to transfer carbon assets created by the ICS to CQC.
In case a replacement stove is being issued / sold to a customer already registered on the project database, a new registration will not be required. The replacement stove will be recorded in the project database in such a way that it is clear that the replaced stove ceases to be included in the CPA; and the replacement stove is associated with the customer's details as a new stove, and is included in the CPA as a new stove. The replacement stove will have a new serial number and will not take over the serial number from the stove that was replaced.

SMS/ICT data will be collated automatically. Written registration cards will be entered manually onto the same database.

Record Keeping
- Detailed records of trade and retail sales and purchase transactions will be captured and kept in paper and/ or electronic formats.
- Copies of all electronic records will be kept in both Nigeria and in the United States for a minimum of two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.
- Paper records (where they are deemed required) will be kept at the CPA Implementer's offices, or another location designated by CQC in Nigeria for a minimum of two years.

Checks on record-keeping system
Getting accurate data in order to find the stoves at a later date will depend on capturing accurate address information. In Nigeria, in the locations where most end-users live, there are no street names or numbers. People use a general description for an address. By having the name, phone number, town, and general address description, the project will in most cases be able to find the actual exact location by visiting that area.

- The delivery manifest for each stove delivery to sellers will contain a list of stove serial numbers for each stove delivered.
- Where electronically submitted, once a given phone number has been used to submit information for a defined number of stoves, the software will block it from a predetermined
- number of future submissions. Stove sellers' phone numbers may be exempted from this by prior agreement.
- Project distribution staff will spot-check end-users to verify that information submitted was factual.

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

In line with paragraphs 124 (m) and (n) of 'CDM project standard for programmes of activities'; version 02.0, "if the generic CPA consists solely of units that qualify as microscale CDM units as defined in the Methodological tool: Demonstration of additionality of microscale project activities" then conditions to ensure that CPAs that will be included meet the small-scale or microscale thresholds and remain within those thresholds throughout the crediting period of the CPAs is not required. Also, such CPAs need not carry out assessment of the debundling check.

As the generic CPA consists of microscale CDM units as demonstrated in Section C of the document, CPAs implemented under the PoA and consisting of microscale CDM units are exempted from demonstrating small scale threshold limit or conducting debundling check throughout their crediting period.

CPAs which do not qualify as consisting of microscale CDM units, shall have to adhere to small scale limit specified under paragraphs 124 (m) & (n) of CDM project standard for programmes of activities; version 02.0

(iii) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the SSC-PoA;

CPA Implementers have the operational responsibility for implementing and monitoring the CPAs under this SSC-PoA. The CME will have legal contracts in place with CPA Implementers and, as appropriate, with entities assisting with the implementation of the CPA. These legal contracts shall clearly state that the implementation of CPA activities are subscribed to this SSC-PoA.

(f) Measures for continuous improvements of the SSC-PoA management system.
The CME will undertake an annual review of the overall SSC-PoA management system, including identifying any problems with stove distribution, stove use once in the homes, monitoring continued stove use and overall database maintenance. This review will ensure that best practices are maintained through the lifetime of the SSC-PoA.

SECTION C. Demonstration of additionality of PoA

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The proposed SSC-PoA is a voluntary coordinated action
There are no mandatory requirements in Nigeria stipulating the use of energy efficient thermal appliances. In addition, the SSC-PoA requires individual households to take voluntary action to participate in the project activities.

If the SSC-PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the SSC-PoA;
Significant capital is required to invest in a programme which could match the achievements of this proposed SSC-PoA, including for import of technologies, developing the brand, widespread marketing, and establishing a distribution and retail network. There is no precedent for large-scale private or public-sector involvement in ICS promotion and distribution in Nigeria. CQC has been unable to find investors willing to provide the level of capital necessary to implement such a program without the hard-currency revenues from selling CERs. CQC's team of investors, which have key roles in providing both debt and equity in the ICS initiative, have all provided letters stating that they would not consider this kind of investment unless this SSC-PoA is CDM registered and eligible to sell CERs. And CQC has been unable to find any other investors in this project, given the risks of doing this kind of project in Nigeria.

The statements from these investors are critical because they will be providing the capital necessary to purchase, import, market and distribute thousands of cooking stoves in Nigeria.

Without this capital, the project simply could not move forward. Although there are tangible benefits for consumers in the form of lower wood costs, the project generates little income for those who are financing the project – the sale of the CERs is the only way in which any investor could be reasonably assured of making a return on such a high-risk project.

About 80% of the population of Nigeria use wood for domestic cooking[8]. There is a very low prevalence of ICS (none were identified in over 250 households randomly selected in the baseline), and the majority of people use open fires with three-stones to support pots, or simple locally-fabricated metal pot supports which offer little or no improvement over the three-stone fire as they do not have the basic characteristics of an improved stove. Only two NGO/private-sector domestic ICS initiative in Nigeria has been identified (based in Kaduna and Kano States); ICS are not available in public markets; and the concept of ICS is not widely understood. Together, this lack of availability and awareness presents a significant barrier to introducing ICS in Nigeria. Carbon finance will enable significant investment in awareness raising, education, promotion and demonstration to create consumer awareness and confidence in these products. Such investment is not forthcoming from any other sector.

Unlike in many other countries across Africa and the Globe, there is little history of improved cooking stove initiatives in Nigeria. As a result, apart from crude, artisanal stoves available in markets which are likely to offer negligible improvements in efficiency and performance, and which have a short life, few alternatives exist. Therefore, many users are unaware of the existence of efficient cooking stoves or their potential benefits. When asked why individuals used traditional cooking stoves, 50% said it was because there was no alternative, and others cited low costs. Sixty percent of people said they were not considering purchasing an ICS; more than 75% said this is because they have not heard of ICS; because ICS were not available, or because ICS were too expensive.

Without significant investment in product marketing and awareness-raising of the potential fuel savings and health and safety benefits of ICS, widespread uptake of ICS in Nigeria would be highly unlikely. In addition, without marketing and awareness-raising, willingness to pay would remain below the cost price of ICS. Marketing and awareness-raising at this scale is costly, and also requires specific skill sets which neither the government of Nigeria nor private-sector bodies generally fund or have capacity to deliver. Therefore, lack of awareness constitutes a significant barrier, and carbon finance would enable the project to be delivered.

Additionality of the CPAs under the PoA is demonstrated through Methodological Tool 19 Demonstration of additionality of micro-scale project activities Version 09.0 as demonstrated below

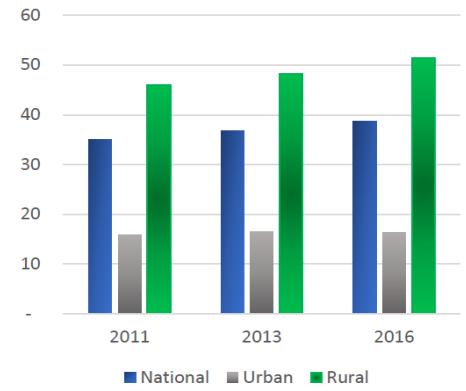
Nigeria is Africa's largest economy and one of the fastest growing in the world, yet, more than half of the Nigerian population grapple with extreme poverty. The paradox of growth in Nigeria is that as the country gets richer, only a few benefit, and the majority continue to suffer from poverty and deprivation.

Poverty and inequality in Nigeria have a strong spatial dimension and remains largely a rural phenomenon[9].

[8] National Bureau of Statistics. 2009. Social Statistics in Nigeria

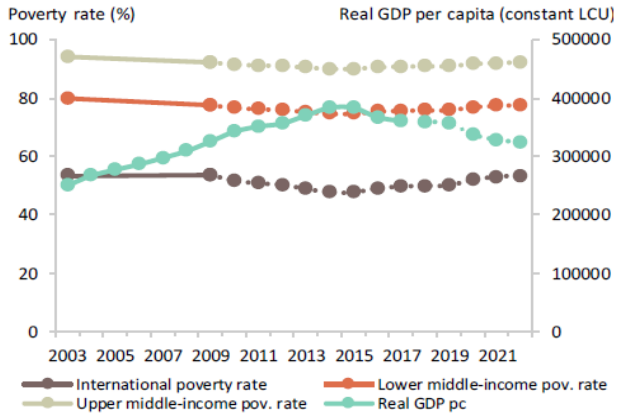
[9] http://documents.worldbank.org/curated/en/636531549879664295/pdf/NIGERIA-Poverty-Briefing-Note.pdf

Figure 1: People living in Poverty
in percent of population in strata



Source: World Bank staff estimates based on GHS.

According to a recently published World Bank document[10], Nigeria's vulnerability to global economic disruption caused by COVID-19, aggravated by declining oil prices, will increase the share of the population vulnerable to falling into poverty due to increase in unemployment and underemployment.



Source: World Bank.
Notes: see table 2.

The document further describes the actual and projected poverty rates in Nigeria. It is clear that the percentage of population living below International poverty line ($1.9) is projected to increase from 50.1% in 2019 to 53.4% in 2022.

International poverty rate ($1.9 in 2011 PPP)[a,b]	49.7	49.9	50.1	52.0	52.9	53.4
Lower middle-income poverty rate ($3.2 in 2011 PPP)[a,b]	75.7	75.8	75.9	76.9	77.4	77.6
Upper middle-income poverty rate ($5.5 in 2011 PPP)[a,b]	90.8	90.9	90.9	91.6	92.0	92.1

Table 2

According to Nigeria- Sustainable Development Goals (SDG) indicators baseline report (2016), 62.6% of population was under the national poverty line in the assessment year. However, a more recent report by National Bureau of Statistics on Poverty and Inequality in Nigeria -2019, pegs the proportion of rural population living below national poverty line (NPL) at 52.1% (page 5) and going

[10] http://pubdocs.worldbank.org/en/848651492188167743/mpo-nga.pdf

by the World Bank document (referenced above) this figure is only going to increase in the coming years in view of the current economic downturn triggered by declining oil prices and outbreak of Covid-19 Pandemic.

The report gives a brief idea about the way NPL is calculated- by adding food poverty line and cost of non-food basic needs which results in a value equal to 137,430 Naira per person per year. The implication of this value is as follows: the individuals living in households whose per capita annual consumption expenditures is below 137,430 Naira are considered poor by national standards (paragraph 14, page 5).

Thus, in accordance with paragraph 10 (b) (iii) of Methodological tool: Demonstration of additionality of microscale project activities Version 09.0; rural regions of Nigeria can qualify as SUZ as 52% of the population in these regions earn less than the national poverty line which is 137,430 Naira.

Therefore, according to paragraphs 12, 14 and 15 of Tool 19, version 09 and the description above, CPAs which qualify the following conditions are additional-

a. Consist of distributed units of less than equal to 20GWh ($60GWh_{th}$) of annual energy saving
b. Implemented in rural[11] regions which have been identified as SUZ areas of Nigeria.

For CPAs which do not qualify the above conditions, additionality shall be demonstrated in line with Figure 2 of the Tool -Demonstration of additionality of microscale project activities, version 09.0.

SECTION D. Start date and duration of PoA

D.1. Start date of PoA

>>
07/11/2012

D.2. Duration of PoA

>>
28 years 00 months

SECTION E. Environmental impacts

E.1. Level at which environmental impacts analysis is undertaken

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The CPA boundaries are not defined geographically but by individual sales location. Moreover, the technologies distributed through each SSC-CPA present similar positive environmental impacts wherever they are applied and no anticipated negative impacts. Therefore, an SSC-PoA-level Environmental Analysis is deemed most appropriate.

An EIA is not required as a part of this program, as illustrated by the following website:

http://www.nigeria-law.org/Environmental%20Impact%20Assessment%20Decree%20No.%2086%201992.htm

EIA Decree states that an environmental assessment of project shall not be required when:

"the project is to be carried out in response to circumstances that, in the opinion of the Agency, the project is in the interest of public health or safety".

[11] Compliance with this requirement (rural area) shall be demonstrated in specific CPA DD.

As stated in the LOA, the government believes that this project will improve health conditions and therefore complies with Option above.

In addition, there is language which states that when the federal government exercises its duty – specifically issuing an LOA – and there is no further duty to be undertaken (as is the case with a cooking stove project), that an EIA is not required:

"For greater certainty, where the Federal, State or Local Government exercises power or performs a duty or function for the purpose of enabling projects to be carried out an environmental assessment may not be required if -

(a) the project has been identified at the time the power is exercised or the duty or function is performed; and

(b) the Federal, State, or Local Government has no power to exercise any duly or perform functions in relation to the projects after they have been identified."

E.2. Analysis of environmental impacts

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The Stoves being disseminated in this programme are expected to present a substantially lower risk to the local and global environment, and also result in real socio-economic and health benefits to users.

In particular, the activities will result in the following positive environmental impacts:

- Reduced wood fuel consumption, resulting in lower greenhouse gas emissions as well as improved local and household air quality;
- Reduced pressure on forest resources through reduced fuelwood demand;
- Reduced transportation of fuelwood within Nigeria through reduced fuelwood demand. There is considerable evidence from literature [12] and baseline studies that firewood is transported significant distances (often many hundred kilometres) to meet demand, particularly in cities. A reduction in demand for firewood, even if it did not shift supplies closer to areas of demand, would result in a reduction in would fuel transported around Nigeria;

Trans-boundary impacts

Emissions calculations are based on the performance of individual stoves within each SSC-CPA, irrespective of where they are manufactured.

E.3. Environmental impact assessment

>> The government of the Federal Republic of Nigeria does not require an environmental impact assessment to be conducted for a typical CPA under this SSC-PoA. In view of this, as well as the conclusion of E1 and E2 that no negative environmental impacts are anticipated, environmental impacts will not be analysed for the SSC-PoA or for any CPAs included in the SSC-PoA.

SECTION F. Local stakeholder consultation

F.1. Level at which local stakeholder consultation is undertaken

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[12] Maconachie, R, A Tanko, and M Zakariya. 2009. Descending the energy ladder? Oil price shocks and domestic fuel choices in Kano, Nigeria. *Land Use Policy*, no. 26.

The CPA boundaries are not defined geographically but by individual sales location and may extend across the SSC-PoA project area. Therefore, an SSC-PoA-level Stakeholder Consultation is deemed most appropriate, covering the whole project area.

F.2. Modalities for local stakeholder consultation

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As per the guidelines (3/CMP.1, Annex, paragraph 1(e)), Stakeholders are the public, including individuals, groups or communities affected, or likely to be affected, by the proposed clean development mechanism project activity. Stakeholder comments have been invited with respect to this SSC-PoA through formal Stakeholder Consultations held on 19 September 2012 in Kaduna[13] and 23 May 2011 in Kano[14].The Kaduna stakeholder consultation was advertised in the local paper and was attended by mostly prospective ICS consumers and distributors of the ICS. For the stakeholder consultation in Kano, a letter of invitation was sent to 60 participants from academia, the media, various Non-Governmental Organizations, Traditional Institutions, hotel managements and restaurants operators, the Firewood Sellers Association, the Peasant Farmers Association, and other artisans association among others. Advertisements were also published in local/national media.

Stakeholders from all over Nigeria were invited for the stakeholders meeting that was held on 23rd May 2011 in Kano vide advertisements in national/local newspapers; Daily Trust and Daily Triumph. Moreover, these advertisements were published consecutively for two days (19th & 20th May 2011) to attract maximum attention of the stakeholders. In the advertisements it was clearly stated that under the PoA the CME intends to implement 2 million improved cooking stoves in Nigerian households in a span of 7 years comprising the first PoA period. In addition to invitation for physical presence, the stakeholders were also given the option of conveying their comments or suggestions via e-mail. Furthermore, through these ads, the stakeholders were also encouraged to contact PP designate to seek more information on the project. Also, vital information about the project was shared in the stakeholders meet, during which it was explained how more people were dying in Nigeria due to indoor air pollution related health issues than HIV and malaria and unabated collection of fuel wood was leading to large scale deforestation and desertification in the country.

