



**Monitoring report form
(Version 04.0)**

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

MONITORING REPORT

Title of the project activity	MicroEnergy Credits -- Microfinance for Clean Energy Product Lines - Mongolia - CPA No.001: XacBank LLC
Reference number of the project activity	CDM PoA 8142, CPA No. 001
Version number of the monitoring report	4
Completion date of the monitoring report	18/07/2015
Registration date of the project activity	12 Nov 2012
Monitoring period number and duration of this monitoring period	Monitoring Period #1 Duration: 01/08/2013 - 30/04/2014
Project participant(s)	MicroEnergy Credits
Host Party(ies)	Mongolia
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	Sectoral scope 3: Energy demand; AMS-II.E. - Energy efficiency and fuel switching measures for buildings version 10
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	50,133 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	31,767 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	N/A
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	31,767 tCO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project activity involves the installation and maintenance of clean energy products (CEPs) including efficient cooking and heating stoves and home insulation products by Partner Organization (PO) in Mongolia.

The current practice in Mongolia is to use inefficient stoves for cooking and heating and inefficient home insulation at the household level, resulting in necessary combustion of large amounts of coal, the primary fuel used for heating. The use of this fuel generates several greenhouse gases (GHG) including Carbon dioxide (CO₂). The replacement of these traditional products with CEPs reduces the amount of fuel required for heating and reduces the amount of GHGs emitted into the atmosphere during combustion.

MicroEnergy Credits (MEC) is the CME for the PoA. MEC is a social enterprise that helps micro-entrepreneurs and low-income households in developing countries to invest in CEPs through their local microfinance institution. Under the PoA, MEC develops programs with microfinance institutions¹ and clean product suppliers to market, distribute, and finance CEPs to micro-entrepreneurs and low-income households.

XacBank LLC is the PO for CPA No. 001. XacBank is a leading microfinance institution in Mongolia, which in partnership with MEC developed a clean energy lending program to offer the CEPs included in the PoA. XacBank has signed the standard contractual agreement with the CME (MEC) to participate in the PoA, which guides the transfer of the emission reduction rights to the CME (MEC).

1. Brief description of the installed technology and equipment

The project activity makes available two types of CEPs to low-income populations in Mongolia:

1. Energy efficiency: Efficient cooking and heating technologies
2. Insulation products: Ger blankets

In this monitoring period, only efficient cooking and heating stoves are credited.

1. Energy efficiency: Efficient cooking and heating stoves (Stove)

The efficient cooking and heating stove models under this CPA are:

- Silver Stove Mini (model 131)
- Silver Stove Turbo (model 126)
- Royal Stove Dul model (Royal Single model)
- Royal Stove Golomt model (Royal Double model)

The efficient cooking and heating stoves reduce the amount of fuel required to keep the house at a habitable temperature during cold weather. The stoves use an insulated combustion chamber and are designed to retain heat for longer and at a higher temperature than the traditional versions, allowing users to keep their homes warmer while using less fuel. All stoves employed in the CPA utilize the most common and locally accessible fuel sources—primarily pit-coal along with a minority use of wood (primarily non-renewable biomass) as a starter fuel—while significantly enhancing the combustion process. The PoA includes emissions reductions from decreased use of coal only; to be conservative it does not include emissions reductions from decreased consumption of non-renewable biomass used as starter fuel.

¹ For the purposes of this document, a “microfinance institution” is defined as a local institution that provides financial services to low income households.

As all of the efficient cooking and heating stoves are similar in design and have thermal efficiency specifications within +/-5% of each other², they are considered as a single technology type of “stove” in crediting.

Stoves are installed in one of two dwelling types: a house or a ger. A ger (i.e. a yurt) is a portable felt-covered dwelling structure that is the traditional housing type and is a low-cost alternative to a more permanent housing structure for many Mongolians. According to analysis of the baseline population, the dwelling type has a significant impact on the amount of coal consumed in the baseline population, therefore the dwelling type was considered to be a factor that would have significant impact on coal consumption in the project scenario (See **ANNEX 8** – Baseline Fuel Consumption Analysis). In addition, analysis of the baseline study revealed that the district in which the household is located has an effect on coal consumption in the baseline. Therefore stoves are divided by dwelling type in crediting.

2. Insulation products: Ger blankets

The ger-blanket models under this CPA are:

- 4-walled model
- 5-walled model

A ger insulation blanket is an insulated blanket which can go over the traditional wool felt ger covering or replace it. It has a double layer of insulation inside and a waterproof layer outside. The blanket comes in six sections, including a special door covering and a section that covers the base of the ger on the outside to keep out wind, water and dirt.

Previously, well-insulated ger blankets were not available on the market due to market barriers. Ger producers did not think there was a demand for the product, because low income people could not afford them, and because marketing and distribution were difficult given the large geographic spread of ger homes. XacBank LLC worked with local small and medium enterprises to develop a high quality ger blanket, and then created the clean energy financing program that would make the products affordable.

While ger blankets reduce household coal consumption, they are conservatively not credited in this monitoring period.

2. *Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)*

The starting date of the project activity is 26/01/2012, as stated in the registered CPA-DD. However the first CEP included in the project activity was installed on 03/05/2013 (Source: **ANNEX 4** - MicroEnergy Credits Tracker Database).

The official start date of the CPA and PoA crediting period is 01/01/2013. The PoA conservatively only credits the reduction in coal used during the heating season, as coal usage during the summer is minimal, used only for cooking. As reported in the Household Energy Survey, 99% of households report using less or the same amount of coal in summer after adopting the CEP (see **ANNEX 5** - Household Energy Survey: Fuel Consumption and Usage Report). As such, crediting starts from the start of the 2013-2014 heating season: 01/08/2013.

3. *Total GHG emission reductions or net anthropogenic GHG removals by sinks: 35,871 tCO₂e*

Table 1: Total GHG emissions reductions and GWh_{thermal} Savings

Project Activity	tCO ₂ e	GWh _{thermal} Savings
CPA No. 001	31,767	129

Source: **ANNEX 2** - ER Calculations

² See technical specifications in Supporting Documents

Per AMS-II.E, the aggregate energy savings of a single CPA may not exceed 180 GWh thermal per year. As demonstrated above, CPA No. 001 is below the threshold. Calculations of GWh thermal are demonstrated in **ANNEX 2** - ER Calculations.

A.2. Location of project activity

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The host party of the project activity is Mongolia.



Figure 1: National Map of Mongolia (Source: Asian Development Bank)

The boundary of CPA No. 001 is determined by the location of the households where the CEPs are installed, but is limited to the boundaries Mongolia. The location of each clean energy installation³ is recorded in MEC's Tracker Platform, which has been designed specifically for accelerating microfinance access to clean and efficient energy (See **ANNEX 3** - MicroEnergy Credits Tracker Platform Summary). These locations define the more precise boundary of the project activity, which for issuance 1 of CPA No. 001 is within the six ger districts of Ulaanbaatar city, in Ulaanbaatar province.

GPS coordinates for Ulaanbaatar (focal point of CPA): 47.9200° N, 106.9200° E

The Tracker Platform is used to collect and store information for each CEP, including the unique identification number or sysnum, location, order date, installation date, and usage status of each CEP in the CPA, making it easy to identify, locate, and verify the installations that pertain to the CPA. The MEC Tracker Platform is a hosted internet service, limiting the risk of loss of data.

