

**MONITORING REPORT FORM (F-CDM-MR)**
Version 02.0**MONITORING REPORT**

Title of the project activity	Federal Intertrade Pengyang Solar Cooker Project
Reference number of the project activity	2307
Version number of the monitoring report	1
Completion date of the monitoring report	02/09/2012
Registration date of the project activity	25/03/2009
Monitoring period number and duration of this monitoring period	5 th 01/11/2011 -31/08/2012 (both days included)
Project participant(s)	Ningxia Federal Intertrade Co. Swiss Re Global Markets Limited Post 2012 Carbon Credit Fund CV
Host Party(ies)	China
Sectoral scope(s) and applied methodology(ies)	Sectoral scope: 1. Energy industries (renewable - / non-renewable sources) Selected methodology: AMS-I.C. Version 12, EB33 - Thermal energy for the user with or without electricity
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	29,024 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	30,166 tCO ₂ e

SECTION A. Description of project activity**A.1. Purpose and general description of project activity**

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The project installed 17,000 solar cookers for the poor rural residents in north-western China. The rating power of each solar cooker is 773.5W and the total capacity of the project is 13.1 MW. The project enabled the rural residents to efficiently substitute solar energy for the fossil fuel (coal) used in daily cooking and water boiling, avoiding CO₂ emission generated by fossil fuel consumption.

The starting date of operation of the project activity was 2 April 2009, which was in the first monitoring period of the project. There were 4 monitoring periods prior to the current monitoring period which is the fifth monitoring period.

The continued operation period for the project is 01/11/2011 - 31/08/2012 which is the current monitoring period. The total emission reductions achieved in this monitoring period is 30,166 tCO₂e.

A.2. Location of project activity

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The Project is located in seven townships (Luowa, Jiaocha, Wangwa, Xiaocha, Fengzhuang, Caomiao, and Mengyuan) in Pengyang County, Ningxia Hui Autonomous Region, China. The approximate locations of the centers of the townships in which the project is located are:

Township	Longitude(E)	Latitude(N)	Longitude(E)	Latitude(N)
	Deg Min Sec	Deg Min Sec	Degree	Degree
Wangwa	106°38'15"E	36° 6'14"N	106.6375	36.1039
Fengzhuang	106°49'0"E	36° 3'59"N	106.8167	36.0664
Xiaocha	106°46'0"E	36° 8'59"N	106.7667	36.1497
Mengyuan	106°49'1"E	35°58'1"N	106.8169	35.9669
Luowa	106°34'0"E	36°16'0"N	106.5667	36.2667
Jiaocha	106°34'21"E	36° 8'54"N	106.5725	36.1483
Caomiao	106°41'1"E	36° 2'1"N	106.6836	36.0336

Each of the 17,000 solar cookers was installed in the yard of its user's home in a location where it can be fully exposed to sunshine.

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)
People's Republic of China (host)	Ningxia Federal Intertrade Co.	No
Netherlands	Swiss Re Global Markets Limited	No
Switzerland	Post 2012 Carbon Credit Fund CV	No

A.4. Reference of applied methodology

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Small-scale CDM baseline methodology “AMS-I.C.(Version 12, EB33), Thermal energy for the user with or without electricity”. For more information regarding the methodology, please refer to the link: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

A.5. Crediting period of project activity

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Type: fixed crediting period

Start date: 27/03/2009

Length: 10 years

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

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The starting date of operation of the project activity was 2 April 2009, which was in the first monitoring period of the project. The current monitoring period is the fifth monitoring period. There is no event or situations that occurred during this monitoring period, which may impact the applicability of the methodology.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

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None

B.2.2. Corrections

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None

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

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None

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

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None

B.2.5. Changes to start date of crediting period

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None

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

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Not applicable

SECTION C. Description of monitoring system

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According to methodology AMS-I.C. (Version 12, EB33) and the registered PDD, the following two parameters were monitored:

