Monitoring report form for CDM project activity
(Version 06.0)

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

MONITORING REPORT		
Title of the project activity	Nanyang Danjiang River Solar Cooker Project Phase I	
UNFCCC reference number of the project activity	6125	
Version number of the PDD applicable to this monitoring report	07	
Version number of this monitoring report	01	
Completion date of this monitoring report	06/12/2018	
Monitoring period number	5	
Duration of this monitoring period	01/01/2018 - 30/11/2018	
Monitoring report number for this monitoring report	01	
Project participants	Sirreon Technology & Development (Beijing) Co., Ltd China Carbon N.V	
Host Party	People's Republic of China	
Sectoral scopes	1: Energy industries (renewable/ non-renewable sources)	
Applied methodologies and standardized baselines	AMS-I.C. "Thermal energy production with or without electricity" (Version 19) No standardized baselines applied.	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	81,577 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	84,847 tCO_2e	

SECTION A. Description of project activity

A.1. General description of project activity

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Nanyang Danjiang River Solar Cooker Project Phase I project is located in the southwest of Henan Province, which is invested and implemented by Sirreon Technology and Development (Beijing) Co., Ltd. This region is an ideal area for solar energy utilization. The project involves the distribution and installation of 48,000 sets of solar cookers for rural households. The daylighting area of each solar cooker will be no less than 1.7 m^2 and the rated output is 773.5W_{th}. The rated and maximum total installed capacity of the project is 37.128MW_{th} and 42.073MW_{th} respectively.

The proposed project will enable the rural households to efficiently substitute solar energy for the fossil fuel (coal) used in daily cooking and water boiling, avoiding CO_2 emission that would be generated by fossil fuel consumption.

The first solar cooker equipment contract was signed on 28th May, 2011, and put into full operation on 1st August, 2011.

The continued operation period for the project is 01/01/2018 – 30/11/2018 which is the current monitoring period. The total emission reductions achieved in this monitoring period is 81,577 tCO_2e.

A.2. Location of project activity

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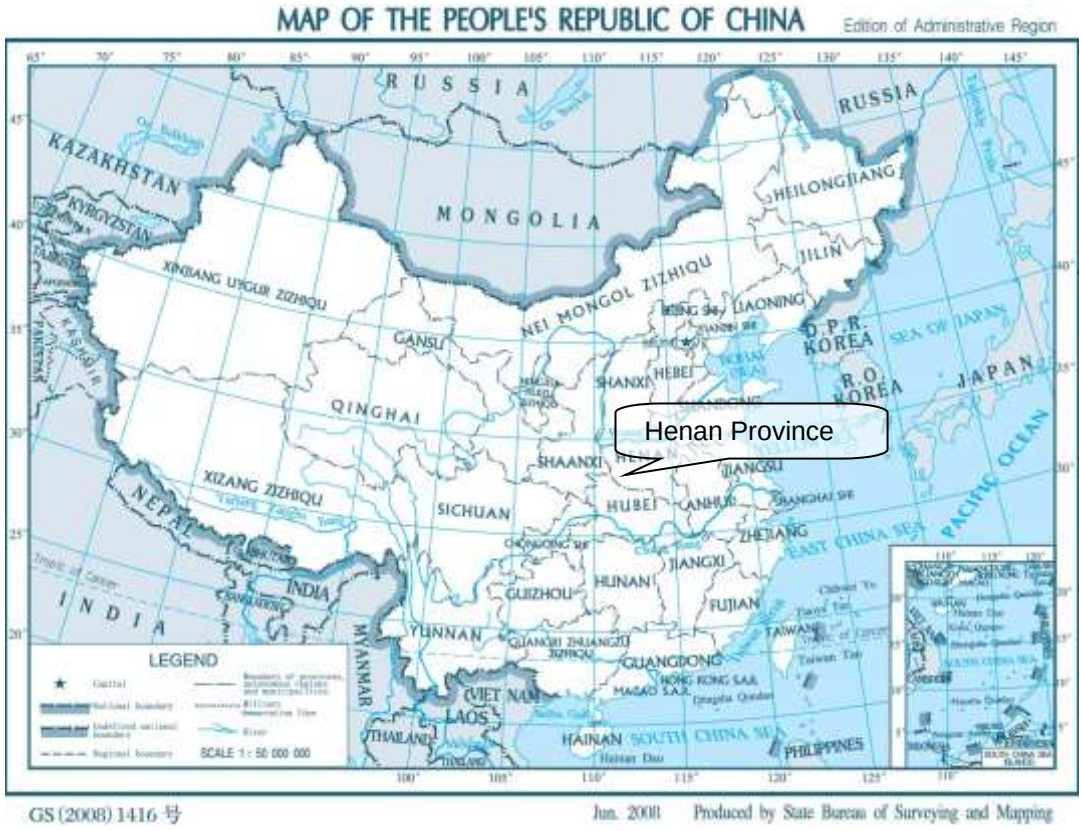
The Project is located in 7 townships (Jingziguan, Siwan, Xihuang, Maotang, Dashiqiao, Shangji and Jinhe) of Xichuan County, Henan Province, P. R. China.