³ Location is defined by one of the following sets of information:

- A. Precise GPS location of the household that purchases/installing clean energy product.
- B. Credible address for household.
- C. Three of the following identifiers: Purchaser name, household address, phone number, bank ID number, national ID number, unique identification number, household GPS location, or GPS location within one mile of household.

A.3. Parties and project participant(s)

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
UK	MicroEnergy Credits	No
Mongolia (host)	XacBank LLC	No

A.4. Reference of applied methodology and standardized baseline

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AMS I.I.E. - Energy Efficiency and Fuel Switching Measures for Buildings -- Version 10.0

A.5. Crediting period of project activity

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Type: Renewable crediting period

Start Date: 12/11/2012

Length: 7 years renewable or 21 years

A.6. Contact information of responsible persons/ entities

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SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

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1. Applicability of monitoring report for PoA:

This monitoring report is applicable for CPA No. 001 for the monitoring period of 01/08/2013 - 30/04/2014, the 2013-2014 heating season in Mongolia.

There are no other CPAs included in the PoA; this is the only monitoring report for the PoA for this monitoring period.

2. Operation of the project activity:

The installation date of a CEP, which is the date a XacBank representative visits the household and confirms installation of the product, is the start of crediting for each individual CEP. In the case that the CEP is installed prior to the start of the heating season and monitoring period, the CEP shall be credited from the first day of the heating season, 01/08/2013. The installation date of the first CEP installed in CPA No. 001 and the PoA is 03/05/2013, thus its crediting start date is 01/08/2013. The total numbers of CEPs included in the CPA with installation dates up to the close of the crediting period, 30/04/2014, are included in Table 2 below.

As explained in section A.1, stoves are credited according to the dwelling type in which they are located, either a house or a ger, and the district in which they are located. Ger blankets are included in the CPA for future crediting periods but are not credited during Issuance 1.

Table 2: Summary Installations of CEPs by Month

Installation Month-Year	Stoves	Ger Blanket	Total CEPs
May-13	3,645	1,033	4,678
Jun-13	1,999	28	2,027
Jul-13	1,437	40	1,477
Aug-13	80	36	116
Sep-13	458	104	562
Oct-13	1,611	29	1,640
Nov-13	6,420	-	6,420
Dec-13	2,988	-	2,988
Total	18,638	1,270	19,908

Source: **ANNEX 4** - MEC Tracker Database

3. Actual operation of the project activity

Products are expected to be in continued use after installation through the heating season. Fuel consumption over the heating season is monitored for the seasons of Autumn, Winter, and Spring. The seasonal definition is taken from the baseline report (**ANNEX 9** - MCA-Mongolia Household Survey Report) and associated survey questionnaire (**ANNEX 10** - MCA-Mongolia Household Survey Questionnaire), in which households were asked how much fuel was consumed in each season, Autumn, Winter, Spring, and Summer. Seasonal definitions were confirmed as follows:

- Autumn – August, September, October
- Winter – November, December, January
- Spring – February, March, April
- Summer – May, June, July

Baseline coal consumption is calculated for each surveyed household through the Baseline Coal Consumption Regression Model, an ex-ante parameter developed from the baseline study, described in **ANNEX 8** - Baseline Fuel Consumption Analysis. ERs through the project are calculated as the difference in project emissions, derived from reported coal consumption, and baseline emissions, derived from the calculated baseline coal consumption. Therefore the Household Energy Survey (HES) questionnaire (see **ANNEX 5** - Household Energy Survey: Fuel Consumption and Usage Report) necessarily used the same seasonal definitions and question format around fuel consumption to ensure fair comparison between the baseline and project datasets.

The CEPs involved in the project are specifically installed to reduce fuel consumption required to heat the home. The CEPs achieve this by either improving insulation or by providing a more efficient heating source. In the project boundary, home heating is generally not required or is greatly reduced in the summer. Although some insulation blankets may still be in use during the summer, many households put their ger blanket in storage and use a lighter covering. Households typically still use the stove for cooking but heating is not necessary and consequent coal savings during the summer months are expected to be much less than during the heating season. Therefore, products are not monitored nor credited for activity during summer. Annual crediting periods are conservatively determined for only the heating season of Autumn, Winter, and Spring from 1 August to 30 April.

Households use coal as the primary heating fuel with wood as a starter fuel. Efficient stoves reduce consumption of wood in addition to coal as the stoves retain heat for longer periods requiring less frequent reigniting with wood. However, the project conservatively only credits the reduction in coal use, and moreover, monitors wood consumption to ensure that consumption does not increase.

The HES, an ex-post sampling survey, was conducted to determine: (1) the fraction of installed CEPs which were in use (Product Operation Fraction or POF) during the monitoring period and (2) the reported fuel consumption of households using a CEP. The results of the HES are discussed in **ANNEX 5** - Household

Energy Survey: Fuel Consumption and Usage Report and have been used accordingly to determine emissions reductions achieved during this monitoring period.

As noted in the description of technologies, households who purchased energy efficient stoves use them in one of two dwelling types: a house or a ger. As was observed in the analysis of baseline data (**ANNEX 8 - Baseline Fuel Consumption Analysis**), household coal consumption is expected to strongly correlate to dwelling type. In addition, analysis of the baseline study revealed that the district in which the household is located was found to have effect on coal consumption in the baseline, specifically households in Bayangol district use less coal, and households in Songinokhairkhan district use more coal. Therefore stoves are divided by dwelling type and location in crediting.

Based on CEP type, dwelling type, and district, CEPs credited in the monitoring period are classified into one of six frames which were used to for sampling to determine coal consumption.

Frame 1: Stove in house dwelling type, located in Songinokhairkhan district (“House - Song.”)

Frame 2: Stove in house dwelling type, located in Bayangol district (“House - Bayan.”)

Frame 3: Stove in house dwelling type, located in other district (“House-Other”)

Frame 4: Stove in ger dwelling type, located in Songinokhairkhan district (“Ger - Song.”)

Frame 5: Stove in ger dwelling type, located in Bayangol district (“Ger - Bayan.”)

Frame 6: Stove in ger dwelling type, located in other district (“Ger - Other”)

These sampling frames also serve as the crediting categories for CEPs.

4. Events during the monitoring period

No events or situations occurred during the monitoring period that impacted the applicability of the methodology.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

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In this monitoring period, only efficient cooking and heating stoves are credited. Ger blankets are conservatively not credited, though they are included in CPA No. 001 and may be credited in future monitoring periods. This is due to the current inability to accurately track product overlap in households, which is necessary to take cross-effects of the technologies into account.

The MEC Tracker Platform contains a unique entry for every CEP purchased, identifiable by sysnum (See **ANNEX 3 - MicroEnergy Credits Tracker Platform Summary**). Each CEP entry in the database contains multiple identifying characteristics to ensure that the product is accurately tracked, including household address, client’s government issued passport number, GPS coordinates, and ongoing usage status updated through monitoring, described in Stage 1 of Section C. The MEC Tracker Platform also contains information critical to crediting for each CEP, including CEP type, date of installation, and dwelling type. In order to credit two CEPs in the household, the MEC Tracker Platform must demonstrate the number of CEPs in the household, the order of installation, and the sysnum of the “sister” CEP (other CEP in household). The MEC Tracker Platform currently defines the household via a match of household identifiers in the database (address, passport number, name) to identify those households that have purchased multiple CEPs. At this time, the MEC Tracker Platform is partially incomplete with respect to the identification of households and therefore the number and details of multiple CEPs in households. As this affects crediting for each CEP, the CME conservatively chooses to not credit ger blankets in this monitoring period. In subsequent monitoring periods, this information shall be completed to enable crediting of both CEPs in two installation households.