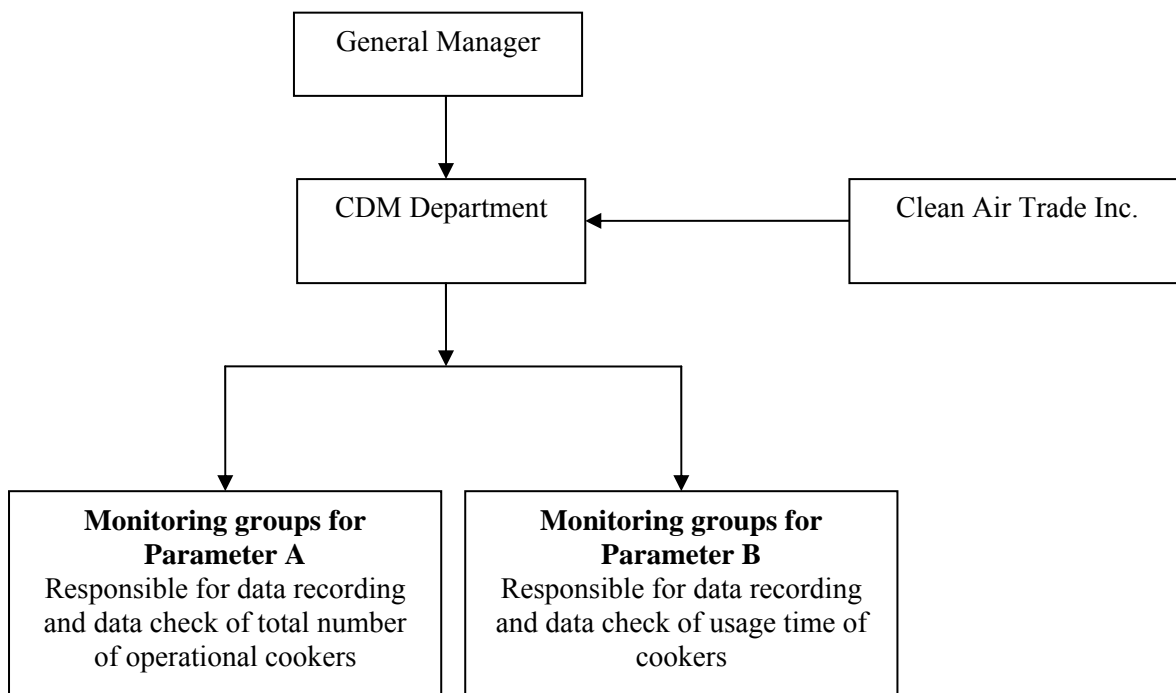
- (a) the number of solar cookers in operation (parameter A), and
- (b) the average operating time of each solar cooker (parameter B).



Monitoring Plan in PDD	Monitoring Process Implemented
<p><u>For the number of solar cookers in operation (Parameter A):</u></p> <p>B7.1 of PDD: The initial value of this parameter will be determined by the sales contract of the solar cookers and then this parameter will be monitored, recorded, and archived annually.</p> <p>B7.2 of PDD: The monitoring of total number of operating solar cookers will be conducted annually during the last quarter of each year. A checklist will be used for monitoring and recording this parameter.</p> <p>To track the solar cookers, a serial number will be put on each of the solar cookers distributed to the users. A list of all the users and the corresponding serial numbers of their solar cookers will be kept.</p>	<p><u>For the number of solar cookers in operation (Parameter A):</u></p> <p>The sales contract has been presented to the verification team during the first verification. 17, 000 solar cookers were ordered and installed initially.</p> <p>The serial number was put during the solar cooker production process. A list of all the users and corresponding serial numbers was kept during the distribution process.</p> <p>The monitoring of this parameter was conducted once by monitoring team A. Team A consisted of 5 groups, and each group consisted of 2 persons (one from the Rural Energy Section under the Bureau of Agriculture, Graze, and Science & Technology of Pengyang County (Hereinafter “RES”) and the other from Ningxia Federal Intertrade Co.).</p> <p>From July 10, 2012 to August 27, 2012, monitoring team A visited each of the users and checked if the cooker is in operation and if the serial number of each cooker matches its user through eye observation and short conversation by monitoring personnel.</p> <p>After the visit to households, the monitoring results were recorded in the monitoring table shown in PDD section B7.2.Clause 3. Then all the operational cookers were summed up to generate the total number of cookers in operation. All the monitoring data were collected, recorded and confirmed by the monitoring team, and then reported to the project owner.</p>
<p><u>For the average operating time of each solar cooker (Parameter B):</u></p> <p>B7.2 of PDD:</p> <ul style="list-style-type: none"> ● Sampling survey will be utilized in the monitoring. 309 sample users will be randomly selected from the 7 townships within the project boundary. ● A number of CDM groups will be set up to conduct the daily monitoring of the 	<p><u>For the average operating time of each solar cooker (Parameter B):</u></p> <ul style="list-style-type: none"> ● Sampling survey method was used and 309 samples were randomly selected using Excel in October 2011. ● There are 7 CDM groups (each consists of 1 person) directly monitoring and recording the operating hours of the 309