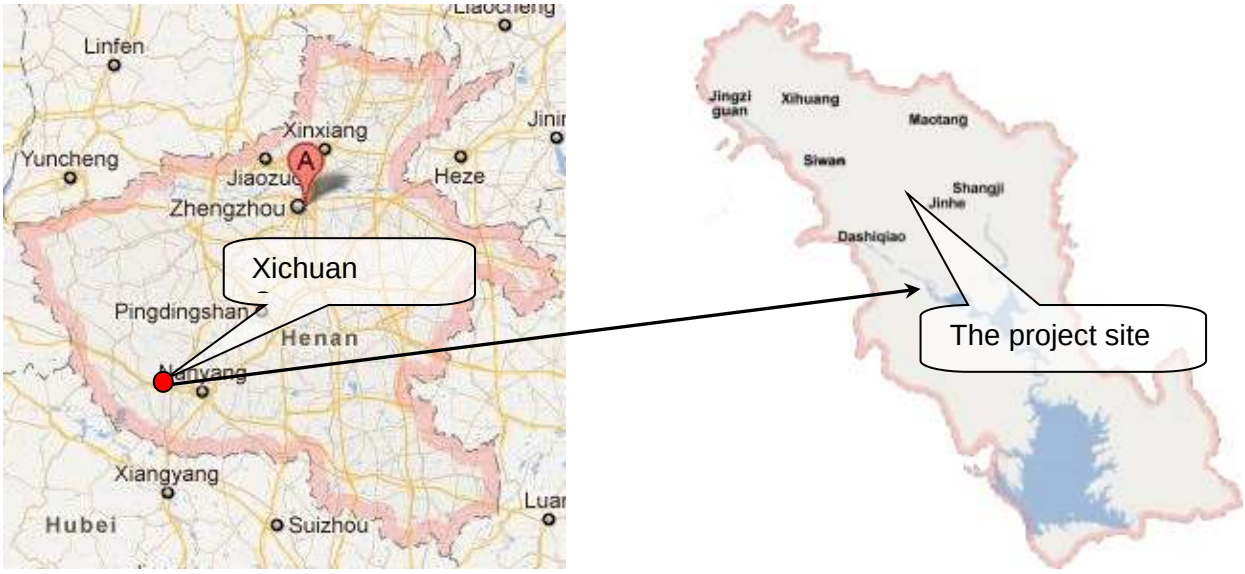


Figure A1 the Geographic Location of the proposed project in China and Henan Province

The location of the project site is presented in the following table:

No.	Township	Number of solar cookers	Geographic coordinate		
				Longitude	Latitude
1	Jingziguan	6,000	Scope	110.9790°E～111.0316°E	33.2323°N～33.2513°N
			Center	111.0174°E	33.2467°N
2	Siwan	6,000	Scope	111.1273°E～111.1651°E	33.1588°N～33.1651°N
			Center	111.1486°E	33.1578°N
3	Xihuang	8,000	Scope	111.1390°E～111.1713°E	33.2393°N～33.2461°N
			Center	111.1615°E	33.2409°N
4	Maotang	8,000	Scope	111.2805°E～111.4480°E	33.1502°N～33.2697°N
			Center	111.3773°E	33.2184°N
5	Dashiqiao	7,000	Scope	111.2509°E～111.2592°E	33.0524°N～33.0575°N
			Center	111.2534°E	33.0567°N
6	Shangji	7,000	Scope	111.4803°E～111.4878°E	33.1289°N～33.1352°N
			Center	111.4825°E	33.1331°N
7	Jinhe	6,000	Scope	111.3979°E～111.4020°E	33.1024°N～33.1030°N
			Center	111.3986°E	33.1016°N
Total		48,000			

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
China (host)	**Sirreon Technology & Development (Beijing) Co., Ltd**	No
The Netherlands	**China Carbon N.V**	No

A.4. Reference to applied methodologies and standardized baselines

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The Small-scale CDM baseline methodology AMS-I.C. “Thermal energy production with or without electricity” (Version 19, EB61) is applied.