This temporary deviation does not require a request for prior approval by the Board, nor does it present a deviation from the applied methodology.

B.2.2. Corrections

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N/A

B.2.3. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

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N/A

B.2.4. Changes to project design of registered project activity

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N/A

B.2.5. Changes to start date of crediting period

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N/A

B.2.6. Types of changes specific to afforestation or reforestation project activity

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N/A

SECTION C. Description of monitoring system

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Monitoring of CPA No. 001 involved two main stages:

Stage 1: MEC Tracker Platform - for determination of installation date, N_{all} , Ulaanbaatar district, and household type

Stage 1 of the monitoring methodology determines the following parameters:

- N_{all} – accurate number of CEPs
- $DW_{y,type}$ – dwelling type, house or ger [required for calculation of $C_{y,old,CEP-i}$]
- D_y , Songinokhairkhan – district, if in Songinokhairkhan district [required for calculation of $C_{y,old,CEP-i}$]
- D_y , Bayangol – district, if in Bayangol district [required for calculation of $C_{y,old,CEP-i}$]

All CEPs disseminated under the PoA are assigned a unique identifier number, the “sysnum”, in the MEC Tracker Platform at the time of sale. Each unique sysnum is assigned to one CPA based on installation date to ensure no double counting. Because the MEC Tracker Platform serves as the sales database for all CPAs, duplicate instances of products can easily be checked and resolved.

The Credit Tracker Platform also includes the following information:

- Household name
- Passport number of purchaser
- Mobile phone number of purchaser
- Location of household (address and/or GPS location)
- Product type installed, i.e. stove or ger blanket
- Product model installed
- Date of sale
- Date of installation
- Unique identifier number for CEP (sysnum)
- Dwelling type categorized as house or ger
- District name
- CPA Assignment (based on sales date)

Household name, purchaser passport number, purchaser mobile number, and location are used to locate end users for surveys or other customer follow-up. Product type and dwelling type are used for assigning CEPs to one of the crediting categories in this monitoring period. District name and dwelling type are needed for calculation of the baseline coal consumption using the Baseline Coal Consumption Regression Model (**ANNEX 9** - MCA-Mongolia Household Survey Report), and defined in ex-ante parameters. As noted above, sysnum and installation date are used to uniquely assign individual CEPs to CPAs.

QAQC is conducted on the MEC Tracker Platform through multiple mechanisms at both the PO and CME level. The brief description of the processes ensuring the accuracy of the Credit Tracker Platform follows (further information on the development and procedures to ensure database accuracy included in **ANNEX 3 - MicroEnergy Credits Tracker Platform Summary**):

- The PO maintains in the MEC Tracker Platform a record of all clean energy products that are installed.
- The PO identifies the exact location of the CEP using GPS location and/or address of the household or organization.
- The emissions parameters required for ex-post management are maintained in the Credit Tracker Platform. These include the number and type of CEPs still in operation.
- The CME uses the MEC Tracker Platform to cross-check the new records with existing records in the MEC Tracker Platform in order to confirm that the installation record is complete, authentic, and that no double-counting occurs.
- The Credit Tracker records are cross-checked with the MFI banking MIS system, so that the number of systems is equivalent to the number of systems that were paid for.
- The CME reviews entries with insufficient information and requires the PO to re-check or collect more information or if insufficient information is gathered, does not include them in a CPA for crediting.
- The CME reviews entries for the location of the product, and if the product is located outside of the project boundary for the CPA, it is not included for crediting.
- The project will be audited by a DOE at minimum biennially. Corrective actions will be taken to ensure more accurate monitoring as necessary, based on the results of the audit.
- All monitored data required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs for the PoA, whichever occurs later.
- The electronic files holding installation records are backed up on the Internet, reducing risk of any loss of data.
- The unique system ID number which is linked to a combination of a GPS location or verified address and the passport number of the head of household eliminates any risk of double-counting between CPAs.
- The sampling Household Energy Survey asks enumerators to verify Tracker information, including product type, dwelling type, and product usage status.

Fehler! Verweisquelle konnte nicht gefunden werden. below shows the data flow into the MEC Tracker Platform and the QAQC measures taken by the PO and CME, described in further detail in **ANNEX 3 - MicroEnergy Credits Tracker Platform Summary**).

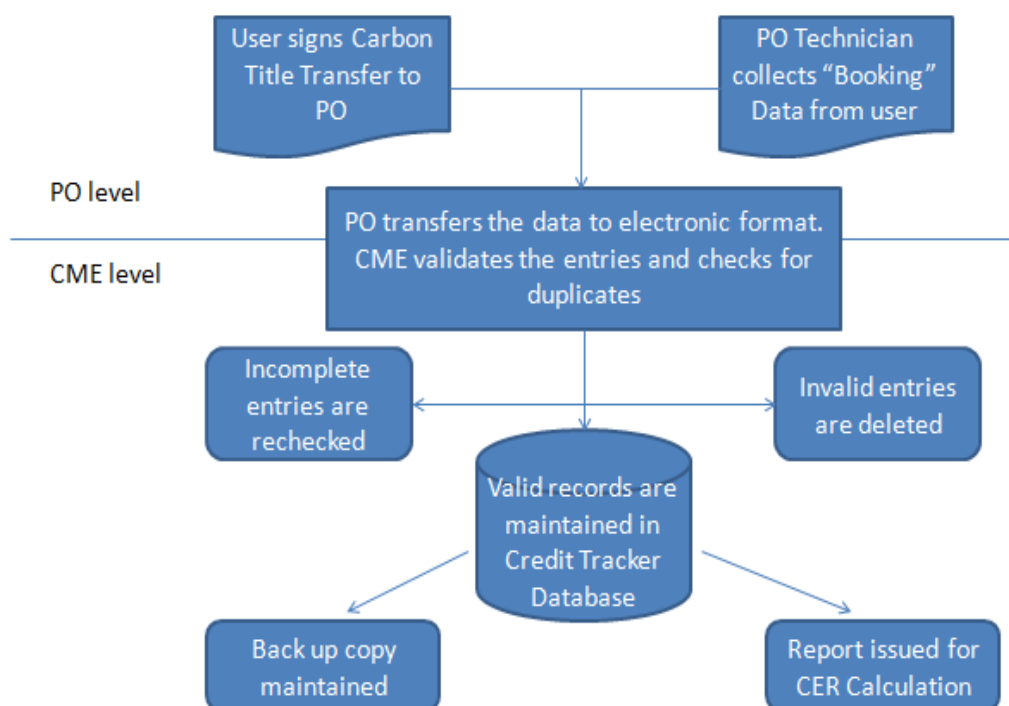


Figure 2: PoA Stage 1 Monitoring Plan

Stage 2: Household Energy Survey (HES)

The HES, ex-post sampling, was conducted to determine the following parameters:

- POF – fraction of CEPs that were in use during monitoring period (by CEP)
- $C_{y,new\ CEP_i}$ – project coal consumption (by household)
- $C_{y,old\ CEP_i}$ – baseline coal consumption (by household)

A detailed description of the HES including methods use is included in **ANNEX 5 - Household Energy Survey: Fuel Consumption and Usage Report**.

Sampling was conducted within CPA No. 001 only, therefore sample sizes were calculated to ensure that mean values of POF, $C_{y,new\ CEP_i}$, and $C_{y,old\ CEP_i}$ determined from the HES met 90/10 confidence and precision for both sampling frames defined in Section B.1.