In the month of September, the following year that is 2012, stakeholders were again given a chance to voice their opinion on the project through second stakeholders meeting held in Kaduna. This meeting also just like the previous one, was advertised in National newspaper – Daily Trust. Personal invitations and e-mails were also sent to identified stakeholders for this meeting. Like the previous meeting, stakeholders were encouraged to submit their concerns, comments or queries through e-mail.

Both meetings were chaired by a project representative. Presentations were given outlining the project, as well as the wider issues of wood fuel use for cooking and improved stoves in general. The meetings provided opportunities for attendees to request clarifications, raise any concerns, and express support for the project, as well as submit written comments. All proceedings were documented.

[13] A local stakeholder consultation was held in Kaduna, and significant representation from prospective consumers and distributers of ICS were present.

[14] A broader stakeholder consultation was initially held in Kano for security reasons as Kano was a safer option and would allow for greater attendance of those who would need to travel from outside the state.

Further consultations were undertaken during baseline assessment, as follows:

1. ICS cooking tests with 5 local women over 2 days
2. Focus group discussions
3. Key-informant interviews held with NGOs, public-sector bodies and Government, including:

a. Desert and Desertification Unit (DDU) (12 Jan 2011): Assistant Director, Chief Forestry Officer and Scientific Officer
b. Energy Commission of Nigeria (31 Jan 2011): Director, Deputy Director, Director Research
c. International Centre for Energy, Environment & Development (ICEED) (13 Jan 2011): Executive Director
d. Women Environmental Programme (WEP) (10 Jan 2011): Executive Director.

Thus in line with paragraph 60 of the CDM project standard for programme of activities, version 02 It can be concluded that the CME made all efforts to reach out to stakeholders such as end users, government bodies, media persons, NGOs etc in a transparent manner and provided them the opportunity to comment on the project in person or via mail. Also, the effect of PoA in terms of reduced deforestation, improvement in quality of life of women, employment opportunities that were expected to arise as a result of demand of stove parts etc which were discussed during stakeholders meeting or which was stated in the advertisements, was in the context of entire Nigeria as the PoA was perceived to bring about positive changes in the country as whole.

F.3. Summary of comments received

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Summary of comments arising from surveys and key informant consultation

1. Will the stove be manufactured in Nigeria to keep costs down and provide employment opportunities?
    a. Stove components will be imported in order to benefit from low-cost, consistent high quality; assembly will be undertaken in Nigeria, which will provide employment opportunities.
2. What measures are in place to ensure sustainability and scale of this project, in view of difficulties faced in the past?
    a. Unlike some previous initiatives, this program will leverage a combination of high-quality, high-performance durable devices; widespread promotion and dissemination channels; and subsidised prices enabling access across society.
3. Can the stoves burn animal dung?
    a. Wood is the most commonly-used fuel within this project area, and the stoves being introduced are specifically designed to improve its combustion. They are not suitable for use with animal manure or all agricultural residues.
4. How will the project deal with imitations of stoves?
    a. All stoves registered under this program will bear a unique serial number, linked to a database. The stoves also use certain highly-specialised materials which would be very difficult to replicate or even imitate.
5. Have academics in Nigeria been involved and consulted in the process of project design?
    a. From the outset academics and other key informants across sectors have been consulted and involved with data collection.
6. (From a user of an ICS) The stoves are convenient, fast, easy-to-use and save money – he reported halving his expenditure on wood fuel.

Comments arising from surveys and key informant consultation

1. Women who tested stoves
    - □ Stoves were found to visibly save considerable fuel, and were described as easy to use;
    - □ 100% wished to purchase an ICS after trying it;
    - □ No one reported any need to change the way food was cooked.

2. Men who participated in focus group discussions

- Some of the men were initially reluctant to pay for an ICS. However, when the economics of the fuel-efficient stove were explained, participants became willing to pay for ICS as they realised the potential savings that could be realised. However, their willingness and ability to pay was still relatively low, and not high enough to meet the full unsubsidised cost of an imported ICS.

3. Key-informant interviews.

All key informants consulted were in support of these activities. Specific comments underlining the additionality of this SSC-PoA and need and support for its activities included:

- Forest cover in Nigeria is fast being depleted, and fuelwood extraction is a major factor and needs to be addressed (DDU).
- Alternatives to woodfuel are not widely available, while efficient wood stoves remain unaffordable to the majority, and prices of wood itself continued to rise. Any initiatives to increase usage of improved stoves across Nigeria are very welcome (Energy Commission of Nigeria).
- Indoor air pollution from cooking presents a major public health issue for Nigeria, but there are no certified improved cooking stoves on the market – the majority are just made from scrap metal. There is a trend towards woodfuel use in Nigeria, mainly driven by affordability of alternative stove and fuels (ICEED).
- Deforestation and indoor air pollution issues need to be addressed, and affordable improved cooking stoves are required in Nigeria.

F.4. Consideration of comments received

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Comments arising from stakeholder consultations

All clarifications requested during the stakeholder consultation were addressed to the satisfaction of attendees. No unresolved issues were raised, nor were any misgivings cited. All other comments received were positive in relation to the planned activities. No follow up action was required in respect of the comments received.

SECTION G. Approval and authorization

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A Letter of Approval has been provided by the Designated National Authority of Nigeria.

PART II. Generic component project activity (CPA)

SECTION H. Description of generic CPA

H.1. Title of generic CPA

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Distribution of fuel-efficient improved cooking stoves in Nigeria- CPA XXX

H.2. Reference number of generic CPA

>>

XXX

H.3. Purpose and general description of generic CPA

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Each SSC-CPA will involve the promotion and sale of affordable improved cooking stoves (ICS) to individual households, defined by a detailed sales record.

Implementation & management

CQC will manage and coordinate the promotion, distribution and sale of the ICS using a 3-channel distribution system.

a. The first channel will leverage existing local, experienced commercial distributors, and focus primarily on peri-urban markets. Each of the distributors will have their own established network of retailers.
b. A second channel will primarily utilise smaller, local retailers and community organisations including churches, mosques and NGOs to access more rural markets. Religious bodies have been used in the past to promote and distribute products in Nigeria.
c. A third channel will market directly to consumers through direct sales at local markets days and other large community events.

CQC will manage and coordinate activities of the partners, and also provide all necessary marketing and promotion assistants to the businesses. CQC will also coordinate the monitoring of the programme activities.

Responsibilities of Operational and Management Entity and CPA Implementer

- **C-Quest Capital (CQC)** – Coordinating and Managing Entity

  - Review all CPAs to confirm that all eligibility requirements are met before a CPA is proposed for inclusion;
  - Manage the inclusion of new CPAs with DOE
  - Maintain copies of the CPAs database and back-up records necessary to verify stoves sold within each CPA and the SSC-PoA overall;
  - Provide overall coordination of ICS distribution across the geographical boundary of the SSC-PoA;
  - Oversee day-to-day operation of the SSC-POA;
  - Coordinate with a DOE to verify emissions reductions from CPAs; and
  - Communicate in all matters with the UNFCCC CDM Executive Board

- **CPA Implementer**
  - Coordinate and manage the market promotion necessary for successful distribution;
  - Coordinate and manage the implementation of the monitoring plan;
  - Manage the process of stove selection, stove testing and stove use surveys in the field on designs agreed with CME;
  - Develop and undertake stove distribution and after sales service systems;
  - Develop and maintain a stove tracking and monitoring and reporting system with a high level of data integrity;
  - Maintain an accurate database of stove location for verification and issuance of carbon credits under a design agreed with CME;
  - Keep all records necessary to verify sold stoves within each CPA;
  - Implement and oversee day-to-day operation of the Programme, including ensuring users of the stoves are aware of how they should be used;
  - Track stoves to end users and verify use;
  - Facilitate the field work of commissioned DOEs for inclusion and verification services;
  - Supervise and provide training to local personnel for, monitoring and stoves distribution;
    - Organize training sessions
    - Distribute training materials

No training of manufacturers will be required for stoves that are imported as finished units. Where CPAs include stoves manufactured or assembled locally, CQC will arrange for appropriate training to ensure consistent high quality as required and in conjunction with the stove manufacturer.

Location & scale

CPAs will be defined as the sum of fixed locations of stoves sold to consumers using ICS within, Nigeria, based on a detailed sales record. The sum of the location of these households will define the spatial boundary of the SSC CPA. For CPAs consisting of microscale CDM units, each ICS

distributed under the CPA will adhere to the micro-scale limit with respect to paragraph 124 (m) of Project standard for programmes of activities; version 02 hence demonstration of adherence of CPA to small scale limit is not required.

For CPAs which do not qualify as consisting of microscale CDM units as defined under paragraphs 12 (a) or (b) of methodological Tool 19; version 09, a limit to the number of stoves based on the specific technology and context, such that the energy savings of each CPA does not exceed the SSC limit of 180 GWh_{th}/ year is required to be demonstrated.

Maximum ICS per CPA[15] = 180 GWhth/($NCV_{biomass}$*$B_{y,savings}$)

Where:

$NCV_{biomass}$	Net calorific value of the non-renewable biomass that is substituted (IPCC default for woodfuel, 0.015 TJ/tonne) – which can be calculated as (0.015TJ/tonne)*(0.277777GWh/TJ)
$B_{y,savings}$	Total biomass that is saved in tonnes in one year (*y*)

Destruction of traditional stoves

The number of cooks reverting to cooking on three-stone fires and traditional stoves may be considered negligible for a number of reasons, as follows.

- 100% of households using the ICS during a pilot in March 2010 wished to purchase the ICS at the end of the pilot and said that they would use the ICS in the future. They were motivated by fuel savings, reduced smoke in the home and time savings.
- Stoves, fuels and diets change very little during the year[16] so the impacts of the seasons on usage may also be considered negligible.
- Surveys reveal that the majority of Nigerians purchase firewood so have an incentive to consume less wood and are aware of the fuel savings realised by ICS.

Any incidents of reverting to traditional stoves would be flagged by the ongoing spot checks and annual monitoring.

A switch to fossil fuels may also be discounted, as there is documented preference for firewood[17] even when fossil fuel alternatives are available and affordable, and the last decade has seen a trend away from petroleum-based fuels to wood use.

H.4. Technologies/measures

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The activities under the proposed SSC-PoA will promote improved cooking stoves that result in substantially reduced fuel consumption and emissions for conducting cooking and water heating tasks in homes. The ICS used in this SSC-PoA have characteristics that improve the efficiency of combustion and thermal transfer to the pot compared with a traditional stove or three-stone fire. Most do this by incorporating a 'rocket elbow'; a highly-insulated combustion chamber which provides a conducive environment for clean and efficient combustion of wood. ICS substantially reduce woodfuel consumption compared with a three-stone fire. Efficiency of the ICS shall be established by a national standards body or an appropriate certifying agent recognized by it, or alternatively manufacturers' specification shall be used.

[15] For CPAs which do not consist of microscale CDM units as defined under paragraph 12 (a) or (b) of Tool 19

Specific stoves types will be described for each SSC-CPA.

SECTION I. Application of methodologies and standardized baselines

I.1. References to methodologies and standardized baselines

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AMS-II.G. Energy Efficiency Measures in Thermal Applications of Non-Renewable Biomass. Version 11.

I.2. Applicability of methodologies and standardized baselines

>>

Methodology

The AMS-II.G Version 11 methodology pertains to appliances involving the efficiency improvements in the thermal applications of non-renewable biomass. Examples of these technologies and measures include the introduction of high efficiency biomass fired cooking stoves or ovens or dryers and / or improvement of energy efficiency of existing biomass fired cooking stoves or ovens or dryers.

Further, it requires that non-renewable biomass has been in use since 1989.

SSC-PoA applicability

79.6% of Nigerians are dependent on woodfuel for domestic cooking[18]. The technologies employed in this SSC-PoA are improved cooking stoves (ICS) which substantially reduce fuel consumption through improved combustion and thermal-transfer efficiency.

The use of non-renewable biomass is prevalent; there is significant evidence of widespread long-term deforestation across Nigeria; of a lack of effectively protected forested areas; of increasing price of fuelwood; and of increasing distance of transportation of fuelwood (often of many hundreds of kilometres). See Appendix 3 for details of the NRB assessment.

Avoidance of saving non-renewable biomass accounted for in other projects

Two other improved cooking stoves carbon finance projects are registered within the project boundary of this SSC-PoA. When a new stove is registered by a customer, they will be required to confirm that they previously used a three-stone fire and/ or traditional stove, thus ensuring that no households are enrolled which already own an improved stove registered under a different project. Registration data collected will be verified by spot-checks (see Monitoring).

Evidence that the non-renewable biomass has been in use since 1989

Non-renewable biomass has been used since 31 December 1989 in Nigeria. Evidence for this is presented below:

According to a study quoted by FAO[19], in 1994 demand for fuelwood across Nigeria outstripped supply, as summarised in the table below.

[18] National Bureau of Statistics. 2009. Social Statistics in Nigeria. Table 2.9.

Comparison of production and demand of fuelwood in Nigeria in 1994. ('000m^3) (FAO 2003).

Ecological zones		
A. Production	Guinea Savannah	7,861
	Sudan Savannah	3,163
	High Forest	68,706
	Total production	**79,730**
B. Demand	Guinea Savannah	22,464
	Sudan Savannah	16,054
	High Forest	33,361
	Total demand	**71,879**
Summary	**Net deficit (B – A)**	**-7,851**

The Forest Resources Assessment 2005 (FAO[20]) indicates that total forest resources declined by 36% from 1977 to 1994, as summarised in the following table.

Comparison of forested areas across Nigeria in 1977 and 1994. ('000 Ha)

	1977	**1994**
Dominantly Trees/Woodlands/Shrubs	15 292	8 252
Disturbed Forest	1 473	1 925
Undisturbed Forest	2 623	1 228
Mangrove Forest	1 010	1 012
Montane Forest	683	685
Riparian Forest	748	533
Forest Plantation	101	159
Teak/Gmelina Plantation	63	117
Agricultural Tree Crop Plantation	84	166
Total	**22,077**	**14,077**

In view of the combined evidence of declining forested areas in 1977, with high NRB in 1994, it may be deduced that the majority of wood fuel used across Nigeria in 1989 was from non-renewable sources.

AMS II. G Requirement	**SSC-CPA Compliance Justification**
The methodology is applicable to the introduction of single pot or multi pot portable or in-situ cookstoves with rated efficiency of at least 20 per cent.	Cookstoves distributed under the PoA shall have minimum efficiency of 20% as determined in accordance with 'Data/parameter Table 12' of the applied methodology.
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.	CPAs consisting solely of microscale CDM units as defined by Tool 19, the energy saving of a single ICS shall not exceed the microscale threshold for energy saving per year. For CPAs which do not qualify as consisting of microscale CDM units as defined under paragraphs 12 (a) or (b) of methodological Tool 19, the aggregate energy savings in any year throughout the

[21] http://www.power.gov.ng/download/NREEE%20POLICY%202015-%20FEC%20APPROVED%20COPY.pdf

	crediting period shall not exceed the small- scale threshold of 180 GWh_{th}/year.
Non-renewable biomass has been used in the project region since 31 December 1989, using survey methods or referring to published literature, official reports or statistics.	As demonstrated above, non-renewal biomass has been used in the project region since 31st December 1989.
For cases where the biomass is sourced from renewable sources, the project participants should use a corresponding Type I methodology.	This criterion is not applicable.
If the project device requires a specific fuel for this device (e.g. briquettes, pellets, woodchips), the consumption of the fuel should be monitored during the crediting period.	This criterion is not applicable.
The CDM-PoA-DD/CPA-DD shall explain the proposed method for distribution of project devices including the method to avoid double counting of emission reductions such as unique identifications of product and end-user locations (e.g. programme logo).	Each ICS under the PoA shall be identified through an alpha numeric nomenclature to be fixed to the ICS or in form of registration card to be given to the beneficiary. Specific CPA DDs to include explanation on proposed method of distribution of project devices including method to avoid double counting.
The CDM-PoA-DD/CPA-DD shall also explain how the proposed procedures prevent double counting of emission reductions, for example to avoid that project stove manufacturers, wholesale providers or others claim credit for emission reductions from the project devices.	The stove manufacturers, wholesale providers, end users shall sign an undertaking stating clearly that the CME or an entity authorized by it shall be the sole owner of the CERs arising from the project.