The project also refers to:

Methodological tool: “Tool for the demonstration and assessment of additionality (version 07.0.0)”

For more information regarding the methodology, please refer to the link: http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

A.5. Crediting period type and duration

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Type: fixed crediting period

Crediting period: 02/05/2012-01/05/2022

Length: 10 years

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The solar cooker equipment contract was signed on 28th May, 2011, and put into full operation on 1st August, 2011. 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.

The main actions made for the project implementation are generalized in the following:

Time	***Milestone***
2010.08	*Completion of the project proposal*
2010.10.22	*Approved by local DRC*
2010.10.28	*Approved by local EPA*
2010.12.13	*Shareholder meeting minute about project investment*
2011.05.28	*The solar cooker equipment contract was signed*
2011.08.01	*Full operation*
2012.05.02	*Registered as the CDM project*

The project involves the distribution and installation of 48,000 sets of solar cookers for rural households. The daylighting area of each solar cooker will be no less than 1.7 m^2 and the rated output is 773.5 W_{th}. The rated and maximum total installed capacity of the project is 37.128 MW_{th} and 42.073 MW_{th} respectively.

According to the solar cooker purchase agreement, the total amount of solar cookers engaged in the proposed project is 48000. During the visit to the cooker users by the monitoring team, there were 37 households with nobody at home. Therefore, the monitoring team could not enter the houses to check the solar cookers. Following conservative principle, the monitoring team did not include these cookers into the total number of solar cookers.

The parameters of the solar cookers engaged in the proposed project and the test results are listed below:

Parameters	Unit	Requirements of National Standard	Test Results
Focus	mm	600~750	667 ~ 684
Aperture area	m^2	≥1.7	1.75 ~ 1.82
Rated Power	Wth	≥773.5	815.7 ~ 823.5
Thermal Efficiency	%	≥65%	66.5% ~ 68.8%
The area with temperature over 400°C	cm^2	50~200	73 ~ 105
Maximum operational height	m	≤1.25	1.13 ~ 1.19

Maximum operational distance	m	≤0.8	0.67 ~ 0.73
Technical life of equipment	year	No less than 10 years which is required by the project owner	

Test results source: solar cookers testing report (NO.NY2011J1685)

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines

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None

B.2.2. Corrections

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None

B.2.3. Changes to the start date of the crediting period

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None

B.2.4. Inclusion of monitoring plan

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None

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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None

B.2.6. Changes to project design

>>
None

SECTION C. Description of monitoring system

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There are 4 parameters listed in section 7.1 of the registered PDD. According to methodology AMS-I.C. (Version 19, EB61) and the registered PDD section 7.2 (sub-section 2. "Data Monitored"), *n* and t_i in section 7.1 of the registered PDD (i.e., n and B below) were monitored:

(a) Number of solar cookers in operation in the proposed project (n), and
(b) The monthly operating time of each solar cooker (t_i).
$\mathbf{EF_{FF,CO2}}$ and $\mathbf{R_i}$ in section 7.1 of the registered PDD are the data from reference documents which only need to be updated if there is an update on the latest available data. These two parameters are:
"Monthly solar irradiance rate in project region"(***Ri***) and "Baseline emission factor of coal" ($\boldsymbol{EF_{FF,CO2}}$).

For **Ri**, the latest available data released in 2018 were used in the monitoring report.
For $\mathbf{EF_{FF,CO2}}$, the latest available data is still the IPCC default value used in registered PDD.
For more details of these two parameters, please refer to parameter#3 and #4 in section D.2 of this monitoring report.

According to the registered PDD, stratified sampling (with samples of 312) was used for the monitoring of the average monthly usage time of cookers. However, the samples number in the townships of Dashiqiao and Shangji will be 45.5 according to the method of proportional distribution.

For conservative consideration, both the samples number of Dashiqiao and Shangji were adjusted to 46. As a result, 313 samples users were actually selected from 48,000 users within the project boundary using Excel to ensure conservation. According the principle of stratified sampling method, the samples within each stratum were randomly selected through simple random sampling method by using Microsoft Excel.