MEC Tracker Platform was utilized to assign each credited CEP to 1 of the 6 frames, based on dwelling type and household location. Simple random sampling within each frame was employed. All aforementioned parameters in Stage 2, except $C_{y,old\ CEP_i}$, were determined by asking the sampled households the questions on the HES, including if they were using the product during the heating season, the amount of coal and wood they consumed, their perceptions of air pollution with the new stoves, and the type of coal they used.

$C_{y,old\ CEP_i}$ was calculated using the baseline regression model validated at registration and for each sampled household substituting into the equation the appropriate values for CEP dwelling type, district, and average temperature and average wind speed during the heating season (see section D.1 for description of the ex-ante parameter, Baseline Coal Consumption Regression Model).

Over 50% of the surveys were conducted in person and the remaining surveys were conducted by phone. In-person and phone surveys were conducted using a survey form developed on Open Data Kit (ODK) open source software; in-person surveys were conducted using android phones. Complete text versions of the survey including skip logic are found in **ANNEX 7 - Introduction to the Household Energy Survey**. The use

of electronic data collection, both via ODK survey on smart phones and Survey Monkey's online survey tool, simplifies and shortens the data collection process, and minimizes errors of secondary data entry.

In DOE review for the verification, several non-conforming cases were identified among survey respondents. Further measures the PP shall take to improve the QA/QC of the survey process, specifically to address nonconforming cases include the following:

- **Dwelling type change:** In subsequent monitoring periods, the HES shall be conducted immediately following the heating season in the monitoring period, rather than referring to the previous heating season as was the case in the current monitoring period. If household reports that two dwelling types were in use during the heating season, this shall be noted and the CEP shall be credited in whichever dwelling type is most conservative. In case HES is referring to previous heating season, a question will be added to confirm current situation. MEC Tracker shall be updated with current dwelling type information.

Further, an additional mid-heating season survey shall be conducted to confirm the usage and location of CEPs. Survey shall be conducted through combination of in-person and phone surveys.

- **Relocation of ger:** The HES includes questions at the start to confirm current household location and identification information. Surveyors shall record current household location, which shall be used to update MEC Tracker to ensure the database maintains accurate location information of each CEP.
- **Involvement of other heating system in the household:** In subsequent monitoring periods, the HES and mid-heating season survey shall include question(s) regarding the use of any additional heating system in the household. If another heating system exists, the CEP shall not be credited and counted as 'not in use' for the purposes of the monitored parameter POF.
- **Change of stove type:** In current and subsequent rounds of the HES, if the household no longer has a project stove, it shall not be credited and shall be counted as 'not in use' for the purposes of the monitored parameter POF.
- **Stove kept unused during monitoring period:** In current and subsequent rounds of the HES, if the household was not using the project stove for the entire heating season, it shall not be credited and shall be counted as 'not in use' for the purposes of the monitored parameter POF. Usage of the stove will be checked in the mid-heating season survey as well.

Of 38 households visited during the verification site visit, there were three non-conforming cases:

1. Stove found in house with alternate heating system
2. Stove type changed
3. Stove was broken

As noted above, each of these cases shall have specific methods for being addressed in subsequent monitoring periods and rounds of the HES. Case 2 and 3 are due to the fact that the DOE site visit occurred in the heating season subsequent to the monitored heating season, thus they do not reflect the case during the monitoring period. Nonetheless to be conservative, the PP applied a discount factor of 7.9% to emissions reductions in the monitoring period, reflecting the 3 non-conforming cases out of 38 household visits. Applied discount factor is demonstrated in section E.

The parameters $T_{y,s}$ and $WS_{y,s}$ were calculated based on the daily temperature and windspeed recordings in Ulaanbaatar, Mongolia by NOAA (ANNEX 6 - Household Energy Survey Data Analysis). The parameter η_{new} was determined through third party testing of stoves included in the project (ANNEX 15 - Stove Testing Reports).

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante or at renewal of crediting period***(Copy this table for each piece of data and parameter.)*

Data / Parameter:	<i>NCV_{coal}</i>
Unit:	TJ/tonne
Description:	Net calorific value of the coal that is substituted.
Source of data:	IPCC 2006
Value(s) applied:	0.0189
Purpose of data:	Calculation of baseline emissions Calculation of project emissions
Additional comment:	

Data / Parameter:	<i>EF_{coal}</i>
Unit:	tCO ₂ /TJ
Description:	Emission factor: subbituminous coal
Source of data:	IPCC 2006
Value(s) applied:	96.1
Purpose of data:	Calculation of baseline emissions Calculation of project emissions
Additional comment:	

Data / Parameter:	<i>Baseline Coal Consumption Regression Model</i>
Unit:	Variable
Description:	Regression coefficients for the determination of baseline coal consumption
Source of data:	Baseline Report (ANNEX 8 - Baseline Fuel Consumption Analysis, ANNEX 9 - MCA-Mongolia Household Survey Report)

Value(s) applied):	$C_{y,old,CEPi} = 4.57681 - \left(0.67248 \sum WS_{y,s}\right) - \left(0.01124 \sum T_{y,s}\right) + 0.14638DW_{y,house} + 0.11988D_{y,Songinokhairkhan} - 0.36234D_{y,Bayangol}$ <p>Where the following are monitored parameters:</p> <p>$C_{y,old,CEPi}$ = Mean coal consumption during the heating season (Autumn, Winter, Spring)</p> <p>$T_{y,s}$ = Mean temperature in Celsius for year y and season s (Autumn, Winter, Spring, Summer)</p> <p>$WS_{y,s}$ = Mean wind speed in Knots for year y and season s (Autumn, Winter, Spring, Summer)</p> <p>$DW_{y,house}$ = Dwelling is a house (dummy variable 1=house, 0=ger)</p> <p>$D_{y,Songinokhairkhan}$ = District location is Songinokhairkhan district (dummy variable 1=yes, 0=no)</p> <p>$D_{y,Bayangol}$ = District location is Bayangol district (dummy variable 1=yes, 0=no)</p> <p>Applied regression analysis found the five aforementioned independent variables to have a statistically significant effect on coal consumption.</p>
Purpose of data:	Calculation of baseline emissions
Additional comment:	See ANNEX 8 - Baseline Fuel Consumption Analysis.

Data / Parameter:	<i>Baseline Biomass Consumption Regression Model</i>
Unit:	Variable
Description:	Regression coefficients for the determination of baseline biomass consumption
Source of data:	Baseline Report (ANNEX 8 - Baseline Fuel Consumption Analysis, ANNEX 9 - MCA-Mongolia Household Survey Report)
Value(s) applied):	$B_{y,old,CEPi} = 3.42434 - \left(0.46183 \sum WS_{y,s}\right) - \left(0.00748 \sum T_{y,s}\right) + 0.57023D_{y,Songinokhairkhan} - 0.36234D_{y,Bayangol} - 0.14078D_{y,Chingeltei}$ <p>Where:</p> <p>$B_{y,old,CEPi}$ = Mean biomass consumption during the heating season (Autumn, Winter, Spring)</p> <p>$T_{y,s}$ = Mean temperature in Celsius for year y and season s (Autumn, Winter, Spring, Summer)</p> <p>$WS_{y,s}$ = Mean wind speed in Knots for year y and season s (Autumn, Winter, Spring, Summer)</p> <p>$D_{y,Songinokhairkhan}$ = District location is Songinokhairkhan district (dummy variable 1=yes, 0=no)</p> <p>$D_{y,Bayangol}$ = District location is Bayangol district (dummy variable 1=yes, 0=no)</p> <p>$D_{y,Chingeltei}$ = District location is Chingeltei district (dummy variable 1=yes, 0=no)</p>
Purpose of data:	Calculation of leakage
Additional comment:	See ANNEX 8 - Baseline Fuel Consumption Analysis.