I.3. Application of multiple methodologies

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Not Applicable

I.4. Project boundary, sources and greenhouse gases (GHGs)

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As per the applied methodology AMS.II.G ver. 11, paragraph 16:"The project boundary is the physical, geographical site of the efficient devices that utilize biomass." The geographical area within which all small-scale CDM programme activities (SSC-CPAs) included in the PoA is the Republic of Nigeria. The assessment of sources and gases included in the SSC-CPA boundary is given below.

Source		GHG	Included?	Justification/Explanation
Baseline	Combustion of non-renewable firewood for cooking, Emission Factor for combustion of fossil fuels for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions. Exclusion is conservative assumption.
		N_2O	No	Minor source of emissions. Exclusion is conservative assumption.

Source		GHG	Included?	Justification/Explanation
Project activity	Combustion of non-renewable firewood for cooking, Emission Factor for combustion of fossil fuels for cooking	CO_2	Yes	Major source of emissions
		CH_4	No	Minor source of emissions. Exclusion is conservative assumption.
		N_2O	No	Minor source of emissions. Exclusion is conservative assumption.

I.5. Establishment and description of baseline scenario

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According to the methodology, it is assumed that in the absence of the project activity, the baseline scenario would be "the projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices"..

Application of Tool 11, for 'Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period' version 3.0.1

In line with paragraph 288 and 289 of CDM project standard for programmes of activities; version 02.0; modalities to calculate GHG emission reductions or net anthropogenic GHG removals that result from the baseline scenario has been reassessed in accordance with existing national and/or sectoral policies of Nigeria as well as the latest version of applied methodology.

Assessment of the validity of the data and parameters as per Tool 11

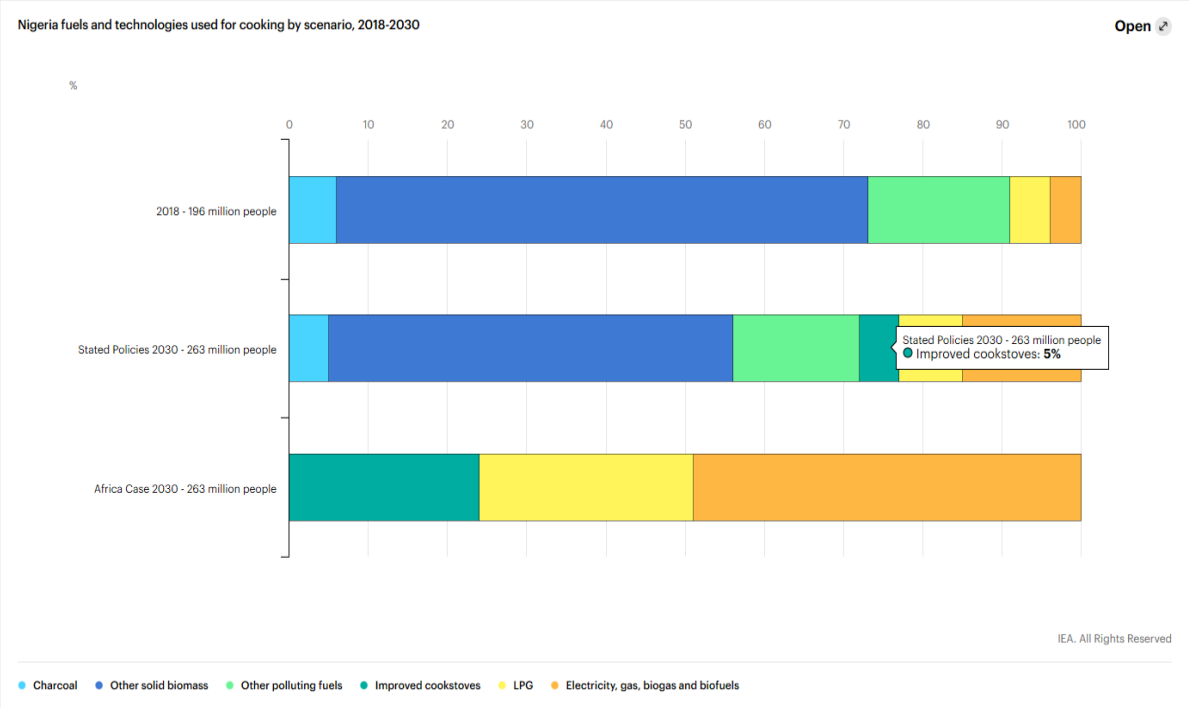
Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or
sectoral policies

The current baseline that is projected use of fossil fuels to meet similar thermal energy needs as those provided by the project devices" is in compliance with the relevant national and sectoral policies of Nigeria.

In an attempt to address the health issues and reduce the pressure on biomass resources, the government of Nigeria introduced policies to encourage the use of efficient clean cooking devices. The National Renewable Energy and Energy Efficiency Policy[21] (2015) and The National Energy Policy, published in 2003, both emphasise the use of efficient cookstoves for household cooking. According to these policies, the government expects to provide clean cooking technologies to 5% of the population by 2030 while acknowledging the fact that solid biomass will continue to be the most preferred fuel for cooking. When this is compared to the current situation, in 2018 more than 70% of the population in Nigeria was dependant on solid biomass along with charcoal for meeting their cooking energy needs (IEA[22]).

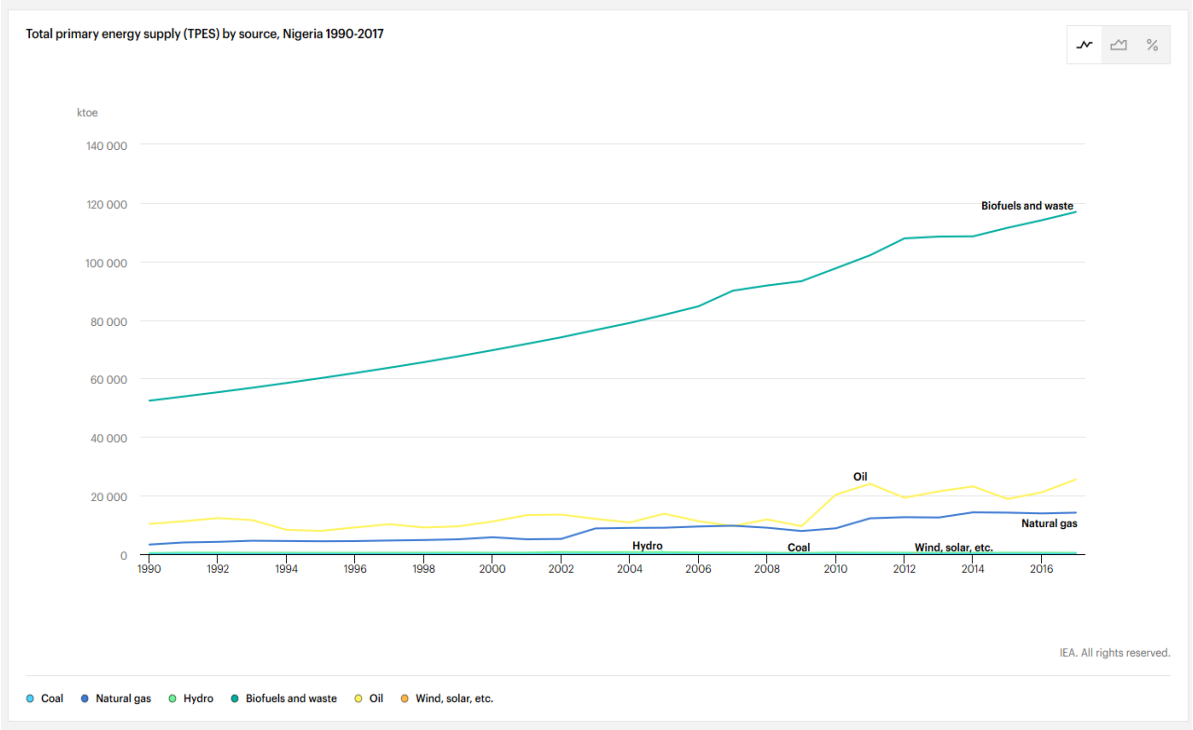
[21] http://www.power.gov.ng/download/NREEE%20POLICY%202015-%20FEC%20APPROVED%20COPY.pdf

[22] https://www.iea.org/articles/nigeria-energy-outlook



Step 1.2: Assess the impact of circumstances

Nigeria relies heavily on solid biomass for meeting its energy demand related to cooking, followed by next most preferred fuel- kerosene. According to a WHO 2016 report, 94% of Nigerians primarily use wood, charcoal, coal and kerosene for cooking. According to IEA[23], biofuels continue to be the most consumed fuel for meeting primary energy demand in Nigeria over last several decades.



[23] https://www.iea.org/countries/Nigeria

Hence the existing circumstances do not affect the credibility of current baseline scenario in Nigeria.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

According to a study[24] published in IOSR Journal of Humanity and Social Science in March 2018, more than 80% of the population in Nigeria, particularly the rural dwellers use the traditional biomass cookstove for cooking with the proportion of households dependant on inefficient cookstoves for domestic cooking being significantly high. The study revealed that only 7.9% households used kerosene as alternative cookstove while other cookstoves usage including electric, liquefied petroleum gas and improved biomass cookstoves were non-existent. Hence the current baseline of use of traditional stoves is still valid.

Step 1.4: Assessment of the validity of the data and parameters

Data and parameters used for determining the original baseline, that were determined ex ante and not monitored during the PoA period and which are no longer valid have been updated according to paragraph 291, CDM project standard for programmes of activities; version 02.0.

Step 2.1: Update the current baseline

The baseline emissions for the subsequent crediting period, have been updated based on the latest approved version of the methodology.

- Default IPCC values – Default IPCC values, other than ones defined in the methodology, have not been used and the ones specified in the latest version of the methodology are updated values.
- Emission factors, values and benchmarks- These have been updated in line with the latest version of methodology.
- The current baseline emissions have been updated for the subsequent crediting period Please refer to Section I.6. for details.
- Data and parameters that were fixed ex-ante and which were not monitored have been updated in accordance with the requirements of the applied methodology AMS II.G, version 11. Please refer to Section I.6.2 for details.

Ex-ante fixed parameters

$B_{old\ HH}$- Annual quantity of biomass used in absence of project activity

Historical data available on United Nations Statistics Division site was used for calculation of household fuelwood consumption by extrapolating the available data to 2018 using a second-order polynomial (quadratic) regression in R. The latest available factors (percentage of population using fuel wood, average household size) used in calculation of B_{old} value were taken from Nigeria Demographic and Health Survey 2018, hence in order to comply with same data vintage, the CME applied second order Polynomial regression to household wood fuel consumption values over a period of 18 years to calculate the 2018 consumption value . The reported consumption from 2000 to 2017 (available from http://data.un.org) was used. The calculation has been included in Nigeria baseline fuelwood consumption sheet.

f_{NRB} – Fraction of non-renewable biomass

The determination of the share of non-renewable biomass (fNRB) in the project area is based on report by C4 EcoSolutions (Pvt.) Ltd which has been calculated in accordance with Tool 30, version 2.

[24] Assessing the Extent of Traditional Biomass Cookstove Usage and Related Cooking Practices: Evidence from Rural Households in Northern Nigeria. IOSR Journal Of Humanities And Social Science (IOSR-JHSS) Volume 23, Issue 3, Ver.1(March. 2018) PP 39-46 e-ISSN: 2279-0837, p-ISSN: 2279-0845. www.iosrjournals.org.

Parameters used for calculation of f_{NRB}

HW_{region} - Average household wood fuel consumption, including fuelwood and charcoal in the country/region.

The household fuelwood and charcoal consumption values have been extrapolated to 2018 using a second-order polynomial (quadratic) regression in R. Household wood fuel and charcoal consumption values over a period of 17/18 years that is from 2000 to 2016 (charcoal) and 2000-2017 (wood fuel) was used to calculate the 2018 consumption value. In line with the requirement of Data/Parameter Table 1, Tool 30; the data has been sourced from Energy statistics database – United Nations Statistics Division[25]

TI_{region} - Non-domestic woody biomass including fuelwood and charcoal consumption for energy applications in the country/region

Non-domestic fuelwood and charcoal consumption values have been extrapolated to 2018 using a second-order polynomial (quadratic) regression in R. Commercial wood fuel and charcoal consumption values over a period of 10/11 years that is from 2007 to 2016 (charcoal) and 2007-2017 (wood fuel) was used to calculate the 2018 consumption value. In line with the requirement of Data/Parameter Table 2, Tool 30; the data has been sourced from Energy statistics database – United Nations Statistics Division[26].

MAI_{forest},& MAI_{other} - Mean Annual Increment of woody biomass growth per hectare of forest and other wooded land areas.

As required by Data/Parameter Table 4, Tool 30; this value has been sourced using option (b)- 2006 IPCC Guidelines for National Greenhouse Gas Inventories for "Above-ground biomass growth rates (t/ha-yr) for different ecological zones" (Chapter 4, Table 4.9). Use a weighted average based on the forest area of two different age categories (i.e. above and below 20 years)

F_{forest},& F_{other} -Extent of forest as well as other wooded land

In the study done by C4 EcoSolutions (Pvt.) Ltd, the forest and other wooded land cover for Year 2000 and 2018 was estimated using Hansen/UMD/Google/USGS/NASA spatial data, and disaggregated according to the FAO global ecological zones. The tree cover was estimated as the fractional area of each grid cell that is covered by the tree canopy (as the size of the grid cells are considerably larger than any individual tree). The total area of all the grid cells that contain some tree cover is roughly equivalent to the total area of the ecological zone. While FAO definitions consider all areas with >10% cover forests, areas with 5-10% cover other wooded lands, and <5% cover as other lands, in the present report in order to capture the forest dynamics and how they may be changing (due to loss or gain in tree cover), the calculations have given some consideration to the forest cover thereby accounting for any deforestation or degradation that results in a transition across the relevant thresholds (5% or 10%). In line with the requirements of Data/Parameter Table 5, Tool 30, option (b) official data has been used for determining this parameter.

P_{forest},& P_{other} -Extent of non-accessible area within forest and other wooded land areas.

According to tool 30, P_{forest} and P_{other} includes "Extent of non-accessible area (e.g. protected area where extraction of wood is prohibited, geographically remote area) within forest/other wooded land areas. To define "geographically remote area", the Tool clarifies that DNAs/PPs may consider proximity to roads or rivers. For example, forests/other wooded lands that are beyond the average distance travelled to collect firewood can be considered non-accessible. The information of the average travel distance may be sourced from national studies or peer-reviewed literature, or surveys in the project area.

[25] http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW

[26] http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aCH

Woody biomass density increases significantly as a function of distance from the edge of a settled area. The Global Alliance for Clean Cookstoves found that in urban areas women spend an average of 1.4 hours and men an average of 2.2 hours collecting fuelwood. This average was higher for women in rural areas, 1.8 hours, and lower for men, 2.1 hours[27]. Assuming that the harvesting of fuelwood takes at least half of the time spent, and an average walking speed of 4 km/hr over uneven terrain, the average one-way walk distance to fuelwood source can be conservatively estimated to be less than 2.5 km. Forested areas beyond the harvestable distance of 2.5 km were therefore determined to be geographically remote. The total available woody cover was estimated by subtracting the woody cover of the protected areas and the woody cover of geographically remote areas from the total woody cover[28.]

To calculate this accessible woody cover, all the areas that are within 2.5 km of a road, leaving protected area was masked out. The protected cover has similarly been determined by masking out all areas that don't fall within a protected area. In line with Option (b) of Data/Parameter Table 6; Tool 30; the extent of protected area has been sourced from National study that is Hansen/UMD/Google/USGS/NASA spatial data. Determination of 2.5 km as the average travelling distance for wood collection has been derived from literature review.

All estimations/ extrapolations/projections have been included in the fNRB calculation spreadsheet, which is submitted along with this PoA-DD.