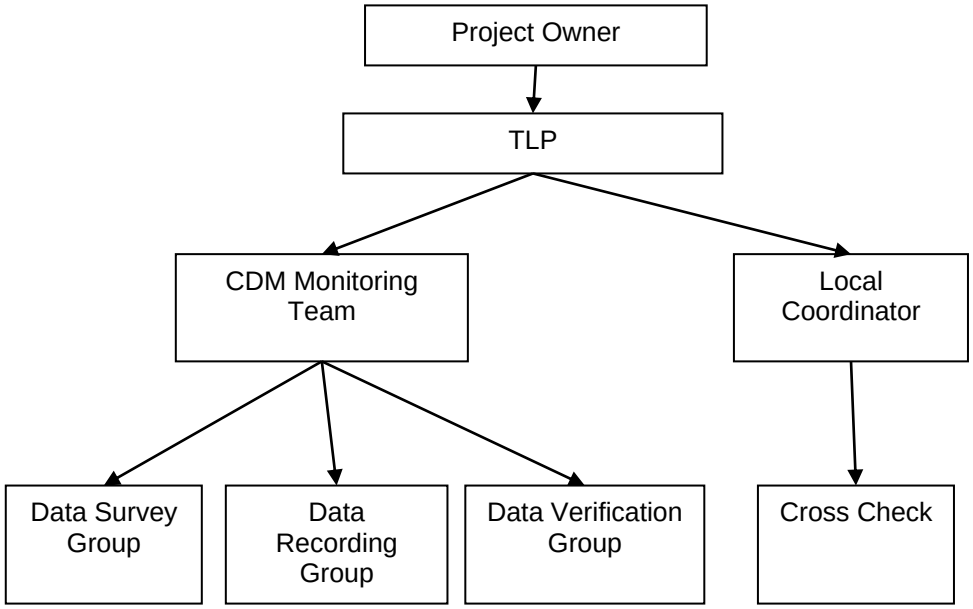
As a result, 313 samples users were actually selected from 48,000 users within the project boundary using Excel to ensure conservation. According the principle of stratified sampling method, the samples within each stratum were randomly selected through simple random sampling method by using Microsoft Excel.

The distribution of the samples in each townships shows as follow:

Year 2018

NO.	Township	Sample number
1	Jingziguan	39
2	Siwan	39
3	Xihuang	52
4	Maotang	52
5	Dashiqiao	46
6	Shangji	46
7	Jinhe	39
Total		313

Since the monitoring of **Ri** and $\mathbf{EF_{FF,CO2}}$ only involves obtaining the latest available data from reference documents, which is handled by project owner, the monitoring system only need to address the monitoring of n and t_i. Below is the organization structure of the monitoring system for n and ti:



Roles and Responsibilities:

The monitoring process was conducted through the coordination between the project owner and the local partner ("TLP"), the governmental organization in charge of the rural energy affairs.

In general, the project owner was responsible for overall management of the entire monitoring process as well as data analysing, checking, and archiving; TLP was responsible for the raw data collection and recording, and all the raw data were confirmed by TLP. The project owner worked closely with TLP to ensure proper equipment installation, training of the users, monitoring, document preservation, and maintenance.

Specifically, under the project owner, there were monitoring teams for the monitoring of n and ti. The monitoring teams consist of personnel from TLP and project owner. For the details of the monitoring team, please refer to the table below.

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.

Monitoring Plan in PDD	Monitoring Process Implemented
For number of solar cookers in operation in the proposed project: **B.7.1 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 at each monitoring period. **B.7.2 of PDD:** Sampling survey method will be used for the monitoring of n. 312 sample users will be randomly selected from the 48,000 users within the project boundary. Before the beginning of each monitoring period, a set of 312 samples will be drawn for the monitoring of n. Before the beginning of the next monitoring period, a new	**For number of solar cookers in operation in the proposed project:** The sales contracts have been presented to the verification team during the first verification. 48,000 solar cookers were ordered and installed initially. The logo of the project and the serial number was put on each of the cookers during the distribution process. Sampling survey method was used in the monitoring of *n* and 313 samples were randomly selected from 48,000 solar cook users using MS Excel software. The monitoring of this parameter was conducted