D.2. Data and parameters monitored

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

Data / Parameter:	N _{all}		
Unit:	Number		
Description:	Total number of CEP installations disseminated. CEP crediting categories in Issuance 1 include: 1. House-Song. 2. House-Bayan. 3. House-Other 4. Ger-Song. 5. Ger-Bayan. 6. Ger-Other		
Measured/ Calculated / Default:	Number of CEP installations disseminated is measured.		
Source of data:	MEC Tracker Platform		
Value(s) of monitored parameter:	Crediting Category (by CEP): 1. House-Song. 2. House-Bayan. 3. House-Other 4. Ger-Song. 5. Ger-Bayan. 6. Ger-Other	N_{all} 1,148 990 2,360 4,594 1,953 7,593	Total CEP-Heating Seasons 871 822 1,905 2,897 1,633 5,373
Monitoring equipment:	MEC Tracker Platform		
Measuring/ Reading/ Recording frequency:	Continuous monitoring/recording		
Calculation method (if applicable):	N _{all} is the total number of stoves installed and credited during the monitoring period. N _{all} is adjusted according to actual operational days during a given monitoring period to derive ‘Total CEP-Heating Seasons’. The installation date for each CEP listed in Credit Tracker signifies the start of operation for each CEP. The operational days of each CEP is divided by the total number of days of the current monitoring period to determine each individual CEP’s ‘CEP-Heating Season’, the sum of which is ‘Total CEP-Heating Seasons’.		
QA/QC procedures:	See ANNEX 3 - MicroEnergy Credits Tracker Platform Summary for measures to ensure accuracy of database. See ANNEX 2 - Emissions Reductions Calculations, Sheet ‘3a-3b’ for demonstration of calculation of N _{all} by adjusting according to monitoring start date.		
Purpose of data:	Calculation of baseline emissions Calculation of project emissions		

Additional comment:	<p>All CEPs disseminated under the PoA have a unique identifier number, 'sysnum' allowing to doubtlessly identify the CEP.</p> <p>Each CEP record in the MEC Tracker Database shall also contain appliance type, date of installation, and geographic location (through GPS coordinates or other specific location identifiers) allowing appliance to be monitored on a regular basis.</p> <p>Per requirements of the PoA, location is defined by one of the following sets of information:</p> <p>A. Precise GPS location of the household that purchases/installs clean energy product.</p> <p>B. GPS location within one mile of the household and credible address for household.</p> <p>C. The following identifiers: Purchaser name, household address, phone number.</p> <p>For evidence of the above, see ANNEX 2 - Emissions Reductions Calculations, Sheet '5. CPA No. 001'</p>
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Data / Parameter:	POF - Product Operation Fraction													
Unit:	Fraction													
Description:	Fraction of CEP installations which are in use and operational. Determined for the following six crediting categories for Issuance 1: 1. House-Song. 2. House-Bayan. 3. House-Other 4. Ger-Song. 5. Ger-Bayan. 6. Ger-Other													
Measured/ Calculated / Default:	Survey													
Source of data:	Household Energy Survey (HES) (ANNEX 6 – Household Energy Survey Data Analysis)													
Value(s) of monitored parameter:	<table><tr><td>1. House-Song.</td><td>0.96</td></tr><tr><td>2. House-Bayan.</td><td>0.92</td></tr><tr><td>3. House-Other</td><td>0.95</td></tr><tr><td>4. Ger-Song.</td><td>0.90</td></tr><tr><td>5. Ger-Bayan.</td><td>0.93</td></tr><tr><td>6. Ger-Other</td><td>0.93</td></tr></table>		1. House-Song.	0.96	2. House-Bayan.	0.92	3. House-Other	0.95	4. Ger-Song.	0.90	5. Ger-Bayan.	0.93	6. Ger-Other	0.93
1. House-Song.	0.96													
2. House-Bayan.	0.92													
3. House-Other	0.95													
4. Ger-Song.	0.90													
5. Ger-Bayan.	0.93													
6. Ger-Other	0.93													
Monitoring equipment:	Household Energy Survey (HES)													
Measuring/ Reading/ Recording frequency:	Biennial (at least every 2 years) for representative sample of appliances installed. Applicable HES was conducted September 2014 - January 2015.													
Calculation method (if applicable):	Number of households who reported they were using CEP divided by total number of households surveyed of same dwelling type that purchased CEP type.													

QA/QC procedures:	The PO conducted the survey with assistance provided by 3 rd party consultant Megan O'Neil who provided survey, training materials, and survey protocol. Training was conducted for enumerators and testers. See ANNEX 5 - Household Energy Survey: Fuel Consumption and Usage Report for detailed description of QA/QC measures in survey design, training, implementation, data quality, and analysis.
Purpose of data:	Calculation of baseline emissions Calculation of project emissions
Additional comment:	

Data / Parameter:	$C_{y,new,CEP-i}$												
Unit:	Tonnes coal/HH/heating season												
Description:	<p>$C_{y,new,CEP-i}$ represents the quantity of coal used in the heating season in the project scenario for CEP-i installation, weighted average if multiple clusters of CEP for target groups in Ger Area homes.</p> <p>Determined for the following six crediting categories for Issuance 1:</p> <ol style="list-style-type: none"> 1. House-Song. 2. House-Bayan. 3. House-Other 4. Ger-Song. 5. Ger-Bayan. 6. Ger-Other 												
Measured/ Calculated / Default:	Survey												
Source of data:	Household Energy Survey (HES)												
Value(s) of monitored parameter:	<table> <tr> <td>1. House-Song.</td><td>3.54</td></tr> <tr> <td>2. House-Bayan.</td><td>3.35</td></tr> <tr> <td>3. House-Other</td><td>3.43</td></tr> <tr> <td>4. Ger-Song.</td><td>3.64</td></tr> <tr> <td>5. Ger-Bayan.</td><td>2.76</td></tr> <tr> <td>6. Ger-Other</td><td>3.40</td></tr> </table>	1. House-Song.	3.54	2. House-Bayan.	3.35	3. House-Other	3.43	4. Ger-Song.	3.64	5. Ger-Bayan.	2.76	6. Ger-Other	3.40
1. House-Song.	3.54												
2. House-Bayan.	3.35												
3. House-Other	3.43												
4. Ger-Song.	3.64												
5. Ger-Bayan.	2.76												
6. Ger-Other	3.40												
Monitoring equipment:	n/a												
Measuring/ Reading/ Recording frequency:	<p>Biennial (at least every 2 years) for representative sample of appliances installed.</p> <p>Applicable HES was conducted September 2014 - January 2015.</p>												