<p>operating hours of the sampled users. Each CDM group will consist of 1~5 people and each person will be responsible for the monitoring and recording of 5~20 sampled users. The monitoring forms will be filled out daily by the CDM group.</p> <ul style="list-style-type: none"> At least once a month the monitoring form will be collected and the quality of data will be checked. At least once a month, the CDM group will choose one family and stay for an entire day in this family' home to monitor the detailed usage of the solar cooker. 	<p>sample users. Please note that the number of users each monitoring person handled is more than 5~20 users as planned in PDD, because the ways of collecting data has been diversified – the monitoring personnel used phone call, SMS message, or visited the user face-to-face to get the data, which significantly improved the efficiency.</p> <ul style="list-style-type: none"> At the end of each month during the monitoring period, the monitoring form was collected and the paper files were converted into electronic form and archived. The quality of data was checked by the “RES” and Ningxia Federal Intertrade Co. separately. In each month of the monitoring period, the monitoring team chose one family and recorded the detailed usage of the solar cooker at this family throughout the day. The purpose of such visit is to double check if the usage time the users reported is within the reasonable range.
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The organization structure of the monitoring system is the following:



Roles and Responsibilities:



The General Manager is responsible for overall management of the entire monitoring process. Under the General Manager, there is a CDM Department which consists of groups for the monitoring of parameter A (total number of cookers in operation) and parameter B (cooker usage time). CDM Department is responsible for data recording, analyzing, checking and archiving, Clean Air Trade Inc. is responsible for overseeing and advising the monitoring process as well as final data checking.

Due to the non-industrial nature of the project, emergency procedures are not applicable to the project. For QA/QC procedures, please refer to QA/QC procedures in section D.2.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	1.EF CO ₂
Unit	tCO ₂ /TJ
Description	Baseline emission factor of Coal
Source of data	IPCC2006, page 2.22, Table2.5
Value(s) applied	94.6
Purpose of data	Calculation of baseline emission
Additional comment	There was no national or regional data available. Thus, IPCC default value was used.

Data / Parameter	2.R
Unit	W/m ²
Description	Standard solar irradiance rate used to calculate rating power of solar cooker
Source of data	National Standard of the People's Republic of China, GB No.: NY/T219-2003
Value(s) applied	700
Purpose of data	Calculation of baseline emission
Additional comment	

Data / Parameter	3.R _i																										
Unit	W/m ²																										
Description	Monthly solar irradiance rate in project region																										
Source of data	Ningxia Meteorological Archives																										
Value(s) applied	<table> <tr> <th><u>Month</u></th><th><u>Value</u></th></tr> <tr><td>1</td><td>397.6</td></tr> <tr><td>2</td><td>519.6</td></tr> <tr><td>3</td><td>521.8</td></tr> <tr><td>4</td><td>601.6</td></tr> <tr><td>5</td><td>689.5</td></tr> <tr><td>6</td><td>746.1</td></tr> <tr><td>7</td><td>666.1</td></tr> <tr><td>8</td><td>727.7</td></tr> <tr><td>9</td><td>656.7</td></tr> <tr><td>10</td><td>652.2</td></tr> <tr><td>11</td><td>402.6</td></tr> <tr><td>12</td><td>398.5</td></tr> </table>	<u>Month</u>	<u>Value</u>	1	397.6	2	519.6	3	521.8	4	601.6	5	689.5	6	746.1	7	666.1	8	727.7	9	656.7	10	652.2	11	402.6	12	398.5
<u>Month</u>	<u>Value</u>																										
1	397.6																										
2	519.6																										
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8	727.7																										
9	656.7																										
10	652.2																										
11	402.6																										
12	398.5																										
Purpose of data	Calculation of baseline emission																										
Additional comment																											