round of random sampling will be conducted among the 48,000 users to generate a new set of 312 samples which will be monitored during the forthcoming monitoring period.1 A monitoring team will be set up to conduct the monitoring of the number of operating cookers of the sample users. The monitoring personnel will be 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. The monitoring will be conducted during the last 3 months of each monitoring period. A table will be used for monitoring and recording this parameter. To track the solar cookers, the logo of the project will be put on each of the solar cookers involved in the project. For the transfer of solar cookers, the monitoring team will ensure that the transferee is also located within the project boundary of the proposed project, and will record the transferor, transferee, and the time of transfer.	by monitoring team. which consisted of data survey group, data recording group and data verification group. All the team members were properly trained beforehand so that they were fully aware of the monitoring procedures and the conservative principle. The monitoring of this parameter involved visiting each of the abovementioned sample users by data survey group. The monitoring data survey group checked if the cooker is in operation, and if the logo of the project and the serial number is on the cooker through visual observation and short conversation. After the visit to households, the monitoring results were recorded in the monitoring table substantially in the form shown in PDD section B.7.2. Clause 3. Then all the operational cookers were summed up to generate the total number of cookers in operation. There was no transfer of cookers during this monitoring period. All the monitoring data were collected, recorded and confirmed by the monitoring data survey grouped the personnel of TLP, and then provided the records to the project owner.
For the monthly operating time of each solar cooker: **B.7.2 of PDD:** Sampling survey method will be used for the monitoring of ti. 312 sample users will be randomly selected from the 48,000 users within the project boundary. Before the beginning of each monitoring period, a set of 312 samples will be drawn for the monitoring of ti. Before the beginning of the next monitoring period, a new round of random sampling will be conducted among the 48,000 users to generate a new set of 312 samples which will be monitored during the forthcoming monitoring period. Method of measurement: respondent self-reports, and operational logs. CDM monitoring team will be set up to conduct the daily monitoring of the operating hours of the sample users. The monitoring forms will be filled out daily by team members to record the daily usage data of these sample users. At least once a month team leader will collect monitoring forms from team members and the quality of data will be checked.	**For the monthly operating time of each solar cooker:** Sampling survey method was used for the monitoring of t_i and 313 samples were randomly selected from 48,000 solar cooker users using MS Excel Software. To monitor this parameter, monitoring team was set up. The monitoring personnel visited the user face-to-face to get and record the data reported by the sampled users. At the end of each month during the monitoring period, the monitoring forms were collected and the paper documents were converted into electronic form and archived. The quality of data was checked by TLP and project owner separately. specifically, TLP collected data from sampled users every day to guarantee data completeness and recorded data in accordance with the monitoring plan od PDD; TLP also ensured the data records (numbers and dates, etc.) were legible and correct, and double checked with sampled users for the data out of normal range. The project owner reviewed TLP's data records and conducted reliability checking to ensure the precision of these data meet the requirement of PDD (For details on reliability checking, please

	refer to section D.3)

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data / Parameter:	*R*
Unit:	W_{th}/m^2
Description:	Standard solar irradiance intensity used to calculate rated power of solar cooker
Source of data:	National Standard of the People's Republic of China, NY/T219-2003
Value(s) applied):	700
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	*A*
Unit:	m^2
Description:	Solar cooker's light-collecting area
Source of data:	Manufacturer
Value(s) applied):	1.7
Purpose of data:	Emission factor for baseline emissions
Additional comment:	

Data / Parameter:	*H*
Unit:	%
Description:	Solar cooker's thermal efficiency
Source of data:	Solar cooker testing report from Rural Energy Bureau of Nanyang city
Value(s) applied):	65%
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	$\eta_{BL,thermal}$
Unit:	%
Description:	Thermal efficiency for the traditional coal furnace
Source of data:	"Clean Energy for Development and Economic Growth: Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations", UNDP, 2002 http://www.undp.org/energy/publications/2002/2002b.htm http://content.undp.org/go/cms-service/download/publication/?version=live&id=2102581
Value(s) applied):	15%
Purpose of data:	Calculation of baseline emissions
Additional comment:	

D.2. Data and parameters monitored

<table>
<tr><td>Data / Parameter:</td><td>n</td></tr>
<tr><td>Unit:</td><td>N/A</td></tr>
<tr><td>Description:</td><td>Number of solar cookers engaged in the proposed project</td></tr>
<tr><td>Measured/ Calculated / Default:</td><td>Measured.

The monitoring of total number of operating solar cookers will be conducted annually at the last quarter of each year</td></tr>
<tr><td>Source of data:</td><td>Sales contract and invoice of the solar cookers. Annual monitoring result.