Calculation method (if applicable):	<p>HES questions are framed in the quantity of units in which households purchase coal, i.e. Zil-130, Porter, or Bag. For example, “how many porters of coal did you use last Autumn?”</p> <p>Calculation of $C_{y,new,CEP-i}$ is the quantity of each unit used multiplied by the quantity of coal in each unit, as demonstrated below.</p> <p style="text-align: center;">Household Coal consumption per season (ton) = # Zil-130 used *(5 ton/Zil) + # of porters used *(2 ton/porter) + # of Government Baganuur bags used (.04 ton/bag) + # Other bags used *(0.0221 ton/bag)</p> <p>Coal consumption across the heating season is the sum of coal consumption in Autumn, Winter, and Spring. $C_{y,new,CEP-i}$ is calculated by taking the mean value of coal consumption for the heating season for the sampling frame. $C_{y,new,CEP-i}$ meets 90/10 confidence precision for each sampling frame.</p> <p>See also ANNEX 5 - Household Energy Survey: Fuel Consumption and Usage Report</p>
QA/QC procedures:	<p>The PO conducted the survey with assistance provided by 3rd party consultant, Megan O’Neil, who provided survey, training materials, and survey protocol. Training was conducted for enumerators and testers. See ANNEX 5 - Household Energy Survey: Fuel Consumption and Usage Report for detailed description of the QA/QC measures in survey design, training, implementation, data quality, and analysis.</p> <p>Further evidence cannot be provided in the form of receipts as households do not get or save receipts for coal. In future monitoring periods, the project intends to have a third party review of the HES to confirm coal consumption values derived from the survey.</p>
Purpose of data:	Calculation of project emissions
Additional comment:	

Data / Parameter:	$C_{y_old,CEPi}$
Unit:	Tonnes coal/HH/heating season
Description:	<p>Quantity of coal used in the baseline cluster (installation cluster CEP (i) may represent baseline for single or multiple CEP installations, thus addressing cross-effects).</p> <p>Determined for following two crediting categories for Issuance 1:</p> <ol style="list-style-type: none"> 1. House-Song. 2. House-Bayan. 3. House-Other 4. Ger-Song. 5. Ger-Bayan. 6. Ger-Other
Measured/ Calculated / Default:	Calculated

Source of data:	Household type and location from MEC Tracker Platform; local wind speed and temperature data from NOAA climate data base; district baseline regression model (see ANNEX 8 – Baseline Fuel Consumption Regression Analysis). Calculated for households included in the HES.												
Value(s) of monitored parameter:	<table> <tr><td>1. House-Song.</td><td>5.67</td></tr> <tr><td>2. House-Bayan.</td><td>4.23</td></tr> <tr><td>3. House-Other</td><td>5.31</td></tr> <tr><td>4. Ger-Song.</td><td>5.23</td></tr> <tr><td>5. Ger-Bayan.</td><td>3.79</td></tr> <tr><td>6. Ger-Other</td><td>4.87</td></tr> </table>	1. House-Song.	5.67	2. House-Bayan.	4.23	3. House-Other	5.31	4. Ger-Song.	5.23	5. Ger-Bayan.	3.79	6. Ger-Other	4.87
1. House-Song.	5.67												
2. House-Bayan.	4.23												
3. House-Other	5.31												
4. Ger-Song.	5.23												
5. Ger-Bayan.	3.79												
6. Ger-Other	4.87												
Monitoring equipment:	n/a												
Measuring/ Reading/ Recording frequency:	Biennial (at least every 2 years) for representative sample of appliances installed. Applicable HES was conducted September 2014 - January 2015.												
Calculation method (if applicable):	Regression Model – See ex-ante parameter ‘Baseline Coal Consumption Regression Model’												
QA/QC procedures:	The PO conducted the HES with assistance provided by 3 rd Party Consultant, Megan O’Neil, which provided survey, training materials, and survey protocol. Training was conducted for enumerators and testers. See ANNEX 5 - Household Energy Survey: Fuel Consumption and Usage Report for detailed description of the QA/QC measures in sampling, survey design, training, implementation, data quality, and analysis.												
Purpose of data:	Calculation of baseline emissions												
Additional comment:													

Data / Parameter:	$T_{y,s}$ household stoves and/or insulation
Unit:	Celsius
Description:	Independent Variable: Mean temperature in Celsius for year y and season s (Autumn, Winter, Spring) for target groups in Ger Area homes
Measured/ Calculated / Default:	Measured
Source of data:	(US) National Climatic Data Center Climatic Service Branch of the National Oceanic and Atmospheric Administration (NOAA). See also ANNEX 6 - Household Energy Survey Data Analysis, sheet '7. $T_{y,s}$ and $WS_{y,s}$ Data'
Value(s) of monitored parameter:	$T_{1, \text{Autumn}}$ 7.5 C $T_{1, \text{Winter}}$ -18.2 C $T_{1, \text{Spring}}$ -7.2 C Values applied for season represent average of daily temperature measurement recorded by NOAA for every day during season, following seasonal definitions below: <ul style="list-style-type: none"> • Autumn – August 2013, September 2013, October 2013 • Winter – November 2013, December 2013, January 2014 • Spring – February 2014, March 2014, April 2014
Monitoring equipment:	NOAA weather station
Measuring/ Reading/ Recording frequency:	Data is extracted and recorded annually for each season; applicable data was extracted in November 2014 for 2013-2014 heating season.
Calculation method (if applicable):	Calculate mean temperature from daily recordings for seasons in question.
QA/QC procedures:	Confirm that temperature data corresponds to time that seasonal surveys were conducted for year y
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$WS_{y,s}$ household stoves and/or insulation
Unit:	knots
Description:	Independent Variable: Mean wind speed in knots for year y and season s (Autumn, Winter, Spring) for target groups in Ulaanbaatar
Measured/ Calculated / Default:	Measured
Source of data:	(US) National Climatic Data Center Climatic Service Branch of the National Oceanic and Atmospheric Administration (NOAA). See also ANNEX 6 - Household Energy Survey Data Analysis, sheet '7. $T_{y,s}$ and $WS_{y,s}$ Data'

Value(s) of monitored parameter:	$WS_{1,Autumn}$ 5.5 knots $WS_{1,Winter}$ 3.0 knots $WS_{1,Spring}$ 5.0 knots Values applied for season represent represent average of daily wind speed measurement recorded by NOAA for every day during season, following seasonal definitions below: <ul style="list-style-type: none"> • Autumn – August 2013, September 2013, October 2013 • Winter – November 2013, December 2013, January 2014 • Spring – February 2014, March 2014, April 2014
Monitoring equipment:	NOAA weather station
Measuring/ Reading/ Recording frequency:	Data is extracted and recorded annually for each season; applicable data was extracted in October 2014 for 2013-2014 heating season.
Calculation method (if applicable):	n/a
QA/QC procedures:	Check that wind speed data corresponds to time that seasonal surveys were conducted for year y
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$DW_{y,type}$, household stoves and/or insulation
Unit:	1=House, 0=Ger
Description:	<i>Independent Variable:</i> Number of dwellings that are houses for target groups in Ger Area homes
Measured/ Calculated / Default:	Measured
Source of data:	MEC Tracker Platform and Household Energy Survey (HES)
Value(s) of monitored parameter:	1 or 0, determined for each household that used product and reported coal consumption in project scenario to calculate baseline coal consumption.
Monitoring equipment:	MEC Tracker Platform
Measuring/ Reading/ Recording frequency:	Monitored continuously. Applied annually for HHs sampled in Household Energy Survey. Applicable HES was conducted September 2014 - January 2015.
Calculation method (if applicable):	n/a
QA/QC procedures:	Verification of MEC Tracker data through HES, in-person and phone survey.
Purpose of data:	Calculation of baseline emissions
Additional comment:	-