$NCV_{biomass}$ – Net calorific value of biomass
The value is in accordance with AMS II.G version 11.

$EF_{projected\_fossilfuel}$- emission factor of the fossil fuel projected to be used in absence of project activity
The value is in accordance with AMS II.G version 11.

L-Leakage
The value is in accordance with AMS II.G version 11.

Step 2.2: Update the data and parameters

Ex-ante Parameter	1st PoA Period	2nd PoA Period
$B_{old, i, j}$ (tons/year)	4.21 (Kaduna); 5.1129 (Kano)	5.72
f_{NRB} (fraction)	0.93	0.96
$NCV_{biomass}$ (TJ/ton)	0.015	0.0156
$EF_{projected\_fossilfuel}$ (t CO_2/TJ)	81.6	73.2

I.6. Estimation of emission reductions

I.6.1. Explanation of methodological choices

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The choice of methodology for a typical SSC-CPA will be AMS IIG Version 11. The activities of each SSC-CPA will entail the distribution of improved cooking stoves, which result in energy

[27] Global Alliance for Clean Cookstoves. Guatemala Cookstoves and Fuel Market Assessment. 1–102 (2013).

[28] More details have been included in the fNRB report being submitted along with this PoA DD

efficiency improvements to some application of non-renewable biomass, as required by AMS IIG Version 11.

In the absence of the project activity, for the purposes of emissions reductions, the baseline is assumed to be the use of fossil fuels to meet similar thermal needs. In this case, as per AMS IIG Version 11, the default value of 73.2 tCO_2/TJ[3] (including CH_4 and N_2O emissions) for Sub-Saharan Africa is applied. In addition, Version 11 allows a default leakage adjustment factor of 0.95 to be applied to B_{old} to account for leakages. This PoA will also use this default

Because of the nature of traditional baseline stoves in use in the countries part of this POA – including three stone fires and traditional pot supports – it is not possible to ensure that these are disposed of. Therefore, this PoA will monitor the continued use of baseline stoves amongst users of ICS that are in operation in order to ensure that baseline stove usage is accounted for in calculation of emission reduction in accordance with Equation 2 of AMS II.G Version 11.0

According to the methodology, $B_{y,savings}$ may be calculated in a number of ways and this PoA will allow the use of Option 3 that is Water Boiling Test for estimation of $B_{y, savings}$ in CPAs under this POA.

Under option 3; the CPAs can use either equation 7 or equation 8 for estimating $B_{y, savings}$. The choice of option shall be stated clearly in the CPA in accordance with paragraph 50 of applied methodology.

I.6.2. Data and parameters fixed ex ante

NB: not all of the following parameters will be reported in each CPA DD form. The parameters will be reported according to the option chosen for determining By,savings as per section I.6.1 of this document.

Data/Parameter	**$B_{old,HH}$**
Data unit	Tonnes / household / year
Description	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices
Source of data	Based on the historical data
Value(s) applied	5.72
Choice of data or Measurement methods and procedures	Calculated from historical data.
Purpose of data	Calculation of baseline emissions
Additional comment	Calculation included in Appendix 4

Data/Parameter	$B_{old,i,j}$
Data unit	tons/annum
Description	Annual Quantity of woody biomass used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type i and batch j.
Source of data	$B_{old,HH} \div N_{d,HH}$
Value(s) applied	5.72
Choice of data or Measurement methods and procedures	. Based on published data. It is envisaged that only a single project stove will be distributed/installed per household hence the value of $B_{old,i,j}$ is equal to the value of $B_{old,HH}$. The value of $N_{d,HH}$ will be monitored at the time of registration of project stove to ensure that only one project device is present per household.
Purpose of data	Calculation of baseline emissions
Additional comment	none

Data / Parameter:	$f_{NRB,y}$
Data 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:	Independent third-party report.
Value(s) applied:	0.96
Choice of data or Measurement methods and procedures:	Calculated as per "Tool 30: calculation of the fraction of non-renewal biomass"; version 2.0
Purpose of data	Calculation of baseline and project emissions
Additional comment:	The fNRB report and calculation sheet being submitted with the PoA DD can be referred for details of calculation

Data / Parameter:	$EF_{projected\_fossilfuel}$
Data unit:	TCO_2/TJ
Description:	Emission factor of the fossil fuel projected to be used for substitution of non-renewable biomass
Source of data:	Default value for Sub-Saharan Africa as provided in Version 11 of AMS IIG
Value(s) applied:	73.2
Choice of data or Measurement methods and procedures:	Regional default value of fossil fuel emission factor given in AMS II.G; version 11.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	none

Data / Parameter:	$NCV_{biomass}$
Data unit:	TJ/ tonne
Description:	Net Calorific Value of non- renewable woody biomass

Source of data:	IPCC default value for woodfuel
Value(s) applied:	0.0156
Choice of data or Measurement methods and procedures:	IPCC default applied
Purpose of data	Calculation of baseline and project emissions
Additional comment:	none

Data / Parameter:	**L**
Data unit:	Fraction
Description:	Leakage adjustment factor
Source of data:	Default value, as per AMS IIG Version 11.
Value(s) applied:	0.95
Choice of data or Measurement methods and procedures:	A net to gross adjustment factor (0.95 default) is applied to $B_{y,savings,i,j}$ to account for leakages as per paragraph 39 of the AMS II.G, version 11 methodology.
Purpose of data	Calculation of baseline emissions
Additional comment:	none

I.6.3. Modalities for ex ante calculation of emission reductions

>>

The SSC-CPAs will calculate emission reductions through application of the following equations:

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

where

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

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

where

- $B_{y,savings,i,j}$ - Quantity of woody biomass that is saved in tonnes per cookstove device of type *i* and batch *j* during year *y*
- $N_{y,i,j}$ - Number of project devices of type *i* and batch *j* operating during year *y*
- μ_y - Adjustment to account for any continued use of pre-project devices during the year *y*
- $f_{NRB,y}$ - Fraction of woody biomass that can be established as non-renewable biomass (f_{NRB})
- $NCV_{biomass}$ - Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne, based on the gross weight of the wood that is 'air-dried')
- $EF_{projected\ \ fossil\ fuel}$ - Emission factor for the fossil fuels projected to be used for substitution of non-

renewable woody biomass by similar consumers.

For emission factor of fossil fuel displaced by the project stoves, default value of 73.2 t CO2/TJ which is the emission factor for Sub-Saharan Africa has been used.

The value of f_{NRB} has been calculated using option 1 that is ex ante and shall be fixed for entire crediting period.

Calculating $B_{y, savings}$

According to the methodology, several options have been given for estimation of $B_{y,savings}$. This SSC-PoA will allow the use of option 3 in CPAs under this SSC-POA.

Under Option 3, either of these two equations may be used by the SSC-CPA, however the choice of option shall be stated clearly in the CPA-DD and shall remain fixed for entire crediting period.

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

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

where

$B_{old,i,j}$	-	Annual quantity of woody biomass that would have been used in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project device type *i* and batch *j* .
$\eta_{new,i,j}$	-	Efficiency of the project device *i* and batch *j*
$\eta_{old,i,j}$	-	Efficiency of the old devices being replaced by project devices of type *i* and batch *j*
$B_{y=1,new,i,j,survey}$	-	Quantity of woody biomass used by project devices in tonnes per device of type *i* and batch *j*

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

where

$B_{old,HH}$	-	Annual quantity of woody biomass that would have been used in the household in the absence of the project activity to generate useful thermal energy equivalent to that provided by the project devices (tonnes/household/year)
$N_{d,HH}$	-	Number of project devices per household (number)

I.7. Monitoring plan

I.7.1. Data and parameters to be monitored

(Copy this table for each piece of data or parameter.)

NB: not all of the following parameters will be reported in each CPA DD form, according to the option chosen for determining $B_{y,savings}$ from Section 6 of the methodology

Data/Parameter	***Z***
Data unit	Number of stoves sold
Description	Total number of stoves sold and registered in the Project Database Records
Source of data	Project Database records
Value(s) applied	To be mentioned in individual SSC-CPA DDs.
Measurement methods and procedures	Detailed sales information will be collected for each customer, either using electronic or paper-based means. On electronic means, the data will be collected by SMS (i.e. mobile phone 'short message service' text) or Information and Communication Technologies ('ICT' – such as PDAs). Information that is entered into the database includes the name of the customer, address/ description of location, contact telephone number(s), unique serial number of the stove, retailer ID, and date of purchase. Sales information submitted via SMS/ ICT will automatically enter the database. Written registration cards will be entered manually into the same database. The unique serial number of each stove sold will correspond to a CPA. The date that the stove is registered in the database shall be used for determining vintage of the stove.
Monitoring frequency	Continuously until the database is frozen for a CPA
QA/QC procedures	Project distribution staff will spot-check end-users to verify that information submitted was factual.
Purpose of data	cross checking
Additional comment	none

Data / Parameter:	$N_{y,i,j}$
Data unit:	Quantity
Description:	Number of project devices of type i and batch j operating in a year.
Source of data:	sample survey
Value(s) applied	To be monitored at CPA level
Measurement methods and procedures:	The percentage of stoves found to be still in operation based on the sampling plan in each monitoring period will be applied to the total number of stoves distributed in each CPA (according to the ICS sales records in the monitoring database and the applicable sample frame). Sampling standard shall be used for determining the sample size to achieve 95 [29] /10 confidence precision. A discount shall be applied based on the percentage of devices operational as determined by the sample survey, e.g. if survey shows that 10% of the devices is non-operating, an adjustment factor of 0.9 shall be applied to number of project devices commissioned in a batch. Separate samples shall be taken for each batch.
Monitoring frequency:	annually/biennially

[29] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements under paragraph 46 of the applied methodology shall apply.

QA/QC procedures:	The unique reference number of each stove shall be logged in the monitoring database showing the total number of stoves sold. Data from the sampling plan will be collected in each monitoring period by trained project staff and applied in the emission reduction calculations. Internal cross-checks by the CME or CPA Implementer will be undertaken as QC.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	This parameter will be monitored annually, beginning 1 year after the date of registration. The monitoring will be done by surveys, undertaking a representative sample from the sales records to ensure the stoves are still in place. The process for determining the sample size is described in Part II Section I.7.2.

Data / Parameter:	μ_y
Data unit:	fraction
Description:	Adjustment to account for any continued use of pre-project devices during the year *y for CPAs using* $B_{old,i,j}$ *for calculation of* $B_{y,savings}$
Source of data:	Survey of a representative sample to determine the ongoing baseline stove use will be undertaken using the sampling approach outlined in Part II section I.7.2 of the SSC-PoA-DD
Value(s) applied	To be monitored at CPA level.
Measurement methods and procedures:	The CPAs can use either of the options provided in the applied methodology, AMS II.G, version 11 (Data/Parameter Table 10) for determining the value of μ_y.
Monitoring frequency:	annually/biennially
QA/QC procedures:	Data for this parameter will be collected using the same survey for the parameter $N_{y,i}$ (in-use appliances) conducted by trained project staff members. Internal cross-checks by the CME or CPA Implementer will be undertaken as QC.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	If equation 7 under option 3 (WBT) is used combined with direct measurement of Biomass new, then $\boldsymbol{\mu y,i,j}$ (parameter 2) may be assumed as 1.0. When the data loggers are used, the days when only project devices or only pre-project devices are used will be attributed accordingly. The days where both devices have been used, if the data loggers are able to detect and record the time each device has been used (e.g. in hours), the share in the total duration of utilization will be used to attribute a fraction of this day to one or to the other device. Alternatively, if the data loggers are not able to determine the duration of the utilization, but only the situation of the device being on or off (i.e. used or not used during that day), the share of 50:50 may be used

Data / Parameter:	$\eta_{new,i,j}$
Data unit:	Fraction
Description:	Efficiency of the device type i and batch j being deployed as part of the project activity
Source of data:	Efficiency test report
Value(s) applied	To be monitored at CPA level

Measurement methods and procedures:	Efficiency may be determined using any of the following 1. The efficiency of the project devices shall be based on certification by a national standards body or an appropriate certifying agent recognized by that body; 2. Alternatively, manufacturer specifications on efficiency based on water boiling test (WBT) may be used as per directives given in methodology. 3. If the efficient cookstoves are produced by a manufacturer with a recognized management system in place (e.g. ISO certification) to ensure that the individual equipment produced do not vary beyond the range of acceptance limits (e.g. characteristics such as materials, critical dimensions). Directives given in the methodology with respect to simplified approach may be used.
Monitoring frequency:	• Recorded at the time of stove installation/distribution. • In the subsequent years after stove installation, the efficiency of project stoves to be estimated annually in accordance with options (b), (c) or (d) under paragraph 37 of the applied methodology. Choice of option to be mentioned in the CPA DD
QA/QC procedures:	Efficiency tests to be carried out in accordance with national or international standards / guidelines by an authorized agency.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	Loss in efficiency of project devices due to ageing shall be assessed in accordance with paragraph 37 of the applied methodology. The CPAs developed under the PoA can use either of the options stated below for determining drop in efficiency of the project devices. (b) Manufacturer of project devices shall confirm with technical justification based on certification by a national standards body or an appropriate certifying agent recognized by that body that no decrease in efficiency of project device is envisaged during the crediting period; or (c) Determine the rate of efficiency drop for a representative sample of the first batch of project device i in year y and assume that same rate of loss in efficiency applies to all other batches. In other words, it may be assumed that the degradation of efficiency measured in a representative sample of the first batch of project devices i apply to all subsequent batches. The efficiency of the project devices in the first batch has to be monitored annually through representative samples and this rate of loss in efficiency may be applied correspondingly to all batches; (d) Determine the loss in efficiency annually from a representative sample of each batch and use the actual loss rate that is measured. CPA DD to clearly mention the option selected.

Data / Parameter:	$\mathbf{B_{y=1,new,i,\ j,survey}}$
Data unit:	tonnes
Description:	Quantity of woody biomass used by project devices in tonnes per device of type *i*.
Source of data:	Sample survey of end user or direct measurement at each end user locations.
Value(s) applied	To be monitored at CPA level.

Measurement methods and procedures:	Determined in the first year of the introduction of the devices (e.g. during the first year of the crediting period, y=1) through measurement campaigns at representative households and/or sample survey. Sample surveys to estimate this parameter, that are solely based on questionnaires or interviews (i.e. that do not implement measurement campaigns) may only be used if the following conditions are satisfied: • Pre-project devices have been completely decommissioned and only efficient project device(s) are exclusively used in the project households; • If multiple devices are used in the project, it is possible from the results of the survey questions to clearly differentiate the quantity of woody biomass being used by each device. In other words, if more than one device, or another device that consumes woody biomass, are in use in project households, then the sample survey needs to distinguish the quantity of biomass used by the project device and the other devices that use biomass
Monitoring frequency:	Once within first year of project installation
QA/QC procedures:	Survey to be conducted in accordance with "Standard for sampling and surveys for CDM project activities and programme of activities, version 08.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	none

Data / Parameter:	Nd,HH
Data unit:	number
Description:	Number of project devices distributed per household
Source of data:	To be monitored at CPA level
Value(s) applied	To be mentioned in individual SSC-CPA DDs for CPAs that have already been implemented, else to be declared in the first monitoring report.
Measurement methods and procedures:	Recorded at the time of stove installation/distribution
Monitoring frequency:	Once at the time of CPA implementation
QA/QC procedures:	
Purpose of data	Calculation of baseline and project emissions
Additional comment:	Results of ex post monitoring/survey not to be used for determining this parameter.