Data / Parameter	4.A
Unit	m ²
Description	Solar cooker's light-collecting area
Source of data	Project owner(technical specification of the solar cooker)
Value(s) applied	1.7
Purpose of data	Calculation of baseline emission
Additional comment	

Data / Parameter	5. η
Unit	
Description	Solar cooker's thermal efficiency
Source of data	Solar cooker testing report from Ningxia Department of Agriculture and Graze, Rural Energy Section
Value(s) applied	65%
Purpose of data	Calculation of baseline emission
Additional comment	

Data / Parameter	6. η_{th}
Unit	
Description	Thermal efficiency for the traditional coal furnace
Source of data	1) The on-site measurement data of thermal efficiency of rural coal stoves in Ningxia by the Energy Saving Monitoring Technical Service Center of Ningxia Hui Autonomous Region, the provincial authority in charge of collecting and monitoring energy usage data in Ningxia. 2)“Clean Energy for Development and Economic Growth: Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations”, United Nations Development Programme (UNDP), 2002 http://www.undp.org/energy/publications/2002/2002b.htm
Value(s) applied	15%
Purpose of data	Calculation of baseline emission
Additional comment	

D.2. Data and parameters monitored

Data/Parameter	1. n
Unit	Not applicable
Description	Number of solar cookers engaged in the proposed project
Measured/Calculated /Default	Measured.
Source of data	The monitoring records of monitoring team
Value(s) of monitored parameter	16,957 Numbers of the solar cooker in operation in each of the townships involved in the project are listed below:



	Township	Number
	Wangwa	4114
	Fengzhuang	880
	Xiaocha	963
	Mengyuan	4618
	Luowa	1485
	Jiaocha	1265
	Caomiao	3632
	Total	16957
Monitoring equipment	Monitoring equipment is not necessary, and thus not used.	
Measuring/Reading/Recording frequency	At least once a year	
Calculation method (if applicable)	Sum up the total number of operational cookers	
QA/QC procedures	<ul style="list-style-type: none"> ● The solar cookers used for the project were tested before the operation of the project by authorities to ensure their specs and quality meets the requirements of the project. ● There are maintenance and repair plan ready for the solar cookers. This plan will ensure the cookers in the project can remain in operational condition. ● For missing or damaged data record, zero value is used for the missing or damaged data, which is the most conservative approach. 	
Purpose of data	Calculation of baseline emission	
Additional comment	Records were kept in electronic form and paper form.	

Data/Parameter	2. t_i																					
Unit	Hour																					
Description	The average monthly operating time of each solar cooker																					
Measured/Calculated /Default	Measured and calculated.																					
Source of data	Usage time measured by the project monitoring team																					
Value(s) of monitored parameter	<table><tr><td>Nov-2011</td><td>80.75</td></tr><tr><td>Dec-2011</td><td>124.89</td></tr><tr><td>Jan-2012</td><td>145.84</td></tr><tr><td>Feb-2012</td><td>116.77</td></tr><tr><td>Mar-2012</td><td>112.39</td></tr><tr><td>Apr-2012</td><td>133.17</td></tr><tr><td>May-2012</td><td>128.28</td></tr><tr><td>Jun-2012</td><td>149.39</td></tr><tr><td>Jul-2012</td><td>117.75</td></tr><tr><td>Aug-2012</td><td>125.16</td></tr></table>		Nov-2011	80.75	Dec-2011	124.89	Jan-2012	145.84	Feb-2012	116.77	Mar-2012	112.39	Apr-2012	133.17	May-2012	128.28	Jun-2012	149.39	Jul-2012	117.75	Aug-2012	125.16
Nov-2011	80.75																					
Dec-2011	124.89																					
Jan-2012	145.84																					
Feb-2012	116.77																					
Mar-2012	112.39																					
Apr-2012	133.17																					
May-2012	128.28																					
Jun-2012	149.39																					
Jul-2012	117.75																					
Aug-2012	125.16																					
Monitoring equipment	Clock or watch																					