Data / Parameter:	η_{new}															
Unit:	% thermal efficiency															
Description:	Efficiency of the new CEP															
Measured/ Calculated / Default:	Measured															
Source of data:	Credit Tracker and Household Energy Survey															
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th>Stove Type</th><th>Thermal Efficiency</th><th>Tester, Year</th></tr> </thead> <tbody> <tr> <td>Royal Single/Mini Dul</td><td>74.3%</td><td>SEET, 2014</td></tr> <tr> <td>Royal Double/Golomt</td><td>75.8%</td><td>SEET, 2014</td></tr> <tr> <td>Silver Turbo/Khas</td><td>77.0%</td><td>SEET, 2014</td></tr> <tr> <td>Silver Mini/ Ulzii</td><td>76.2%</td><td>SEET, 2013</td></tr> </tbody> </table> <p>All tests were conducted by the Stove Emissions and Efficiency Testing (SEET) Laboratory in Ulaanbaatar Mongolia. The laboratory was developed with support from the Asian Development Bank to conduct efficiency, emissions, and stove performance testing, particularly focused on household level stoves. The SEET Lab is currently under management of the national Mongolian University of Science and Technology (MUST). Testing followed the protocol: "UJ SeTAR Centre Standard Operating Procedure: The Heterogenous Testing Procedure for Thermal Performance and Trace Gas Emissions."</p> <p>Source: ANNEX 15 -Stove Testing Reports</p>	Stove Type	Thermal Efficiency	Tester, Year	Royal Single/Mini Dul	74.3%	SEET, 2014	Royal Double/Golomt	75.8%	SEET, 2014	Silver Turbo/Khas	77.0%	SEET, 2014	Silver Mini/ Ulzii	76.2%	SEET, 2013
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Royal Double/Golomt	75.8%	SEET, 2014														
Silver Turbo/Khas	77.0%	SEET, 2014														
Silver Mini/ Ulzii	76.2%	SEET, 2013														
Monitoring equipment:	Stove manufacturer technical specifications															
Measuring/ Reading/ Recording frequency:	Ongoing as new stoves are added															
Calculation method (if applicable):	n/a															
QA/QC procedures:																
Purpose of data:	Eligibility criteria #18 for inclusion of CEP in CPA: "The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications"															
Additional comment:																

D.3. Implementation of sampling plan

>>

The following parameters have been determined by survey using the sampling approach, described in Stage 2 of the monitoring approach (section C):

- POF – fraction of CEPs that were in use during monitoring period
- $C_{y,new\ CEPi}$ – project coal consumption
- $C_{y,old\ CEPi}$ – baseline coal consumption

The samples were selected through simple random sampling from the 6 frames separately:

Frame 1: Stove in house dwelling type, located in Songinokhairkhan district (“House - Song.”)

Frame 2: Stove in house dwelling type, located in Bayangol district (“House - Bayan.”)

Frame 3: Stove in house dwelling type, located in other district (“House-Other”)

Frame 4: Stove in ger dwelling type, located in Songinokhairkhan district (“Ger - Song.”)

Frame 5: Stove in ger dwelling type, located in Bayangol district (“Ger - Bayan.”)

Frame 6: Stove in ger dwelling type, located in other district (“Ger - Other”)

A summary of the HES sampling results are shown in Table 3-Table 5 below. The application of the sampled parameters in calculating emissions reductions is demonstrated in Section E.1. As demonstrated below, each of the parameters met required confidence/precision for both sampling frames.

Table 3: POF Survey results

Crediting Category	N	POF	Std Err	90% Confidence Level: Precision Achieved	Meets 90/10 Rule?
House-Song.	24	96%	0.04	7.00%	Yes
House-Bayan.	52	92%	0.04	6.59%	Yes
House-Other	65	95%	0.03	4.49%	Yes
Ger-Song.	31	90%	0.05	9.67%	Yes
Ger-Bayan.	41	93%	0.04	7.22%	Yes
Ger-Other	60	93%	0.03	5.68%	Yes

Source: **ANNEX 6** - Household Energy Survey Data Analysis

Table 4: $C_{y,new,CEPi}$ Survey results

Crediting Category	N	Mean (tons coal/HH/ heating season)	Standard Deviation	90% Confidence Level: Precision Achieved	Meets 90/10 Rule?
House-Song.	22	3.54	0.74	7.31%	Yes
House-Bayan.	39	3.35	1.20	9.43%	Yes
House-Other	51	3.43	1.16	7.77%	Yes
Ger-Song.	26	3.64	1.00	8.81%	Yes
Ger-Bayan.	37	2.76	0.64	6.29%	Yes
Ger-Other	49	3.40	1.40	9.69%	Yes

Source: **ANNEX 6** - Household Energy Survey Data Analysis

Table 5: $C_{y,old,CEPi}$ Calculation Results

Crediting Category	N	Mean (tons coal/HH/ heating season)	Standard Deviation	90% Confidence Level: Precision Achieved	Meets 90/10 Rule?
House-Song.	22	5.67	0.00	0.00%	Yes
House-Bayan.	39	4.23	0.00	0.00%	Yes
House-Other	51	5.31	0.00	0.00%	Yes
Ger-Song.	26	5.23	0.00	0.00%	Yes
Ger-Bayan.	37	3.79	0.00	0.00%	Yes
Ger-Other	49	4.87	0.00	0.00%	Yes

Source: **ANNEX 6** - Household Energy Survey Data Analysis

Complete details of the HES survey, data analysis, and results can be found in **ANNEX 5** - Household Energy Survey: Fuel Consumption and Usage Report and **ANNEX 6** - Household Energy Survey Data Analysis.

SECTION E. Calculation of emission reductions or GHG removals by sinks

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

>>

1. Emissions Reductions per product

Emissions reductions are calculated using the following equations:

$$ER_y = \sum_i BE_{y,CEPi} - PE_{y,CEPi}$$

Where:

ER_y	Emission reductions during the year y in tCO ₂ e
$BE_{y,CEPi}$	Baseline emissions for CEP-i during the year y in tCO ₂ e.
$PE_{y,CEPi}$	Project activity emissions for CEP-i during the year y for technology i in tCO ₂ e.

BE_y and PE_y are determined through surveys, which may encompass single CEP or multiple CEP installations in a building or structure. As the baseline study determined that the district in which a household is located affects coal consumption, the CEP and household location is also taken into consideration in dividing the population into frames. As ger blankets are not credited in Issuance 1, the following combinations of installed project CEPs per building were surveyed:

Frame 1: Stove in house dwelling type, located in Songinokhairkhan district (“House - Song.”)

Frame 2: Stove in house dwelling type, located in Bayangol district (“House - Bayan.”)

Frame 3: Stove in house dwelling type, located in other district (“House-Other”)

Frame 4: Stove in ger dwelling type, located in Songinokhairkhan district (“Ger - Song.”)

Frame 5: Stove in ger dwelling type, located in Bayangol district (“Ger - Bayan.”)