Data / Parameter:	η_{old}
Data unit:	Fraction
Description:	Efficiency of pre-project device
Source of data:	default
Value(s) applied	0.10/0.20
Measurement methods and procedures:	Recorded at the time of stove installation/distribution
Monitoring frequency:	Once at the time of CPA implementation

QA/QC procedures:	At the time of project stove distribution/installation, the nature of baseline stove with respect to it being a i. three-stone fire using firewood (not charcoal), ii. conventional device with no improved combustion air supply or flue gas ventilation, that is without a grate or a chimney iii. other types of devices, not included in categories above shall be recorded. For categories (i) & (ii) default value of 0.10 shall be used, & for baseline stoves belonging to category (iii) default value of 0.20 shall be used.
Purpose of data	Calculation of baseline and project emissions
Additional comment:	Fixed for each individual household included in the CPA

Data / Parameter:	**Life Span**
Data unit:	years
Description:	The operating life- time of the project device.
Source of data:	Manufacturer (certified by a national standards body or an appropriate certifying agent recognized by that body)
Value(s) applied	To be declared in individual SSC CPA DD
Measurement methods and procedures:	none
Monitoring frequency:	Recorded once at the time of CPA implementation
QA/QC procedures:	none
Purpose of data	Methodology requirement
Additional comment:	none

Data / Parameter:	**Date of commissioning of batch j**
Data unit:	date
Description:	Stoves can be grouped in batches and latest date of commissioning of a device within the batch shall be used as the date of commissioning for the entire batch.
Source of data:	CPA database
Value(s) applied	To be reported for each batch in monitoring report
Measurement methods and procedures:	none
Monitoring frequency:	Recorded at the time of commissioning of last stove in a batch
QA/QC procedures:	none
Purpose of data	Methodology requirement
Additional comment:	none

Data / Parameter:	**Date of commissioning of project device i**
Data unit:	date
Description:	Date of commissioning of individual stove
Source of data:	CPA database
Value(s) applied	Reported in emission reduction calculation sheet for a monitoring period
Measurement methods and procedures:	none

Monitoring frequency:	Recorded at the time of installation or distribution or completion of registration process of an individual stove.
QA/QC procedures:	none
Purpose of data	Methodology requirement
Additional comment:	none

I.7.2. Sampling plan

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As per *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities; version 08.0,* the sampling plan is the following:

(a) Sampling Design

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

(i) Objective and Reliability Requirements:

The objective is to obtain an unbiased and reliable estimate of the proportion or mean value of the following key variables over the course of the crediting period, and with 95 [30] /10 confidence/prevision (as per paragraph 23 of Standard for sampling and surveys for CDM project activities and programme of activities; version 08.0).

Monitored Parameters:

Sr. no	Parameter	Description of Parameter	Frequency
1	$Ny_{,i,j}$	Number of ICS still in operation	Annual/biennial
2	μ_y	Adjustment to account for any continued use of pre-project devices. (in case equation 7 of methodology is used)	Annual/biennial
3	$\eta_{new,i,j}$	Efficiency of device type 'i'; batch 'j'	Annual
4	$B_{y=1,new,i,survey}$	Quantity of woody biomass used by project devices in tonnes per device. (in case equation 8 of applied methodology is used)	Once, within 1st year of project start date

(ii) Target Populations:

- The target population for parameters 1,2 and 4 are all households in the SSC-PoA database which are using fuelwood in ICS distributed under the SSC-PoA for cooking.
- The target population for parameter 3 is the set of stoves that are operational and belong to same model and vintage.

(iii) Sampling Frame

[30] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

To ensure the homogeneity of the CPAs included for a single sampling plan, two sampling frames shall be defined. The CPAs are to be implemented in urban, peri-urban and rural households of same geographic location of Nigeria, thus it is expected that the geographical locations do not have influence on the parameter of interest. Therefore, all these 4 parameters can be assumed to be highly homogeneous regardless of how the end user group and distribution/installation location is defined. The Sampling Frame for individual parameters have been defined in the following paragraphs

The sample frame refers to all the information sources on the Database. There are two primary mechanisms for data collection: the SMS/ICT system and paper registration card for newly distributed ICS and the Monitoring Survey (which includes a household questionnaire and visual inspection of ICSs) that will be used throughout the lifetime of the SSC-PoA. The SMS/ICT data and/or paper registration card (or equivalent) is used to populate the stoves Database and the Monitoring Survey follows the "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities"; version 08.

The SSC-POA is open to different CPA Implementers and different models of ICS. As explained below (on section "sampling method"), to take the different characteristics of different CPA Implementer and ICS models into consideration, CPAs shall be grouped together to create a Primary Sampling Unit which is homogenous. Paragraph 22 of the Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities"; version 08, allows for the use of a single sampling plan covering a group of CPAs, provided the homogeneity of population can be demonstrated, or differences are taken into account in the sample size calculation. As per paragraph 23, 95[31]/10 confidence/precision shall be applied for sampling surveys in all cases, whether the CPAs are grouped together or when sampling is conducted at the CPA level for CPAs that are solely composed of "microscale CDM units" as defined in the Methodological tool "Demonstration of additionality of microscale project activities".

1) Sampling frame for proportion of ICS still in operation ($\boldsymbol{N_{y,j}}$)

The first step is to identify the Primary Sampling Units.

Factors such as model of the ICS or implementer of CPA do not effect parameter $N_{y,j}$ since no of stoves that are operational are largely independent of who is distributing/installing stoves or the type of stove being distributed. Moreover, the CME has put in place measures to regulate the activities of CPA implementers with regard to distribution/installation and after sales services thereby resulting in all CPA implementers following more or less similar practices. Therefore Primary sampling unit in case of parameters $N_{y,j}$ is independent of CPA implementer or model of stove.

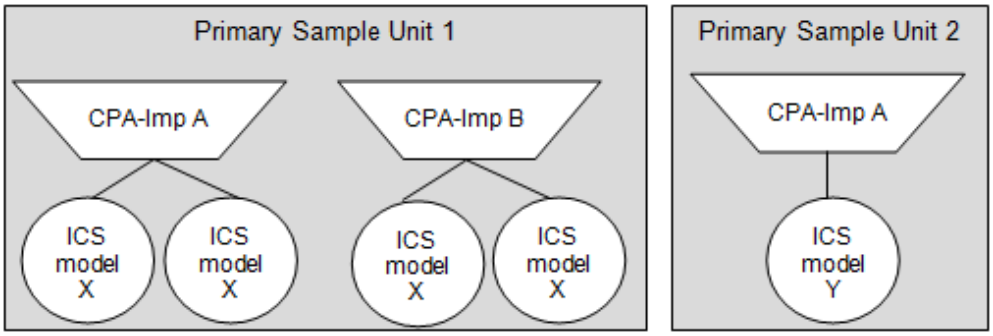
2) Adjustment to account for any continued use of pre-project devices (μ_y)

Alike $N_{y,}$j, factors such as model of the ICS or implementer of CPA do not effect (μ_y) since continued use of pre-project devices is largely dependent on cooking practices within the population rather than on who is distributing/installing stoves or the type of stove being distributed. Hence a single primary sampling unit can be used for different CPA implementers or different models of stoves provided they have similar design or working principle.

[31] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply- 90 % confidence interval and 10% margin of error for annual sampling and 95% confidence interval and 10% margin of error for biennial sampling.

3) Thermal Efficiency of operational ICS ($\eta_{new,i}$)

The thermal efficiency of operational ICSs shall vary in accordance with its model, but not within different CPA Implementers. Hence for parameter $\eta_{new,i}$ the Primary Sampling Unit shall be defined as the group of ICSs of the same model and same vintage. If the same CPA Implementer has two different ICS models being implemented in the same vintage – this will form two Primary Sampling Units. Finally, two primary sampling units will be formed by ICS from two different vintages and all other factors (ICS model and CPA Implementer) remaining equal. The below schematics illustrate the example used above assuming all stoves in the schematic are in one vintage.



For example, if different CPA Implementers are implementing CPAs using an ICS model "Y" for the past 3 years. In order to evaluate the thermal efficiency of the different vintages of the same stove "Y", the primary group shall consist of all ICSs under the POA (regardless of CPA Implementer) which are of the same vintage and same model – in this example this would be ICSs of vintage 2 (over one year old and under two years old) and vintage 3 (over two years old and below 3 years old).

4) Quantity of woody biomass used by project devices in tonnes per device ($B_{y=1,new,i,\ survey}$)

Similar to thermal efficiency $B_{y=1,new,i,\ survey}$ shall vary in accordance with its model, but not within different CPA Implementers. For this parameter, CPAs with the same ICS model can be grouped together and form a Primary Sampling Unit. In the event the SSC-CPA has two different CPA Implementers using the same ICS model, these will form a single Primary Sampling Unit. However, if the same CPA Implementer has two different ICS models being implemented – this will form two Primary Sampling Units.

(iv) Sampling Method

The sampling method for all four monitored parameters $Ny_{,i,j,}$ μ_y, $B_{y=1,new,i,\ survey}$ and $\eta_{new,i}$ is Simple Random Sampling and samples will be randomly selected from the primary sampling units as illustrated above. To ensure a random selection of ICS, random number generators shall be applied. Each ICS in the target population is uniquely identifiable by its unique ID number. Each ICS can thus be allocated a Sample Selection Number in each monitoring period, starting at 1 and increasing up to the total number of ICS in the Database for that pre-defined sampling frame. Applying the random number generators, the ICS can then be randomly chosen from the defined population up to the required sample size as calculated by the CME.

To determine the parameters, sampling will involve the following approaches (outcome in brackets):

$n_{y,i,j}$:	Visual inspection of the premises to see if ICS is operational and in use. Interview with end user if required to verify that ICS is still in use (Yes/No)
μ_y	Interview with end user and visual inspection to determine if a baseline (replaced) stove is still being used in addition to ICS (Yes/No)
$B_{y=1,new,i,\ survey}$	Interview with end user for determining average quantity of fire wood used in the project stove per day. Measurement campaigns' for

estimation of consumption of wood in project households. (wood fuel quantity)

$\eta_{new,i}$: ICS will be tested using WBTs (ICS thermal efficiency)

The thermal efficiency of ICS ($\eta_{new,i}$) will be determined by the water boiling test. The thermal efficiency of ICS will be determined across CPAs using the same stove model and same vintage (Primary Sample Unit). Using the formulas below, the CME will randomly sample the required number of ICS from the primary sampling units. It is important to note that $\eta_{new,i}$ and hence the thermal efficiency test must take into consideration --and be conducted for-- each ICS vintage. As an illustrative example, consider a PoA that distributed a single ICS model but had two vintages: 75% of the total ICS distributed have been in use for less than 365 days (ie. vintage 1) and 25% have been in operation for over 365 days but less than 730 days (ie. vintage 2). In this case, 2 Primary Sampling Units shall be formed with each sampling unit representing one vintage. For each vintage, the number of ICSs is to be randomly selected and sampled and the sample sizes are to be determined using the below equations. The mean thermal efficiency of each vintage shall be used for calculating emission reductions for all stoves of vintage *i*. that is if $\eta_{new,i}$ for stoves vintage 1 is 26% and vintage 2 is 24%, then all ICS which have been in use for less than a year will use a thermal efficiency of 26% in its calculations, while stoves vintage 2 will use 24%. In the event the monitoring period being over one year (let's use the example of 2 years), an ICS which began its operation on the first day of the monitoring period, the stove shall apply the equivalent number of days in operation under vintage 1 and the equivalent number of days of operation under vintage 2. For avoidance of doubt, in every monitoring period, all ICS vintages will be sampled and the thermal efficiency for each vintage shall be established and used for the calculation of emission reductions for that monitoring period.

(v) Sample Size

For the estimation of the proportion or mean value of the parameters investigated, the minimum sample size for each sample frame has to achieve the 95[32]/10 confidence/precision irrespective of annual or biennial monitoring.

The procedure to determine the sample of households will ensure that they adequately represent the broader project population, minimizing sampling error. Using a 95[33] per cent confidence level, and a 10 per cent margin of error, random samples will be selected from each Primary Sampling Unit. There are three parameters that will be estimated through sampling: the number of stoves still in operation during the monitoring period as determined by the monitoring survey ($Ny_{,j}$), the fraction of baseline stoves in use within the population of operational ICS during a monitoring period (μ_y) and the average ICS efficiency, ($\eta_{new,i}$). The parameter $Ny_{,i,j}$ and μ_y will be sampled in a single survey with a random sample of households using the above described confidence/precision levels depending on annual or biennial monitoring frequency. Quantity of woody biomass used by project devices in tonnes per device $B_{y=1,new,i,\ survey}$ shall also be estimated through sampling within the first year of project installation. It can be coupled with $Ny_{,j\ j}$ and μ_y for the first year. Of the three parameters to be monitored, two are proportion/percentage parameters (μ_y and $n_{y,i,j}$) and one is a mean value parameter ($\eta_{new,i}$).

In order to calculate the required sample size estimates, values for the proportions and the mean values are required. Furthermore, the standard deviation needs to be assumed in case of sampling for a mean value. As per Guidelines for Sampling and surveys for CDM project activities and programmes of activities, there are different ways available to obtain the estimates of the parameter of interest:

[32] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

[33] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

(a) Refer to the result of previous studies and use these results;
(b) In a situation where information from previous studies is not available, a preliminary sample as a pilot could be conducted and use that sample is used to provide the estimates;
(c) Use best guesses based on the researcher's own experiences.

For the registration/inclusion purpose of CPA-DD, option (c) as stated above shall be applied. For the first monitoring period, the values from a pilot study shall be applied. For the following monitoring periods, the estimates shall be adjusted taken the results of the previous monitoring period(s) into account or the result from recent pilot study which is conducted after the previous monitoring periods.

To estimate the sample size for parameters $Ny_{,i,j}$ and μ_y the following equation[34] is used:

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

Where:

n	= Sample size
N	= Population size (Total number of households/ICS)
p	= Expected proportion
1.96	= Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)
0.1	= Represents the 10% relative precision

The following assumptions are made to exemplify the sample size calculation for parameters: $n_{y,j}$, μ_y and $\eta_{new,i}$.

1. An overview of the estimated sample sizes for a hypothetical population of 100,000 ICS units applying a level of 95/10 is provided below. It is likely that all the sample frames for each parameter will include fewer than 100,000 ICS in the first monitoring period, so this is a conservative approach. Hence, population size, N, is taken as 100,000 households/ICS (Assuming one ICS for one household).
2. It is expected at least 80% of ICS still in operation, hence the expected proportion *p* for $Ny_{,j}$ is taken as 0.8.
3. Based on past experience, the expected proportion *p* for $\boldsymbol{\mu_y}$ is taken as 0.608.
4. The expected mean of ICS thermal efficiency is 0.38[35] and its standard deviation is assumed to be 20% of the overall thermal efficiency mean value which is 0.076.

Sample size calculation:
The calculation of the required sample size for each parameter in the first monitoring period is illustrated below for a 95[36]/10 level of confidence and precision. In all cases a conservative approach is taken, however if for any parameter the required 95[37]/10 confidence/precision is not

[34] Equation 1 of Appendix 2, *Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities (Version 4)*

[35] 38% is the thermal efficiency (η_{new}) of the ICS used in the first CPA.

[36] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

[37] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

met then the CME will randomly select an additional sample and collect further data from this sample to ensure the pooled data meet or exceed the required thresholds.

Parameter **$Ny_{,i,j}$**:
Based on the above assumptions, the resulting sampling size for a 95/10 confidence/precision is calculated as:

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.8(1-0.8)}{(100{,}000-1) \times 0.1^2 \times 0.8^2 + 1.96^2 \times 0.8(1-0.8)} = 95.95$$

Therefore, in this case a sample size of 96 is to be sampled from each primary sampling unit.

In case the resulting sample size to achieve the desired confidence/precision levels is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion.

Parameter **μ_y**

Based on the above assumptions, the sample size calculation for a 95/10 confidence/precision would be:

$$n \geq \frac{1.96^2 \times 100{,}000 \times 0.608(1-0.608)}{(100{,}000-1) \times 0.1^2 \times 0.608^2 + 1.96^2 \times 0.608(1-0.608)} = 247.07$$

The required sample size to be sampled from each Primary Sampling Unit is at least 248.

As in the case of parameter $Ny_{,i}$, if the resulting sample size based on the above equation is smaller than 30 ICS, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion.