According to the solar cooker purchase agreement, the total amount of solar cookers engaged in the proposed project is 48000.</td></tr>
<tr><td>Value(s) of monitored parameter:</td><td>47,963 (2018)
Numbers of the solar cooker in operation in each of the townships involved in the project are listed below:
<table>
<tr><td>1</td><td>Jingziguan</td><td>5,998</td></tr>
<tr><td>2</td><td>Siwan</td><td>6,000</td></tr>
<tr><td>3</td><td>Xihuang</td><td>7,992</td></tr>
<tr><td>4</td><td>Maotang</td><td>7,986</td></tr>
<tr><td>5</td><td>Dashiqiao</td><td>6,995</td></tr>
<tr><td>6</td><td>Shangji</td><td>6,995</td></tr>
<tr><td>7</td><td>Jinhe</td><td>5,997</td></tr>
<tr><td colspan="2">Total</td><td>47,963</td></tr>
</table>
During the visit to the cooker users by the monitoring team, there were 37 households with nobody at home. Therefore, the monitoring team could not enter the houses to check the solar cookers. Following conservative principle, the monitoring team did not include these 37 solar cookers into the total number of solar cookers.

Therefore, the monitoring result of this monitored parameter is: 48,000 – 37 =47,963.</td></tr>
<tr><td>Monitoring equipment:</td><td>No monitoring equipment is used.</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Once per year</td></tr>
<tr><td>Calculation method (if applicable):</td><td>N/A</td></tr>
</table>

QA/QC procedures:	The solar cookers used for the project were tested by authorities to ensure their specs and qualities meet 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 emissions
Additional comment:	

Data / Parameter:	t_i
Unit:	Hour
Description:	The monthly operating time of each solar cooker
Measured/ Calculated / Default:	Measured. According to statistical principles, 313[1] samples is sufficient to represent the entire population of 48,000 and the 313 sample users were selected from 48,000 solar cookers by stratified sampling method. The project team measured the usage of time of these 313 sample users.
Source of data:	Usage time measured by the CDM monitoring team
Value(s) of monitored parameter:	

Month	Using hour
2018.01	123
2018.02	123
2018.03	126
2018.04	124
2018.05	125
2018.06	124
2018.07	126
2018.08	129
2018.09	128
2018.10	130
2018.11	121

[1] According to the registered PDD, stratified sampling (with samples of 312) was used for the monitoring of the average monthly usage time of cookers. However, the samples number in the townships of Dashiqiao and Shangji will be 45.5 according to the method of proportional distribution.

For conservative consideration, both the samples number of Dashiqiao and Shangji were adjusted to 46. As a result, 313 samples users were actually selected from 48,000 users within the project boundary using Excel to ensure conservation. According the principle of stratified sampling method, the samples within each stratum were randomly selected through simple random sampling method by using Microsoft Excel.

Monitoring equipment:	Clock or watch
Measuring/ Reading/ Recording frequency:	i) The usage time of cookers were measured and recorded daily ii) 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):	i) For each of the 313 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; ii) Sum up the monthly usage time of all the 313 users to get the total monthly usage time for the 313 users. iii) Divide the number obtained in ii) by 313 to get the average monthly usage time per user.
QA/QC procedures:	If the recorded raw data on the monitoring form are reasonable and basically consistent with the actual meteorological information, the raw data will be archived. The general principle is that zero value will be used for the missing or damaged data. This is most conservative approach. The monitoring personnel will be 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 will be required to strictly abide by the above conservative principle in data recording, i.e., use zero values for all the missing or damaged data. If the monitoring results are satisfactory in terms of correct reporting, data completeness and correct analysis, the data will be accepted for the monitoring report.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	EF_{FF,CO_2}
Unit:	tCO_2/TJ
Description:	Baseline emission factor
Measured/ Calculated / Default:	Default
Source of data:	IPCC2006, page 2.22, Table2.5
Value(s) of monitored parameter:	87.3
Monitoring equipment:	No monitoring equipment is used.
Measuring/ Reading/ Recording frequency:	Any revision of the IPCC Guidelines should be taken into account
Calculation method (if applicable):	N/A
QA/QC procedures:	The data is source from IPCC and no addition QA/AC procedures may need to be planned.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

Data / Parameter:	R_i
Unit:	W_{th}/m^2
Description:	Monthly solar irradiance intensity in project region
Measured/ Calculated / Default:	Monitored
Source of data:	Statistical data of Nanyang Meteorological Bureau
Value(s) of monitored parameter:	

Month	R_i
2018.01	419.36
2018.02	413.22
2018.03	442.55
2018.04	466.01
2018.05	532.69
2018.06	628.74
2018.07	643.25
2018.08	673.47
2018.09	658.23
2018.10	537.15
2018.11	432.36