Frame 6: Stove in ger dwelling type, located in other district (“Ger - Other”)

$$BE_{y,CEP-i} = C_{y,old,CEP-i} * NCV_{coal} * EF_{coal}$$

$$PE_{y,CEP-i} = C_{y,new,CEP-i} * NCV_{coal} * EF_{coal}$$

Where:

$C_{y,old,CEP-i}$	Quantity of coal used in the heating season in the absence of the project activity in tons of coal per household per heating season, calculated through baseline regression model (see ANNEX 8 – Baseline Fuel Consumption Regression Analysis)
$C_{y,new,CEP-i}$	Quantity of coal used in the heating season used during the project activity in tons of coal per household per heating season, measured through surveys.
NCV_{coal}	Net calorific value of coal.
EF_{coal}	Emission factor for the amount of CO ₂ e resulting from the combustion of coal

Demonstration of calculations of ER_y for each sampling frame and equivalent crediting category is demonstrated below.

$$BE_y = C_{y,old} * NCV_{coal} * EF_{coal}$$

Parameter	Unit	House-Song.	House-Bayan.	House-Other	Ger-Song.	Ger-Bayan.	Ger-Other
$C_{y,old}$	tons coal/HH/Heating Season	5.67	4.23	5.31	5.23	3.79	4.87
NCV_{coal}	TJ/ton	0.0189					
EF_{coal}	tCO ₂ e/TJ	96.1					
BE_y	tCO ₂ e/HH/Heating Season	10.30	7.67	9.65	9.50	6.88	8.85

$$PE_{y,CEP-i} = C_{y,new,CEP-i} * NCV_{coal} * EF_{coal}$$

Parameter	Unit	House-Song.	House-Bayan.	House-Other	Ger-Song.	Ger-Bayan.	Ger-Other
$C_{y,new}$	tons coal/HH/Heating Season	3.54	3.35	3.43	3.64	2.76	3.40
NCV_{coal}	TJ/ton	0.0189					
EF_{coal}	tCO ₂ e/TJ	96.1					
PE_y	tCO ₂ e/HH/Heating Season	6.42	6.08	6.23	6.62	5.02	6.17

$$ER_y = BE_y - PE_y$$

Parameter	Unit	House-Song.	House-Bayan.	House-Other	Ger-Song.	Ger-Bayan.	Ger-Other
ER_y	tCO ₂ e/HH/Heating Season	3.88	1.60	3.42	2.89	1.86	2.68

In summary, BE_y , PE_y , and ER_y are demonstrated for the two crediting categories in Table 6 below.

Table 6: ER_y by Crediting Category

Crediting Category	BE _y (tCO ₂ e/HH/ Heating Season)	PE _y (tCO ₂ e/HH/ Heating Season)	ER _y (tCO ₂ e/HH/ Heating Season)
House-Song.	10.30	6.42	3.88
House-Bayan.	7.67	6.08	1.60
House-Other	9.65	6.23	3.42
Ger-Song.	9.50	6.62	2.89
Ger-Bayan.	6.88	5.02	1.86
Ger-Other	8.85	6.17	2.68

2. Emissions Reductions over the monitoring period

POF is taken into consideration for calculation of ER for the monitoring period. The POF value for Stove-House is 96.12% and for Stove-Ger is 97.56%.

Table 7 below demonstrates the emissions reductions in tCO₂e per year by crediting category realized during the monitoring period. Calculation of emissions reductions is included in **ANNEX 2 - ER Calculations**.

As noted in section C. above, a 7.9% discount factor is applied to account for the 3 non-conforming cases found from 38 household visits made by DOE on verification site visit. Application of discount factor is demonstrated below.

Table 7: Emissions Reductions

Crediting Category	ER _y	POF	N _{all}	Total CEP - Heating Seasons	tCO ₂ e	Applied Discount	Applied tCO ₂ e
Total	2.72	0.93	18,638	13,502	34,490	7.9%	31,767
House-Song.	3.88	0.96	1,148	871	3,236	7.9%	2,981
House-Bayan.	1.60	0.92	990	822	1,211	7.9%	1,115
House-Other	3.42	0.95	2,360	1,905	6,221	7.9%	5,730
Ger-Song.	2.89	0.90	4,594	2,897	7,553	7.9%	6,957
Ger-Bayan.	1.86	0.93	1,953	1,633	2,813	7.9%	2,591
Ger-Other	2.68	0.93	7,593	5,373	13,456	7.9%	12,394

Source: **ANNEX 2 - ER Calculations**

The ER Calculator calculates emissions reductions for 2013 and 2014 in the monitoring period. Emissions reductions are calculated for each 'CEP Heating Season' accrued in the monitoring period, or the portion of the monitoring period that the CEP was installed and active.

Emissions reductions for each crediting period are calculated by multiplying ER_y per product, adjusted N_{all} (or Total CEP-Heating Seasons), and the POF for each crediting category.

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

>>

N/A

E.3. Calculation of leakage

>>

1. Displaced stoves

As stated in the PDD, leakage may be considered if the displaced baseline stove is not dismantled or if it is put to a secondary purpose that does not involve cooking or heating. The PoA aims to dismantle 100% of old stoves. According to XacBank operating procedures, every household must give up their old stove at the time of installation of the new stove (see **ANNEX 14 - Stove Dismantling Procedures**). The stove is collected by the XacBank representative at time of installation and stored in a container at the sales center. XacBank has an on-going contract with a local stove dismantling company which picks up the old stoves in the container and destroys them. The scrap metal is then sold to a recycling company. XacBank and project partners agreed that for households that demonstrate with official government letter they are a newly married couple or a household that is otherwise purchasing their first stove, the old stove requirement is waived as there is no previous stove to surrender (see **ANNEX 14 - Stove Dismantling Procedures**).

The HES included a survey question asking respondents about the fate of the previous stove which confirmed the procedures outlined above. Of households surveyed, over 98% reported that they gave up their stove at installation, and <1 % (1 household) had the newly married couple exemption.

2. NRB Consumption

Wood is used as a starter fuel in the use of both baseline stoves and efficient stoves. While the consumption of biomass is expected to decrease, the project conservatively does not credit reduction in wood consumption. The consumption of wood in the project scenario was monitored to ensure that consumption did not increase as a result of using the efficient stove. This parameter is compared to the calculated value of baseline biomass consumption, derived from the ex-ante parameter, *Baseline Biomass Consumption Regression Model*.

As demonstrated in **ANNEX 5 - Household Energy Survey: Fuel Consumption and Usage Report** households saved wood in the project scenario, shown in Table 8 below. As such, no leakage is considered due to wood consumption.

Table 8: Change in wood consumption (m3) for heating season 2013-2014

	All Stoves
	Mean (m ³)
Baseline biomass consumption	4.11
Project biomass consumption	3.99
Change in biomass consumption (Baseline - Project Biomass Consumption)	0.12

Source: **ANNEX 6 - Household Energy Survey Data Analysis**

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	102,814	71,047	-	31,767

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	50,133	31,767

E.6. Remarks on difference from estimated value in registered PDD

>> Emissions reductions achieved during the monitoring period are lower than the values estimated in the ex-ante calculation of registered PDD because (a) 59% of the stoves credited in CPA No. 001 were installed after the start of the heating season, therefore they received only partial crediting; (b) emissions reductions per CEP are lower than anticipated in the registered PDD, for which emissions reductions calculations were based on a 50% reduction in coal consumption with the use of an improved stove; and (c) ger blankets are not credited during this heating season. Further a 7.9% discount factor was applied to address non-conforming cases found on DOE verification site visit.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO ₂ e)	-	31,767

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Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	<input type="checkbox"/> Project participant <input checked="" type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	MicroEnergy Credits
Street/P.O. Box	1201 Alaskan Way #200
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City	Seattle
State/Region	Washington
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Country	USA
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E-mail	sriskandh@microenergycredits.com
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Contact person	Sriskandh Subramanian
Title	Head of Carbon and Sustainability
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Last name	Subramanian
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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	<p>Revisions to:</p> <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		