Parameter **$\eta_{new,i}$:**

For the purposes of determining sample size in the first monitoring period, the performance of ICS is characterized by the range of likely mean efficiency and the likely values of SD relative to the mean, according to the type of ICS. The ICS models that are manufactured in modern factories tend to be very highly efficient (30-50% thermal efficiency) and have been designed to meet stringent efficiency specifications so the standard deviation is expected to be relatively low.

To estimate the sample size for parameter $\eta_{new,i}$ the following equation[38] is used:

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

Where:

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

[38] Equation 4 of Appendix 2, *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (version 04.0)

n	= Sample size
N	= Population size (Total number of households/ICS)
mean	= Expected mean of ICS thermal efficiency
SD	= Expected standard deviation
1.96	= Represents the 95% confidence required (In the case of 90% confidence, 1.645 shall be used)
0.1	= Represents the 10% relative precision

Based on the above assumptions, the sample size calculation for a 95/10 confidence/precision would be

$$n \geq \frac{1.96^2 \times 100{,}000 \times \left(\frac{0.076}{0.38}\right)^2}{(100{,}000-1)\times 0.1^2 + 1.96^2 \times \left(\frac{0.076}{0.38}\right)^2} = 15.36$$

The resulting sample size based on the above equation is smaller than 30, since $\eta_{new,i}$ is a numeric mean value (i.e. not a proportion or percentage) the Student's t-distribution shall be used as per paragraph 14 of "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 08.0.

The sample size for parameter $\eta_{new,i}$ under t-distribution is referred to the equation below[39]:

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

Where t_{n-1} is the value of the t-distribution for 95[40]% confidence when the sample size is n. Since the sample size is not known yet, the first step is to use the value for 95[41]% confidence when the sample is large, i.e. 1.96 and then redefine the calculation.

$$n = \left(\frac{1.96 \times 0.076}{0.1 \times 0.38}\right)^2 = 15.37$$

Thus n is rounded up to 16.
The calculation now need to repeat using t-value for 95% confidence and n = 16

$$n = \left(\frac{2.131 \times 0.076}{0.1 \times 0.38}\right)^2 = 18.17$$

And n is rounded to 19.

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[39] Equation 38,*Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (version 04.0)

[40] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

[41] For CPAs not qualifying the conditions under paragraph 12 of Tool 19, the requirements of the applied methodology shall apply.

The calculation now need to repeat using t_{n-1} value for n = 19. The process should be iterated until there is no change to the value of n.

t_{19-1}	2.101
n=	17.66
Round up	18

t_{18-1}	2.110
n=	17.81
Round up	18

The repeated calculation shows that *n* = 18. Thus the sample size to be sampled from each sampling unit is 18.

The sampling for parameter $\eta_{new,i}$ shall comprise of ICS installed/distributed during the current vintage and oldest vintage. The annual efficiency loss of ICS established from these two vintages may be used to correct the initial efficiency of the ICS installed/distributed later on.

Sample size estimation of 'Quantity of woody biomass used by project devices in tonnes per device' ($B_{y=1,new,i,\ survey}$) shall be included in the CPA DD depending on choice of option for estimation of $B_{y,\ savings}$

The CME may choose to use the same samples to monitor more than one parameter. For instance, the CME can sample $\boldsymbol{\mu_y}$, $\mathbf{Ny_{,i,j}}$, $\mathbf{B_{y=1,new,i,\ survey}}$ and $\eta_{new,\ i}$ –or a combination of these parameters- in the same samples. Since parameters $Ny_{,j}$, μ_y and $\mathbf{B_{y=1,new,i,\ survey}}$ share the same sampling units, CME may choose to have one common survey for these three parameters with largest number of sample size between these three parameters being chosen, then a separate sampling effort may be arranged for parameter $\eta_{new,i}$. Sampling more than one parameter within the same sample (household) helps reduce travel needs for monitoring and the associated costs. At the same time this approach ensures the random selection of samples for every parameter.

Oversampling is strongly encouraged, not only to compensate for any attrition, outliers or non-response associated with the sample, but also to prevent a situation at the analysis stage where the required reliability is not achieved, and additional sampling efforts would be required. The sample size shown above will be adjusted upwards to account for non-responses, CME shall determine the appropriate non-responses rate based on previous experience.

(b) Data:

(i) Field Measurements:

To monitor the number of stoves that continue to be in use ($\boldsymbol{Ny_{,i,j}}$) and the percentage of continued baseline stove use among ICS households in the database ($\boldsymbol{\mu_y}$), the data collected will be a representative number of stoves in the database that are in use for the monitoring period. The method of collecting data will be field surveys of required sample size of ICS users in the database. Frequency of data collection is one survey per monitoring period. Data will be collected from the field surveys, entered in the database and included in the monitoring report.

For monitoring $B_{y=1,new,i,\ survey}$, the data collected will be representative number of stoves in the database that were distributed within one year of start date of CPA implementation. The method of collecting data will be field survey and frequency will be once during the entire crediting period.

To monitor the efficiency of the stove annually (as required by the AMS II.G version 11 methodology) a new test will be conducted to determine the rate at which a sample of stoves from a given vintage year deteriorate in efficiency. The test method to collect the efficiency data will be the Water Boiling Test.

The table below summarizes field measurement data requirements

Parameter	Timing (indicative)	Frequency (required by AMS II.G – Version 11)	Methods to be applied	Comments on seasonal fluctuation
$N_{y,i,j}$	Monitoring will likely occur every 12 months	annual/biennial	Visits to the premises, visual inspection and interview with ICS end-user	Unlikely to be due to any seasonal fluctuation.
μ_y	Monitoring will likely occur every 12 months	annual/biennial	Visits to the premises, visual inspection and interview with ICS end-user.	Unlikely to be due to any seasonal fluctuation.
$\eta_{new,i}$	Monitoring will likely occur every 12 months, but will include ICS of "new vintage[42] as well as the oldest vintage in the sampling frame (sample allocated proportional to size)	annually	Water Boiling Test (WBT) Protocol	Not due to any seasonal fluctuation.
$B_{y=1,new,i,survey}$	Within 1st year from the starting date of CPA implementation for CPAs applying equation 8 of applied methodology.	Once. The value will be fixed for entire crediting period	Visits to the premises, visual inspection, measurement and interview with ICS end-user.	unlikely

(ii)Quality Assurance/Quality Control

The CME will apply measures to ensure the required confidence/precision for each sampled parameter is met, allowing for non-response and the possible removal of outliers from the sample, as part of a Quality Control/Quality Assurance system. The choice of measure applied to each parameter will depend on the cost of each data collection approach and logistics required. The CME will determine the most effective measure for each parameter from the following list (illustrated using a required sample size of 20 and an effect of non-response of 2 to 4 ICS):

- Oversampling: Randomly draw a sample of minimum 24 ICS and collect data from each
- Buffer Group: Randomly draw a sample of at minimum 24 ICS and collect data from only 22 ICS. If this would not result in the required sample size data would be collected from the additional 2 ICS that were selected in the sample.
- Draw an additional sample: Randomly draw a sample of 22 ICS and collect data from these. If the required sample size is not achieved, an additional sample of 2 elements will be drawn and included in the sample.
- Use lower confidence bound (of $Ny_{,i,j.}$, $B_{y=1,new,i,survey}$ or $\eta_{new,i}$) or, with a conservative approach according to the parameter definitions, the upper confidence bound of μ_y

[42] Vintage shall be defined as the "age" of the ICS – ie. number of years it has been in operation.

The CME may choose to stop monitoring a particular parameter once the required level of confidence/precision has been reached, as long as the calculated minimum number of samples has been achieved. As an example, the following steps could logically be followed for the case of applying a 30% buffer:
1. Visit first 10% of premises required for the 30% buffer. If the number of responses is sufficient to achieve the required reliability level, then stop sampling.
2. If step 1 is not sufficient to achieve the required reliability level, then visit the next 10% of premises (increases the additional sampling to 20% of the 30% buffer). If this additional sampling is sufficient, then stop sampling.
3. If step 2 is not sufficient to achieve the required reliability level, then complete the final 10% of the additional sampling buffer (bringing the total to 30%).

The sampling plan has the following procedures in place to ensure good quality data. The CME will ensure that field personnel have reviewed, understand and have signed the monitoring plan, including provisions for maximizing response rates, documenting out-of-population cases, refusals and other sources of non-response. A quality control and assurance strategy will be documented. Quality control and assurance strategies include addressing non-sampling errors, such as non-response or bias from interviewer. The monitoring plan will explain how to properly survey households to prevent bias from interviewer. In the case a household refuses to participate, another household will be chosen at random. To reduce interviewer bias, good questionnaire design and well-tested questionnaires will be used.

The calculation of the sample size will be carried out using estimates for parameter proportions, mean values and standard deviations, as the actual characteristics of the population/sampling frame are unknown. In order to ensure the quality of the sampling results, the CME can draw on the provisions for reliability calculations as provided by the *Guidelines for Sampling and Surveys in CDM Project Activities and Programme of Activities* (version 04). In the event that the sampling results do not fulfil the required level of confidence and precision, the CME can undertake additional samples. If the reliability is still not sufficient after additional samples or other measures, the sampling may be repeated with an increased sample size. Alternatively, the CME may choose to apply the lower bound or higher bound according to the more conservative approach.

As the continued use of ICS and the incidence of baseline stove usage among ICS users are binary parameters, there can be no outliers in the sampled data and no treatment for outliers is required. The sample data for $\eta_{new,i}$ is continuous and therefore the presence of outliers is possible. The following approach will be used to identify and address outliers for the parameter $\eta_{new,i}$.

Outliers for parameter η_{new} will be defined as those data points with values greater than three standard deviations from the mean of the sample.

Data points identified as outliers according to the above analysis will be examined further to correct for possible transcription and data entry errors but will be omitted from the analysis if no such administrative errors exist.

(i) Data archiving
Hard copies of the surveys will be kept and the registration database will have back up. Original stove purchase contracts (SMS data and/or paper registration card or equivalent) or other means of acceptance by the users will be stored in the main office for the coordinating entity. A back-up of the registration database will also be stored on an electronic medium by the CME. All data monitored and required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the project activity, whichever is later.

(ii) Analysis
The CME will manage a project database that includes the following data that can be directly attributable to each CPA within the SSC-PoA, thereby allowing unambiguous determination of the emission reductions attributable to each CPA:

- A list of households participating in each CPA, including name, community/location, distribution date and unique serial number;
- Testing to ensure that the stoves are still operating above the minimum 20% efficiency required by the AMS II.G (version 11) methodology, by the CPA Implementer, CME or a third party certified by a national standards body or an appropriate certifying agency recognized by it.
- Where replacements are made, assurance that the efficiency of the new ICS is similar to the specified.

Data obtained from the samples will be used to estimate proportions and mean values for the parameters described above. The values will then be factored into the emissions reduction calculations and result in the request for issuance of CERs for that group of CPAs – the primary sampling Units. The parameters are applied for emission reduction calculations as outlined in Part II I.6.3 of the SSC-PoA-DD. The stoves that are not in use will be excluded from emissions reductions calculations and will not be counted towards the total number of ICS in operation during the monitoring period. The thermal efficiency of new stoves ($\eta_{new,i}$) will be used in the calculation of the per stove emission reduction, which will be multiplied by the number of stoves in operation in the CPA to obtain the emission reductions per CPA.

(c)Implementation
Sampling for the purpose of emission reduction calculation and elaboration of the monitoring report will occur at the end of each monitoring period. This sampling will be conducted by trained personal either part of the CPA Implementer or CME team, or an experienced third party entity. The maximum length of one monitoring period will be two years (duration, not calendar years), as AMS II.G., version 11 provides the option for annual or biennial (every two years) monitoring. The CPA Implementer will be responsible for managing household data collection and entry into the project database. Field personnel will receive training on how to properly deal with surveying techniques and reduce errors and sign a document certifying that there is no conflict of interest of those involved in data collection and analysis. If there is conflict of interest, the personnel will not be allowed to participate in data collection and analysis. The project database will record the start and end dates of each monitoring period, and record the emission reductions attributable to each monitoring period. Appropriate record keeping procedures will be implemented to ensure that each monitoring period data set can be transparently attributed to its corresponding CPA, preventing any occurrences of double counting. An internal review of the project database will be able to determine the current status of each SSC-CPA—the duration of previous monitoring periods, the households delivering monitoring data, and current verification activities.

Assessment for Leakage
According to methodology II.G, version 11, Paragraph 39; leakage related to the non-renewable woody biomass saved by the project activity shall be assessed on *ex-post* surveys of users and the areas from which the woody biomass is sourced. The methodology offers the alternative that if B_{old} is multiplied a net to gross adjustment factor of 0.95 to account for leakages, surveys are not required. This SSC-PoA will use the 0.95 leakage adjustment factor instead of *ex-post* surveys.

Disposal of Low Efficiency Appliances and Use of Baseline Stoves
In line with equation 2 of the applied methodology, CPAs using equation 7 are required to determine whether pre-project devices are still in use along with project ICS and if found so, an adjustment factor 'μ_y' to account for use of wood in pre-project devices needs to be applied to emission reduction- $ER_{y,i,j}$ calculation. The number of households continuing to use a baseline stove in addition to their ICS, will be monitored throughout the project lifetime using sampling approach described above.

Monitoring Reporting
The CME will assess all monitoring data and produce one or two monitoring reports for the PoA for the DOE to verify corresponding to the preceding monitoring period of all CPAs. This report will

present the data relating to the emission reductions generated by those CPAs included in the SSC-PoA at the time of the monitoring period.

I.7.3. Other elements of monitoring plan

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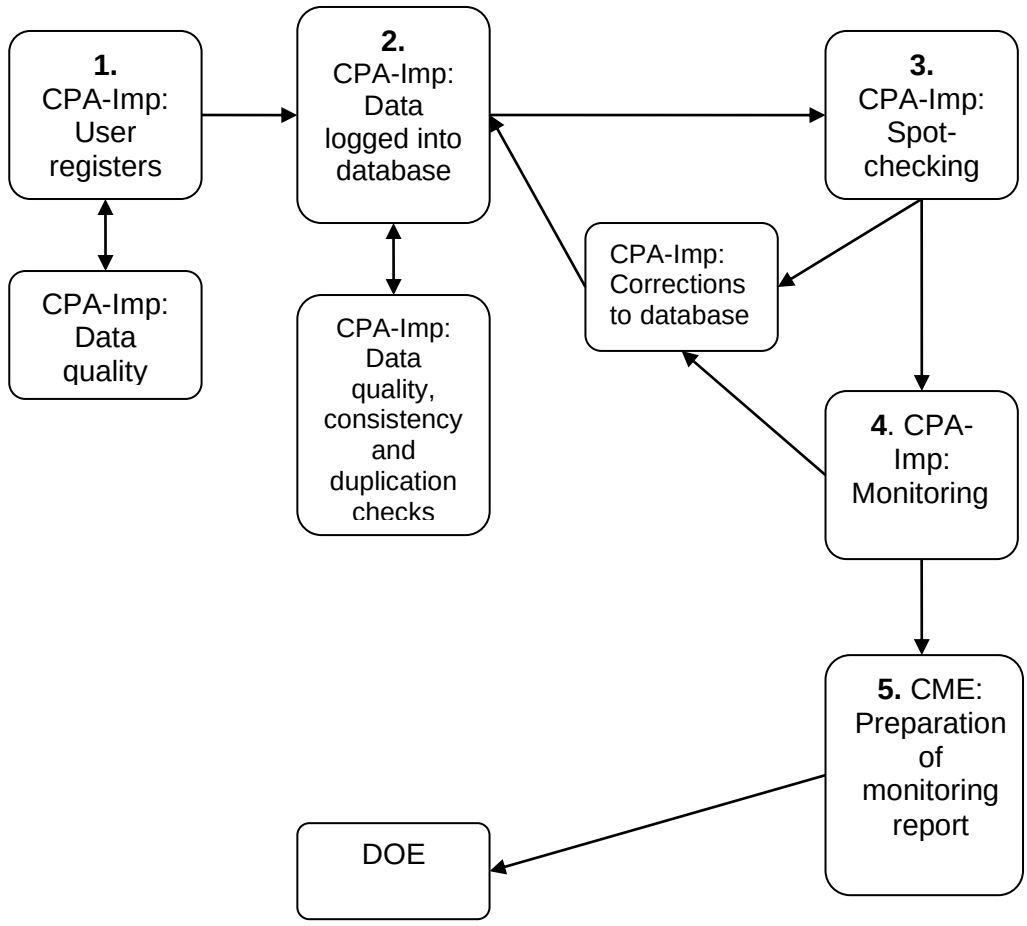
The Monitoring Plan applied in this SSC-PoA involves a number of key elements that ensure that the CME and CPA-Implementer have high-quality, unbiased and reliable information regarding the performance of the project in terms of implementation and outcomes, and for the purposes of calculating Certified Emission Reductions (CERs) following AMS II.G version 11.0 on the basis of the mass of non-renewable biomass saved by the ICS in the project activity.