	No calibration requirement is specified in the registered PDD and the applied Methodology AMS-IC version 12.
Measuring/Reading/Recording frequency	<ul style="list-style-type: none"> ● The usage time of cookers were measured and recorded daily ● At the end of each month, all the daily data of the past month were summarized to produce the monthly usage time.
Calculation method (if applicable)	<ol style="list-style-type: none"> (1) For each of the 309 sample users, measure and record their daily usage time, then sum up all the daily usage time in a month to get the monthly usage time of each user; (2) Sum up the monthly usage time of all the 309 users to get the total monthly usage time of the 309 users. (3) Divide the number obtained in (2) by 309 to get the average monthly operating time of each solar cooker.
QA/QC procedures	<p>Before implementing the project, Ningxia Federal Intertrade Co., Ltd. trained the personnel of monitoring teams on how to properly conduct the monitoring process.</p> <p>The following process was conducted for missing or damaged data record:</p> <ol style="list-style-type: none"> 1. The general principle is that zero value is used for the missing or damaged data. This is most conservative approach. The monitoring personnel were trained before the starting of the project operation to ensure that each team member is fully aware of and able to strictly follow this conservative principle. During the monitoring process, the monitoring personnel were required to strictly abide by the above conservative principle in data recording, i.e., use zero values for all the missing or damaged data. 2. If this is due to the working error of the monitoring personnel, further train the person until he or she can perform the job properly. And in the mean time, use zero value for the missing or damaged data; 3. If this is due to the inability or attitude of a particular worker in monitoring team, dismiss such worker and re-hire those with proper ability and attitude. And in the mean time, use zero value for the missing or damaged data; 4. If the monitoring team as a whole does not meet the job requirement of monitoring process, Ningxia Federal Intertrade Co., the project owner, has the right to require that RES create new monitoring team according to the requirement of Ningxia Federal Intertrade Co. 5. If the data reported by the user significantly higher than the normal range, the monitoring personnel should ask for the reason. If the reason belongs to one of the following: 1) holidays celebration, 2) wedding or funeral, or 3) family/friends party, the reason is considered to be valid. Then the reason is recorded along with the data. Otherwise, zero value is used for that day's data.
Purpose of data	Calculation of baseline emission
Additional comment	Records were kept in electronic form and paper form.

D.3. Implementation of sampling plan

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According to the registered PDD, simple random sampling was used for the monitoring of the average monthly usage time of cookers (Parameter B). 309 sample users were randomly selected from users within the project boundary using Excel in October 2011, and the average monthly usage time per user was calculated (for details, please refer to section D.2, parameter#2, t_i).

According to “Best Practices Examples Focusing on Sample Size and Reliability Calculations” EB67, Annex 6, paragraph 200-203, confidence/precision should be checked following the steps below:

(i) Standard error of the mean = $\sqrt{(1-f) \frac{s^2}{n}}$

f is the sampling fraction – the proportion of the population that is sampled.

s^2 is the sample variance (s is the sample standard deviation) of the monthly usage hours per user

n is the sample size.

In our case, $n = 309$ and the population = 17000, thus, $f = 309/17000 = 0.0182$.

Using Excel, we can calculate:

$s = 18.3796$, and

The mean value of monthly usage hour per user = 123.4381

Putting all these pieces of information together gives:

$$\sqrt{(1-f) \frac{s^2}{n}} = \sqrt{(1 - \frac{309}{17000}) \times \frac{s^2}{309}} = 1.0360$$

and so the standard error of the mean is 1.0360.

(ii) t-value

This value depends on the level of confidence and the size of the sample. The exact figure can be acquired from statistical tables for the t-distribution, or using standard statistical software. The value can also be derived in Microsoft Excel using the TINV function.

For a sample size of 309 and 90% confidence, using the TINV function in Microsoft Excel, the t-value is 1.6498.

(iii) Precision

The precision associated with an estimate is: t-value \times standard error of the mean.

The precision of the monthly average usage (in hours), assuming 90% confidence, is therefore: $\pm (1.6498 \times 1.0360) = \pm 1.7093$.

The ratio of this relative to the average monthly usage is $1.7093/123.4381 = 0.01385$ and so the relative precision is 1.385%. Therefore the required precision of 10% has been met.