Monitoring equipment:	No monitoring equipment is used.
Measuring/ Reading/ Recording frequency:	Once per year
Calculation method (if applicable):	Official source meteorological data
QA/QC procedures:	The data is official source and no addition QA/AC procedures may need to be planned.
Purpose of data:	Calculation of baseline emissions
Additional comment:	

D.3. Implementation of sampling plan

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A. Description of implemented sampling design

According to the registered PDD, simple random sampling (with sample size of 313) was used for number of solar cookers in operation in the proposed project and the monthly operational time of each solar cooker. For each parameter, 313 sample users were randomly selected from users within the project boundary.

The sampling process started as soon as the target population is determined and finished before the beginning of the monitoring period.

The CDM Monitoring Team and local coordinators have implemented the sampling investigation strictly follow the guidance and the sampling work have been conducted by the person with no interest in the proposed project, i.e. the sampling person should exclude the following personnel: 1) the solar cooker users; 2) the persons from the solar cooker manufacturer; 3) other persons that are believed to be not the fit and proper persons. Each township is treated as a stratum and total of 313 sample users have been selected among the 7 stratums. The sample size of each stratum was determined proportionately on the basis of the number of solar cooker distributed.

B. Collected Data

The stratified sampling method was used for the monitoring of the average monthly usage time of cookers.

According the principle of stratified sampling method, the samples number within each stratum were randomly selected through simple random sampling method by using Microsoft Excel. The data was stored in the Excel database.

C. Analysis of the collected data

The samples number in the townships of Dashiqiao and Shangji will be 45.5 according to the method of proportional distribution number

For conservative consideration, both the samples number of Dashiqiao and Shangji were adjusted to 46.

As a result, 313 samples users were actually selected from 48,000 users within the project boundary using Excel in July 2011 to ensure conservation. According the principle of stratified sampling method, the samples within each stratum were randomly selected through simple random sampling method by using Microsoft Excel.

The distribution of the samples in each townships shows as follow:

Year 2018

NO.	Township	Sample number
1	Jingziguan	39
2	Siwan	39
3	Xihuang	52
4	Maotang	52
5	Dashiqiao	46
6	Shangji	46
7	Jinhe	39
Total		313

D. Demonstration on whether the required confidence has been met

According to “Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities” (EB75, Annex 8), confidence/precision have been calculated and checked as follows:

1. The stratified estimated overall mean:

The sample estimate of the overall mean operation hour is calculated with the equation below:

$$m_{Strat} = \sum_{i=a}^{k} \frac{g_i}{N} \times m_i$$

Where:

m_{Strat} The stratified estimated overall mean

g_i Size of the i^{th} district where i=a,…,k

N Population total(48000)

m_i Mean of the i^{th} district where i= a,…,k

2. The standard error of the stratified estimated overall mean:

The standard error of the stratified estimated overall mean is calculated as follows:

$$s.e.(m_{Strat}) = \sqrt{\sum_{i=a}^{k} \left(\frac{g_i}{N}\right)^2 \times \left(1 - \frac{n_i}{g_i}\right) \times \frac{SD_i{}^2}{n_i}}$$

Where:

s.e. (m_{Strat}) Standard error of the stratified estimated overall mean

g_i Size of the i^{th} district where i=a,…,k

N Population total(48000)

n_i Number of sampled units the i^{th} district where i=a,…,k

SD_i^2 Variance of the i^{th} district where i=a,…,k

3. t-value:

t-value is depends on:

(i) The level of confidence, and

(ii) The size of the sample.

The t-value associated with 90% confidence and the sample size of 313 is 1.6497 as derived in Microsoft Excel using the TINV function.

4. Precision:

The precision associated with an estimate is :

t-value × standard error of the mean

5. Calculation results:

The calculation results are shown below. For more details of these calculations, please refer to the ER calculation spread sheet.

	t-value	m_{Strat}	s.e. (m_{Strat})	Precision	Relative Precision
01/01/2018 - 31/01/2018	1.6497	122.52	0.8184	1.3502	1.10%
01/02/2018 - 28/02/2018	1.6497	122.78	0.8105	1.3371	1.09%
01/03/2018 - 31/03/2018	1.6497	125.88	0.9197	1.5173	1.21%
01/04/2018 - 30/04/2018	1.6497	124.35	0.9708	1.6016	1.29%
01/05/2018 - 31/05/2018	1.6497	124.77	0.9889	1.6315	1.31%
01/06/2018 - 30/06/2018	1.6497	124.20	1.0654	1.7577	1.42%
01/07/2018 - 31/07/2018	1.6497	125.73	0.9593	1.5826	1.26%
01/08/2018 - 31/08/2018	1.6497	128.68	0.9442	1.5576	1.21%
01/09/2018 - 30/09/2018	1.6497	127.48	0.8620	1.4220	1.12%