- Data collection procedures
- Distribution and Monitoring Database
- Spot Checking of ICS (ongoing)
- Sample Plan for the Monitoring Survey
- Data Quality, Consistency and Duplication Checks
- Monitoring Reporting

The below flow-chart illustrates the roles and responsibilities of the parties during the implementation of the monitoring plan for the SSC-CPA. In the below flowchart, the CPA Implementer is abbreviated to “CPA-Imp”, and can be the CME or another party authorized by the CME.



Below is the description of the above steps on the flow-chart.

1. **CPA-Imp: User registers stove:** CPA Implementer will collect/receive the necessary information requested on the Registration Card from the user. Means of collecting this information may be through a physical Registration Card filled by CPA-Imp staff, retailers, end-users or partner organization's staff, or through the use of ICTs or SMS. CPA Implementers' staff shall double check the accuracy of information provided, and request for field staff additional clarifications if needed;
2. **CPA-Imp: Data logged into database:** CPA Implementer trained staff will input the data in the database either manually (if data collected from physical Registration Card) or this will be automatically input if data was collected using ICTs or SMS. CPA Implementer staff shall double check the information included on the database and check for duplications. Any duplicate information shall be investigated and errors corrected or excluded from the database if it is a true duplicate entry.
3. **CPA-Imp: Spot- checking (ongoing):** CPA Implementer field staff will continually randomly select households included in the database and visit them to cross-check the information on the database with the factual evidence in the field. Any inconsistencies found (eg. change in the address of a user) will be updated on the database, and in the case ICS are found to be no longer in use, they will be clearly marked as such and excluded from emission reductions calculations.
4. **CPA-Imp: Monitoring:** CPA Implementer will follow the requirements as per SSC-POA-DD to collect the necessary information for a monitoring report.
5. **CME: Preparation of monitoring report:** the CPA Implementers or the CME will prepare the final monitoring report to be provided to the verifier DOE for verification of emission reductions. A copy of the monitoring report will remain with the CME

The CME will coordinate and manage each CPA Implementer and assist them in implementing each element of the monitoring plan. The monitoring plan shall be elaborated per CPA an in accordance with the Sampling Plan in I.7.2 above.

SECTION J. Crediting period type and duration

>>
Fixed.
10 years 00 months

SECTION K. Eligibility criteria for inclusion of CPAs

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No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
1.	PoA specific requirement	Involve the promotion and distribution of ICS by CQC or entities approved and authorised by CQC.	A clear description of which entity is distributing ICS and model of ICS shall be given on the CPA-DD. If it is an entity approved by CQC, a letter from CQC acknowledging its participation or the agreement between CQC and the entity (covering its participation on the SSC-POA) shall suffice as evidence for this eligibility criterion.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
2.	Geographical Boundary	Is implemented within the geographical boundary Nigeria;	The CME/ CPA Implementer shall self-declare that the stoves will only be sold within the geographic confines of Nigeria. This self-declaration shall be provided to DOE at the time of inclusion of the CPA.
3.	Small Scale threshold	1. If the CPA consists of units which qualify as microscale CDM units, compliance of the CPA with small scale threshold throughout the crediting period is not required as referenced from paragraph 124 (m) of CDM standard for programme of activities; version 02.0 2. For small scale CPAs not conforming to paragraphs 12 (a) or (b) of Tool 19, demonstration of adherence to small scale threshold to be carried out in accordance with paragraph 124 (m) of PS for PoA.	Calculation of annual energy saving for individual ICS to be submitted to DOE in case of option 1 and aggregate energy saving of CPA in case of option 2.
4.	Additionality	Each CPA will satisfy the criteria for demonstrating additionality by establishing that it is implemented in rural Nigeria and comprises of distributed units with an energy saving limit of <= 60 GWh_{th}/yr and end users are households/communities. For small scale CPAs not conforming to paragraphs 12 (a) or (b) of Tool 19, additionality to be demonstrated through figure 2 of Tool 19.	For demonstrating that the CPA is implemented in rural area, the CME/CPA implementer shall use publicly available/official data/survey. Energy saving calculation and self-declaration by CME/CPA implementer regarding target end users to be submitted to validating DOE.
5.	Double Counting check	Has a database describing uniquely identified and defined households in which ICS have been distributed;	A CPA will have a database that includes the following for each ICS unit: name of the customer, address/ description of location, contact telephone number(s), unique serial number of the stove (including prefacing the serial number with the letters “CQC” or three letters representing the stove model), retailer ID, and date of purchase. Sample of database shall be made available to the DOE at time of inclusion.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
6.	Compliance with applicability of methodology	Conditions to ensure compliance with the applicability of the applied methodologies, and other regulatory documents. ..The CPA should comply with all criteria. These applicability criteria include: (1) the project involves the distribution of energy efficient cooking stoves; (2) these new stoves have an efficiency of no less than 20%; (3) non-renewable biomass has been used as a fuel since 1989(4) proposed method of distribution (5) define steps to ensure that double counting does not occur.	Project participants must show evidence of compliance with these eligibility criteria. This would include (1) a description and technical specifications of the improve stove models to be included in the project; (2) the results of a water boiling test indicating that the ICS implemented under the CPA has an efficiency of no less than 20%; and (3) an NRB analysis citing relevant literature showing that non-renewable biomass has been used since Dec. 1989.(4) self- declaration letter enumerating the method of stove distribution and (5) carry out double counting check as stated in eligibility criteria no 4 & 9.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
7.	Exclusivity clause	Does not involve households already involved or covered by any other CPA or CDM project involving the distribution of ICS	Each ICS in each SSC-CPA included in this SSC-PoA will be identified by a unique combination of customer name and geographical location, as well as a unique serial number. The serial number will allow for a clear distinction between the stoves from this SSC-PoA with those of other potential SSC-PoAs. No individual serial number can be in more than one CPA, so it will not be possible for one stove to be counted in two different CPAs. In addition, each CPA will be cross-checked with other CPAs in this SSC-PoA and with CPAs in any other SSC-PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard (GS), and other relevant voluntary schemes to ensure that the CPA is not included in any other SSC-PoA, CDM project activity or voluntary project activity. CPA Implementer or CME will review all on-line materials that might be available from the UNFCCC and GS websites, which list every SSC-PoA, CPA and single-project activity to ensure no other projects are covering the households included in this CPA. When possible, the CPA Implementer will try and obtain access to other project developers' databases to cross-check and ensure there is no overlap of households. Given that each stove in this SSC-PoA will have a serial number beginning with "CQC" or three letters representing the stove model, it is extremely unlikely there will be any overlap. All of this information will be summarized in a report and provided to the DOE upon verification.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
8.	CPA start date	Be able to provide documentary evidence of the start date.	The start date of the CPA will be when the first stove is sold and registered in the database -- this evidence can be provided to the DOE. Specifically, the registration card or SMS text/ ICT will have the date of purchase, and the DOE can review the database to confirm the earliest date of a sale of a stove.
9.	Diversion of ODA fund	Be able to affirm that no funding is coming from Annex I parties. If any public funding is made available from Annex I parties, affirm there is no diversion of Official Development Assistance (ODA);	Self-declaration letters from the CME shall be provided to the validator at time of inclusion asserting that no funding is coming from Annex I parties. If there is funding from an Annex I party, there must be a letter from the funding organization stating that the funding is not a diversion of ODA. If possible, supporting data will be provided to support this assertion, such as the budget for the CPA (stove purchases, marketing/distribution costs) and the amount of financing coming from a private source.
10.	Double counting check	Is not registered as an individual CDM project activity nor included in another registered SSC-PoA	The CME shall cross-check the CPA with other CPAs in this SSC-PoA and with CPAs in any other SSC-PoA or in a CDM project activity operating in the country using the UNFCCC, the Gold Standard, and other relevant voluntary schemes to ensure that the CPA is not included in any other SSC-PoA, CDM project activity or voluntary project activity. All of this information will be summarized in a report and provided to the DOE upon verification.
11.	PoA related requirement	Is approved by CQC entity prior to its incorporation into the SSC-PoA.	CQC shall confirm (through a letter to the DOE at time of inclusion) that it has approved the incorporation of the CPA into the SSC-POA.
12.	Local stakeholder consultation & environmental analysis	The Local Stakeholder Consultation has been conducted at PoA Level and the EIA process is also performed at PoA level.	CPAs to be included in the present PoA are not required to conduct LSC or environmental analysis as these have been done at PoA level.

No.	Eligibility criterion - Category	Eligibility criterion - Required condition	Supporting evidence for inclusion
13.	Technology	Is introducing ICS that will have a thermal efficiency of no less than 20%, (using the WBT outlined in AMS IIG. Version 11 approved by the CDM Executive). Efficiency of the ICS shall be established by a national standards body or an appropriate certifying agent recognized by it, or alternatively manufacturers' specification shall be used	The model of stove implemented under the CPA shall demonstrate its efficiency according to the Water Boiling Test – as per AMS II.G. v11. The CPA is using a stove technology, whose manufacturer specifications are confirmed using a Water Boiling Test.
14.	Target group	The target group should be defined clearly in the CPA and should be households or communities.	Declaration by CME/CPA implementer to be submitted to validating DOE.
15.	Sampling	CPAs shall use Standard for sampling and surveys for project activities and programme of activities, version 08; for surveys	Sample size calculation to be submitted to verifying DOE.
16.	De-bundling check	1. As the generic CPA consists of units which qualify as microscale CDM units, CPAs developed under the present PoA are exempted from performing de-bundling check, as referenced from paragraph 124 (n) of CDM standard for programme of activities; version 02.0. 2. For small scale CPAs not conforming to paragraphs 12 (a) or (b) of Tool 19, it should be demonstrated that the CPA meets the criteria for not being a de-bundled component of a larger project activity (eg: the debundling rule does not apply if the stove, the independent subsystem, does not exceed 1% of the 180 GWh)	Calculation of annual energy saving for individual ICS to be submitted to DOE.
17.	CER Ownership rights	CPAs must include a mechanism that transfers the ownership rights of CERs from the ICS user to the project participants.	The CPA requires that a warranty card is signed or accepted by the end-user upon purchase or distribution of the stove that states that the PPs have ownership of the carbon assets for the life of the stove.

Appendix 1. Contact information of coordinating/managing entity and project participants

Coordinating/managing entity and/or project participants	☒ Coordinating/managing entity ☒ Project participant
Organization name	C-Quest Capital LLC
Country	USA
Address	1211 Connecticut Ave NW, Suite 800, Washington DC 20036
Telephone	+1 (202) 416 2410
Fax	+1 (202) 416 2499
E-mail	cqc-operations@cquestcapital.com
Website	www.cquestcapital.com
Contact person	Isabel Alegre

Coordinating/managing entity and/or project participants	☐ Coordinating/managing entity ☒ Project participant
Organization name	Swedish Energy Agency
Country	Sweden
Address	PO Box 310, 631 04 Eskilstuna, Sweden
Telephone	+46 16 544 20 00
Fax	+46 16 544 20 99
E-mail	-
Website	http://www.energimyndigheten.se/en/
Contact person	Maria Gustavsson

Appendix 2. Affirmation regarding public funding

No public funding is expected to be made available for the proposed SSC-PoA, or any CPA under the proposed SSC-PoA. If any public funding occurs, it is ensured there is no diversion of Official Development Assistance (ODA).

Appendix 3. Applicability of methodologies and standardized baselines

Non-renewable biomass (NRB) assessment
The UNFCCC methodology defines demonstrably renewable biomass (DRB) as (paraphrased) that which:

1. Originates from forests which remain forests, where sustainable management practices are in place and followed, and where national forestry and conservation measures are followed.

2. Originates from non-forest areas which remain as non-forest or become forest, where sustainable management practices are in place and followed, and where national forestry and conservation measures are allowed.

Non-renewable biomass (NRB) is described as the total biomass used at baseline, minus DRB, providing at least two of the following indicators of non-renewability are in place:

1. A trend showing an increase in time spent or distance travelled for gathering fuelwood, by users (or fuelwood suppliers) or alternatively, a trend showing an increase in the distance the fuelwood is transported to the project area;

2. Survey results, national or local statistics, studies, maps or other sources of information, such as remote-sensing data, that show that carbon stocks are depleting in the project area;

3. Increasing trends in fuelwood prices indicating a scarcity of fuelwood;

4. Trends in the types of cooking fuel collected by users that indicate a scarcity of woody biomass.

Supporting evidence is the trend in loss of forest from 1990 to 2010. The Global Forest Resources Assessment 2010[43] (FAO) indicates that total forest area declined by 48% from 1990 to 2010, as summarized in the following table.

Trends in extent of forest 1990-2010

	Forest area (1 000 ha)				Annual change rate					
					1990-2000		2000-2005		2005-2010	
Country/area	1990	2000	2005	2010	1 000 ha/yr	%[a]	1 000 ha/yr	%[a]	1 000 ha/yr	%[a]
Nigeria	17234	13137	11089	9041	-410	-2.68	-410	-3.33	-410	-4.00

In relation to this forest loss over time, the trend in carbon stock in living forest biomass has also reduced by approximately 46% over the 1990 to 2010 time period as summarized in the following table[44].

Trends in carbon stock in living forest biomass 1990-2010

	Carbon stock in living forest biomass (million tonnes)					Annual change (million tonnes/yr)			Annual change per hectare (t/ha/yr)		
Country/ area	1990	2000	2005	2010	Per hectare 2010 (tonnes)	1990-2000	2000-2005	2005-2010	1990-2000	2000-2005	2005-2010
Nigeria	2016	1550	1317	1085	120	-47	-47	-46	n.s.	n.s.	n.s.

We see strong evidence that much of the biomass used in the Guinea Savannah region of Nigeria is *derived from non-renewable sources*.

1. There is considerable evidence that there is a strong trend towards increased distance travelled by fuelwood dealers. Hyman[45] reports that demand outstripped supply across the country and that the deficit is met through long-distance transportation of fuelwood.
2. FAO 2003[46] presents data on demand and supply of biomass within the Guinea and Sudan Savannah regions of Nigeria. Its data indicate a combined deficit of 38.9 million m^3

[43] http://www.fao.org/forestry/fra/fra2010/en/ GLOBAL TABLES, Table 3

[44] http://www.fao.org/forestry/fra/fra2010/en/ GLOBAL TABLES, Table 11

[45] Hyman, E. 1994. Fuel substitution and efficient woodstoves: Are they the answers to the fuelwood supply problem in Northern Nigeria? *Environmental Management* 18, no. 1. http://www.springerlink.com/content/4q86106135738360/

[46] FAO. 2003. Experience of Implementing National Forest Programmes in NIGERIA. EC-FAO PARTNERSHIP PROGRAMME (2000-2003), p42.

firewood. Of total demand within these areas, only 17% is met by supply. These data are presented in the following table.