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

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

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According to the registered PDD, the emission reduction can be calculated in the following table using the parameters below:

$$BE_y = n \times \sum [773.5 \times (R_i / 700) \times t_i \times 3.6 \times 10^{-9}] \times EF_{CO_2} / \eta_{th} \quad (i = 1, 2, \dots, 12)$$

Where:

R_i	R_i is the actual solar irradiance rate in month i in W/m^2 . The values adopted are parameter #3 in the data table D.1
t_i	t_i is the usage time of the solar cooker in month i in hours. The values adopted are parameter #2 in table D.2
n	The total number of solar cookers installed by the proposed project. The value adopted is 16,957 (parameter #1 in table D.2).
EF_{CO_2}	The CO_2 emission factor of coal (tCO_2e/TJ). IPCC default emission factor of $94.6tCO_2e/TJ$ will be adopted in the proposed project (parameter #1 in table D.1).
η_{th}	The efficiency of the coal-fired stove that would have been used in the absence of project activity. The value adopted is 15% (parameter #6 in table D.1)

The result is summarized in the table below:

	Time Interval	Solar irradiance rate	Actual Power of Solar Cooker	Monthly Usage Time	Net Heat Supplied Monthly	CER Generated Monthly
Month		R_i	$P_i = 773.5 \cdot (R_i/700)$ Equation (8) in PDD	t_i	$HG_i = n \cdot [P_i \cdot t_i \cdot (3.6 \times 10^{-9})]$ Equation (6) in PDD	$BE_i = HG_i \cdot EF_{CO_2} / \eta_{th}$ Equation (5) in PDD
		(W/m^2)	(W)	(hour)	(TJ)	(tCO_2e)
2011-11	01/11/2011 – 30/11/2011	402.6	444.9	80.75	2.19300	1383
2011-12	01/12/2011 – 31/12/2011	398.5	440.3	124.89	3.35701	2117
2012-01	01/01/2012 – 31/01/2012	397.6	439.3	145.84	3.91145	2467
2012-02	01/02/2012 – 29/02/2012	519.6	574.2	116.77	4.09279	2581
2012-03	01/03/2012 – 31/03/2012	521.8	576.6	112.39	3.95606	2495
2012-04	01/04/2012 – 30/04/2012	601.6	664.8	133.17	5.40415	3408
2012-05	01/05/2012 – 31/05/2012	689.5	761.9	128.28	5.96615	3763
2012-06	01/06/2012 – 30/06/2012	746.1	824.4	149.39	7.51846	4742
2012-07	01/07/2012 – 31/07/2012	666.1	736.0	117.75	5.29061	3337
2012-08	01/08/2012 – 31/08/2012	727.7	804.1	125.16	6.14349	3874

Using Equation (4) in PDD, total Baseline Emissions in the monitoring period = $\sum BE_i = 30,166 tCO_2e$

Therefore, the total Baseline Emissions generated in the monitoring period is **30,166 tCO₂e**.

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

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There is no project emission.

E.3. Calculation of leakage

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There is no leakage.

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

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO ₂ e)	Project emissions or actual net GHG removals by sinks (tCO ₂ e)	Leakage (tCO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO ₂ e)
Total	30,166	0	0	30,166

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 (tCO ₂ e)	29,024 ¹	30,166

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

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The actual monitored emission reduction (ER) is 30,166 tCO₂e, which is slightly higher than the estimated 29,024 tCO₂e in PDD. The higher actual ER is due to the fact that the actual usage time of the cookers is higher than the estimated value in PDD. The difference between the actual value and estimated value is within a reasonable range.

¹ Please refer to Annex 1 of the document.

**Annex 1. CERs estimated in ex-ante calculation of registered PDD**

Month	Time Interval	Monthly CERs² in registered PDD (tCO₂e)
2011-11	01/11/2011 – 30/11/2011	2060
2011-12	01/12/2011 – 31/12/2011	2039
2012-01	01/01/2012 – 31/01/2012	2035
2012-02	01/02/2012 – 29/02/2012	2659
2012-03	01/03/2012 – 31/03/2012	2670
2012-04	01/04/2012 – 30/04/2012	3079
2012-05	01/05/2012 – 31/05/2012	3529
2012-06	01/06/2012 – 30/06/2012	3818
2012-07	01/07/2012 – 31/07/2012	3409
2012-08	01/08/2012 – 31/08/2012	3724
Total		29,024

² For simplicity, the monthly CER values in the table are just shown to the nearest integers. But the sum of these monthly CER values was calculated using their exact value.