01/10/2018 - 31/10/2018	1.6497	130.07	0.8939	1.4747	1.13%
01/11/2018 - 30/11/2018	1.6497	121.02	0.8838	1.4581	1.20%

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>

According to the registered PDD,

$$BE_{thermal,co_2,y} = n * \sum [773.5 * (R_i / 700) * t_i * 3.6 \times 10^{-9}] * EF_{FF,CO_2} / \eta_{BL,thermal} \quad (i = 1, 2, \ldots, 12)$$

Where:

R_i The actual solar irradiance intensity in month *i* in W_{th}/ m^2. The values adopted are in section D.2. parameter #3;

t_i The usage time of the solar cooker in month *i* in hours.

n The total number of solar cookers installed by the proposed project. The value adopted is 48,000.

EF_{FF,CO_2} The CO_2 emission factor of coal (tCO_2e/ TJ). IPCC default emission factor of 87.3 tCO_2e/TJ will be adopted in the proposed project.

$\eta_{BL,thermal}$ The efficiency of the coal-fired stove that would have been used in the absence of project activity. The value adopted is 15% (refer to section B. 6.2 parameter #6 for details).

The result is summarized in the table below:

Month	**Time Interval**	**Solar irradiance intensity** W_{th}/m^2	**Actual Power of Solar Cooker** W_{th}	**Monthly Usage Time** h	**Net Heat Supplied Monthly** TJ	**CER Generated Monthly** tCO2e
		R_i	P_i Formula (6) in PDD	t_i	$EG_{thermal,i}$ Formula(5) in PDD	$BE_{thermal,co_2,i}$ Formula (4) in PDD
2018-01	01/01/2018 - 31/01/2018	419.36	463.39	123	9.81	5,709
2018-02	01/02/2018 - 28/02/2018	413.22	456.61	123	9.69	5,637
2018-03	01/03/2018 - 31/03/2018	442.55	489.02	126	10.64	6,190
2018-04	01/04/2018 - 30/04/2018	466.01	514.94	124	11.06	6,439
2018-05	01/05/2018 - 31/05/2018	532.69	588.62	125	12.69	7,385
2018-06	01/06/2018 - 30/06/2018	628.74	694.76	124	14.91	8,678
2018-07	01/07/2018 - 31/07/2018	643.25	710.79	126	15.44	8,987
2018-08	01/08/2018 - 31/08/2018	673.47	744.18	129	16.55	9,629
2018-09	01/09/2018 - 30/09/2018	658.23	727.34	128	16.02	9,324
2018-10	01/10/2018 - 31/10/2018	537.15	593.55	130	13.34	7,764

2018-11	01/11/2018 - 30/11/2018	432.36	477.76	121	9.99	5,814
Total in 2018						**81,557**

Total BE in the monitoring period is 81,557 tCO_2e

E.2. Calculation of project emissions or actual net removals

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There is no project emission and actual net GHG removals by sinks.

E.3. Calculation of leakage emissions

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There is no leakage.

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals ($t CO_2e$)	Project GHG emissions or actual net GHG removals ($t CO_2e$)	Leakage GHG emissions ($t CO_2e$)	GHG emission reductions or net anthropogenic GHG removals ($t CO_2e$)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	81,557	0	0	0	81,557	81,557

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period ($t CO_2e$)	Amount estimated ex ante ($t CO_2e$)
81,557	84,847

E.6. Remarks on increase in achieved emission reductions

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The actual monitored emission reduction (ER) is 81,557 tCO_2e, which is 3.9% lower than the estimated 84,847 tCO_2e in PDD. The lower actual ER is due to the fact that the actual solar irradiance intensity is lower than the estimated value in PDD. For household cooking, a few percent of difference between the actual and estimated solar irradiance intensity is quite normal and reasonable. Therefore, a few percent of difference between the actual ER value and estimated ER value as in this case is within a reasonable range.

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Document information

Version	*Date*	*Description*
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • 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 *F-CDM-MR* to *CDM-MR-FORM*; • 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 GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, 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).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report