Comparison of production and demand of fuelwood in Nigeria. ('000m^3) (FAO 2003)

Ecological zones	1994	1995	2000	2005	2010
A. Production					
Guinea Savannah	7,861	7,635	6,500	6,149	5,797
Sudan Savannah	3,163	3,267	2,767	2,748	2,359
Total production	**11,024**	**10,902**	**9,267**	**8,897**	**8,156**
B. Demand					
Guinea Savannah	22,464	22,808	25,033	26,271	26,417
Sudan Savannah	16,054	17,054	19,577	20,118	20,660
Total demand	**38,518**	**39,862**	**44,610**	**46,389**	**47,077**
Summary					
Net deficit (B – A)	**-27,494**	**-28,960**	**-35,343**	**-37,492**	**-38,921**
NRB % (= 100*(B-A/B)	**71**	**73**	**79**	**81**	**83**

Woodfuel collection in both the forest and savanna regions has been described scientific journals as "unsustainable"[47] and this sentiment is also reflected in the National Energy Policy of Nigeria, which notes that demand for woodfuel is unsustainable and significantly greater than annual woodfuel supply.

It is unlikely that trends in loss of carbon stocks and the time it takes to collect firewood are influenced by enforcement of rules and regulations, given the widespread challenges to implementing forestry laws in Nigeria. On the contrary, the lack of enforcement of forestry management has exacerbated widespread depletion of forest resources across Nigeria[48]. The Federal Ministry of Environment sets national policies, but responsibility for the implementation of forest management lies with each of the country's 36 states, each of which has its own forestry laws guided by those at federal level. At the state level, management capacity of the state forestry departments and local organizations is mostly low, with poor funding, low staff morale, limited technical training and often high levels of government corruption. Across the board at the state level, forest laws are often obsolete, and weakly enforced[49]. Management strategies are generally considered insufficient to maintain forest cover and conserve biodiversity[50, 51, 52, 53].

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[47] Gbadegesin, A. and Olorunfemi, F. (2011) Socio-economic aspects of fuelwood business in the Forest and Savanna Zones of Nigeria: Implications for Forest Sustainability and Adaptation to Climate Change. Global Journal of Human Social Science 11(1). PAGE 55

[48] Chemonics International. (2008) Nigeria Biodiversity and Tropical Forestry Assessment: Maximising Agricultural Revenue in Key Enterprises for Targeted Sites (Markets). Available from: http://pdf.usaid.gov/pdf_docs/PNADN536.pdf. PAGE 37

[49] National Programme Document- Nigeria. Available on the UN-REDD website at: http://www.un-redd.org/PolicyBoard/7thPolicyBoard/tabid/54129/Default.aspx PAGE 22

[50] Chemonics International. (2008) Nigeria Biodiversity and Tropical Forestry Assessment: Maximising Agricultural Revenue in Key Enterprises for Targeted Sites (Markets). Available from: http://pdf.usaid.gov/pdf_docs/PNADN536.pdf. PAGE 37

[51] Aruofor, R. (2001) Forestry outlook study for Africa: Nigeria. Food and Agriculture Organisation of the United Nations. Available from: http://www.fao.org/DOCREP/004/AB592E/AB592E00.htm#TOC. Section "Forestry policy, legislation and institutions"

[52] Usman, B.A. and Adefalu, L.L. (2010) Nigerian forestry, wildlife and protected areas: Status report. Biodiversity 11(3), 44 – 52. PAGE 50

Therefore it is highly unlikely that enforcement of regulations is causing collection further away from areas where villagers would collect in the absence of any such regulations. Rather, collection from further distances is a result of deforestation.

The above provides evidence that forested areas (including those with protected status) are vulnerable to encroachment; that traditional supplies of firewood around cities have been depleted; that demand for firewood continues to grow and exceed supply by a factor of 4; that wood is transported many hundreds of kilometres within Nigeria; that prices have increased in recent years; and that there is a net reduction in forested and wooded areas across Nigeria and that this is particularly pronounced within the project area.

Together, this may be used to conclude that 100% of fire wood consumed in the project area is from non-renewable sources.

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

Calculation of B_{old}

Extrapolation of fuelwood consumption -Households from 2000-2017 Data			
Country	Commodity	Year	Quantity (1000 m3)[54]
Nigeria	Fuelwood - Consumption by households	2000	116524.7947
Nigeria	Fuelwood - Consumption by households	2001	119491.0783
Nigeria	Fuelwood - Consumption by households	2002	122544.6086
Nigeria	Fuelwood - Consumption by households	2003	125697.7559
Nigeria	Fuelwood - Consumption by households	2004	128968.4729
Nigeria	Fuelwood - Consumption by households	2005	132370.0055
Nigeria	Fuelwood - Consumption by households	2006	135906.185
Nigeria	Fuelwood - Consumption by households	2007	139577.9967
Nigeria	Fuelwood - Consumption by households	2008	143391.133
Nigeria	Fuelwood - Consumption by households	2009	147348.4401
Nigeria	Fuelwood - Consumption by households	2010	151451.7789
Nigeria	Fuelwood - Consumption by households	2011	155704.8714
Nigeria	Fuelwood - Consumption by households	2012	160105.9661
Nigeria	Fuelwood - Consumption by households	2013	164461.6311
Nigeria	Fuelwood - Consumption by households	2014	168895.3476
Nigeria	Fuelwood - Consumption by households	2015	173392.8845
Nigeria	Fuelwood - Consumption by households	2016	177995.5118
Nigeria	Fuelwood - Consumption by households	2017	182681

[53] ITTO. (2009) Encouraging Industrial Forest Plantations in the Tropics - Report of a Global Study. International Tropical Timber Association. Available from: http://www.itto.int/direct/topics/topics_pdf_download/topics_id=2165&no=0&disp=inline. PAGE 68

[54] [54] http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW%3btrID%3a1231#f_1

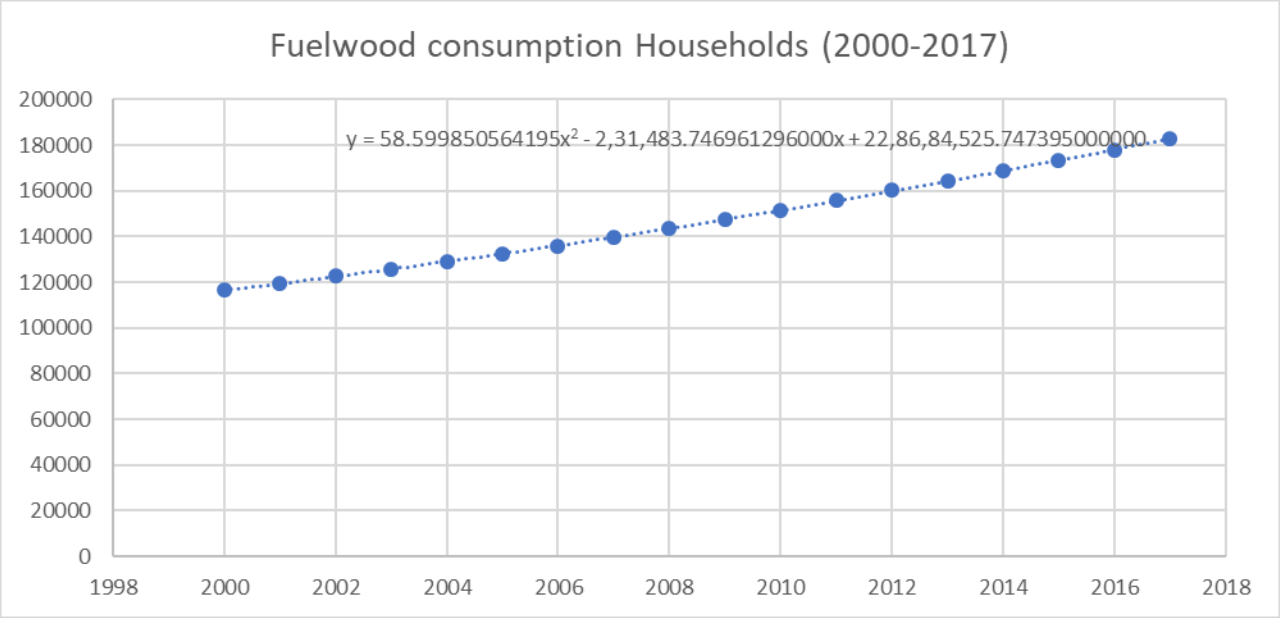
The household fuelwood consumption value for 2018 was extrapolated using a second-order polynomial (quadratic) regression in R. The reported fuel wood consumption values from 2000 to 2017 was used to determine the equation –

$$y = 58.599850564195 \times x^2 - 231483.746961296000 \times x + 228684525.747395$$

where y= fuelwood consumption for x year
and x in this case = 2018.

$$y_{2018} = 58.599850564195 \times 2018^2 - 231483.746961296000 \times 2018 + 228684525.747395$$

$$y_{2018} = 187{,}902{,}228\ m^3$$



2nd order polynomial regression equation

	Parameter	Unit	Value	Source
A	Fuel wood consumption 2018	m^3	18,79,02,228	extrapolated from UN Data [1] Calculation in "Projection of 2018 Value" sheet
B	Density of wood	tons/ m^3	0.725	FAO [2]
C	Fuel wood consumption 2018	tons	13,62,29,116	Calculated (A*B)
D	Population of Nigeria (2018)	#	19,58,74,740	World Bank[3]
E	Share of population using wood for cooking	%	66.50%	Nigeria General Household Survey-Panel Wave 4; 2018/19
F	Population using wood for cooking	#	13,02,56,702	Calculated (D*E)
G	Average fuelwood consumption per capita	tons / y	1.040	Calculated (C/F)
H	Average household size	#	5.500	Nigeria General Household Survey-Panel Wave 4; 2018/19

	Fuelwood consumption per household (B_{old})	tons / y	**5.720**	Calculated (G*H)

Reference

1 http://data.un.org/Data.aspx?d=EDATA&f=cmID%3aFW%3btrID%3a1231#f_1
2 http://www.fao.org/docrep/008/j0926e/J0926e07.htm
3 https://data.worldbank.org/indicator/SP.POP.TOTL?locations=NG

The detailed calculation can be referred from the "Nigeria Baseline Fuelwood consumption assessment (2018)" excel sheet.

Appendix 5. Further background information on monitoring plan

Not applicable.

Appendix 6. Summary report of comments received from local stakeholders

Please refer to Section F of the document for stakeholder's comments.

Appendix 7. Summary of post-registration changes

Via PRC-6283-001, the following permanent changes were made in PoA-DD.

(i) Corrections: Correction was made in PoA-DD to reflect the extended geographical boundary of Kano State and due to the switch of PoA DD template.
(ii) Changes to programme boundary to expand geographical coverage: Kano State was added to the PoA boundary along with Kaduna State, Nigeria.
(iii) The coordinating/managing entity has updated the eligibility criteria for inclusion of CPAs in the PoA to reflect the changes due to additional geographical boundary of Kano State.

Via PRC-6283-002, the following changes were made in PoA-DD.

1. The following has been changed from registered monitoring plan:

   a) During the registration, the sampling method applied in the monitoring plan is multi-stage sampling. Multi-stage sampling is a sophisticated method which is not easy to be implemented and the data analysis is difficult. Given that the population being studied is relatively homogeneous with respect to the parameter being studied, therefore simple random sampling is chosen to replace the existing sampling method. Accordingly, sampling

frame, sampling method and sample size calculation of monitoring plan is revised with information correlated with simple random sampling.

2. The following corrections have been done in the PoA-DD:

   a) In Part 1 Section C, edit is made on the procedure to avoid double counting and record keeping system for each CPA under the PoA. Information and Communication Technologies ('ICT' – such as PDAs) is added as one of the options under electronic means for gathering information from stove end user.
   b) In Part II Section B.7.1 has been updated to provide additional clarification on the options available in electronic means when collecting end user information.

Current Changes

1. Changes to Programme Design

i- Changes to Programme Boundary- the programme boundary has been expanded within Host country to cover entire Nigeria instead of just Kano and Kaduna. Accordingly, concerned sections have been updated. The CME intends to extend the PoA for entire Nigeria.

ii- Application of paragraph 124 (m) of CDM project standard for programme of activities, version 02.0 resulting in change in relevant sections of the PoA DD. This change is in line with EB 86 which introduced the applicability of micro-scale threshold at unit level, for CPAs qualifying under paragraph 12[55] of Tool 19.

iii- Changes in the eligibility criteria- eligibility criteria nos 2,4, & 16 have been revised owing to change in programme boundary and application of micro scale threshold at unit level. Change in applicability criteria no 6 owing to use of latest version of applied methodology. Addition of applicability criteria 3,12, 14 & 15 to comply with the requirement of paragraph 124 of CDM standard for programme of activities, version 02.0. These changes are required to make the sections of PoA DD consistent amongst one other.

2. Permanent changes to registered monitoring plan.

i. Definition of Primary sampling unit for parameter - proportion of ICS still in operation ($N_{y,i}$) has been revised. As the use of project stove is not dependent on CPA implementer or the model, hence these factors are now not required to be considered for defining the primary sampling unit for $N_{y,i}$

ii. Parameters; μ_y- Adjustment to account for any continued use of pre-project devices and $B_{y=1,new,i,\ survey}$ - Quantity of woody biomass used by project devices in tonnes per device, have been added as a result of application of latest version of methodology accordingly the primary sampling units of these two parameters have now been defined in the monitoring plan.

3. Corrections

i. Swedish Energy Agency has been added as participant in section A.5 and Appendix 1 to comply with MoC.

ii. Additions owing to change of template as well as editorial changes.

Impact of proposed changes on

[55] Applicable for energy efficiency projects

a. *The applicability and application of the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents, with which the PoA or CPA has been registered or included* – as a result of application of para 124 (m) of the CDM standard for PoA; version 02, methodological tool- "Demonstration of additionality of microscale project activities", version 09.0 is now applied for demonstrating additionality.

b. *The compliance of the monitoring plan with the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents;* - there is no change in compliance of the monitoring plan with respect to applied methodology

c. *The level of accuracy and completeness in the monitoring of the PoA or the CPA compared with the requirements contained in the registered monitoring plan*; - change in definition of primary sampling unit for parameters Ny,j and µy will not affect the accuracy and completeness in the monitoring as compared to the registered PoA DD.

d. *The additionality of the PoA or CPA;* - please refer to point number (a)

e. *The scale of the CPA;* - with the application of para 124 (m) of PS PoA, the CPAs which were bound by small scale threshold under registered PoA are no longer required to demonstrate their adherence to small scale threshold.

The eligibility criteria for inclusion of CPAs in the PoA. – eligibility criteria 2,3, 4,12,14,15 and 16 have been revised

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Document information

Version	*Date*	*Description*
09.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN); • Make editorial improvements.
08.1	28 June 2017	Revision to: • Remove a duplicated instruction; • Make editorial improvement.
08.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for programmes of activities" and with the PDD and CPA-DD forms; • Make editorial improvement.

Version	*Date*	*Description*
07.0	25 May 2017	Revision to: • Ensure consistency with the "CDM project standard for programmes of activities" (CDM-EB93-A07-STAN) (version 01.0); • Incorporate the "Programme design document form for small-scale CDM programmes of activities" (CDM-SSC-PoA-DD-FORM); • Make editorial improvement.
06.0	15 April 2016	Revision to ensure consistency with the "Standard: Applicability of sectoral scopes" (CDM-EB88-A04-STAN) (version 01.0).
05.0	9 March 2015	Revision to: • Include provisions related to choice of start date of PoA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Add exception for generic CPA where technology is under positive lists; • Make editorial improvement.
04.1	5 August 2014	Editorial revision to correct the document information table.
04.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM programme of activities (these instructions supersede the Guideline: Completing the programme design document form for CDM programme of activities (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the PoA in B.4 and Appendix 1; • Add general instructions on post-registration changes in paragraphs 2 and 3 of general instructions and Appendix 6; • Change the reference number from F-CDM-PoA-DD to CDM-PoA-DD-FORM; • Make editorial improvement.
03.0	3 December 2012	EB 70 Revision to reflect changes to the *Guideline: Completing the programme design document form for CDM programmes of activities* (EB 70, Annex 6).
02.0	13 March 2012	EB 66 Revision required to ensure consistency with the "Guidelines for completing the programme design document form for CDM programmes of activities" (EB 66, annex 12).
01.0	27 July 2007	EB 33, Annex 41 Initial publication.

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