Verification and certification report form for CDM project activities

(Version 03.0)

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

BASIC INFORMATION	
Title and UNFCCC reference number of the project activity	Nanyang Danjiang River Solar Cooker Project Phase I UNFCCC ID: 6125
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the verification and certification report	1.0
Completion date of the verification and certification report	11/08/2020
Monitoring period number and duration of this monitoring period	MP: 6th 01/12/2018-30/04/2020 (Included both days)
Version number of the monitoring report to which this report applies	02
Crediting period of the project activity corresponding to this monitoring period	Fixed crediting period (10 years) 02/05/2012 to 01/05/2022
Project participants	Sirreon Technology & Development (Beijing) Co., Ltd (Project Owner) China Carbon N.V (CER Buyer)
Host Party	People's Republic of China
Applied methodologies and standardized baselines	AMS-I.C "Thermal energy production with or without electricity" (version 19) No Standardized Baseline is applied
Mandatory sectoral scopes	Sectoral scope 1: Energy industries (renewable/ non-renewable sources)
Conditional sectoral scopes, if applicable	-
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	127,768 tCO_2e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	116,585 tCO_2e
Name and UNFCCC reference number of the DOE	DOE Name: Shenzhen CTI International Certification Co., Ltd (CTI) UNFCCC reference number of the DOE: E-0061
Name, position and signature of the approver of the verification and certification report	Zhou Lu General Manager 

SECTION A. Executive summary

China Carbon N.V has commissioned the Shenzhen CTI International Certification Co., Ltd. to carry out the 6th periodic verification of the project **"Nanyang Danjiang River Solar Cooker Project Phase I"** in Henan Province, China with regard to the relevant requirements for CDM project activities.

This report summarises the findings of the verification of the project, performed on the basis of paragraph 62 of the CDM modalities and procedures, as well as criteria given to provide for consistent project operations, monitoring and reporting and the subsequent decisions by the CDM Executive Board. Verification is required for all registered CDM project activities as well as programme of activities intending to confirm their achieved emission reductions and proceed with request for issuance of CERs. This report contains the findings from the verification and a certification statement for the certified emission reductions.

Verification is the periodic independent review and *ex post* determination of both quantitative and qualitative information by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activities during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification is to verify and certify emission reductions reported for the **"Nanyang Danjiang River Solar Cooker Project Phase I"** in Henan Province, P. R. China (UNFCCC Ref. No. 6125) for the period 01/12/2018 - 30/04/2020.

The purpose of verification is to review the monitoring results and verify that monitoring methodology was implemented according to monitoring plan and monitoring data, used to confirm the reductions in anthropogenic emissions by sources is sufficient, definitive and presented in a concise and transparent manner.

In particular, monitoring plan, monitoring report and the project's compliance with relevant UNFCCC and host Party criteria are verified in order to confirm that the project has been implemented in accordance with previously registered design and conservative assumptions, as documented and also if the monitoring plan is in compliance with the approved monitoring methodology.

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan.
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement.
- To verify that reported GHG emission data is sufficiently supported by evidence.
- Where sampling is involved, sampling guidelines are applied to ensure the adequate sampling and survey method is followed in reaching professional judgements.

The verification shall ensure that reported emission reductions are complete and accurate in order to be certified. The verification comprises a review of the monitoring report over the monitoring period 01/12/2018 - 30/04/2020 based on the registered PDD in part of the monitoring parameters and monitoring plan, emission reduction calculation spreadsheet, monitoring methodology and all related evidence provided by project participants. On-site visit and stakeholders' interviews are also performed as part of the verification process.

The verification has been performed as described in the CDM validation and verification standard for project activities (version 02.0)/VVS/ and constitutes the following steps:

- Publication of the MR on the UNFCCC website (22/05/2020)
- Desk review of the MR (version 01 dated 16/05/2020)/MR/ and the relevant documents
- On-site assessment (06/07/2020~08/07/2020)
- Issuance of draft verification report & verification protocol
- Desk review of the revised MR and related documents
- Resolution of the raised CAR
- Issuance of the final verification report

The on-site visit from 06/07/2020 to 08/07/2020 was carried out 21 days after the global publication of the MR on 22/05/2020, which is in conformity with the requirement in paragraph 209 of CDM project cycle procedure for project activities (Version 02.0)/PCP/.

The project activity involves the distribution and installation of 48,000 sets of solar cookers for rural households. The total rated installed capacity of the project activity is 37.128MW_{th}.

The project activity enables rural households to efficiently substitute fossil fuel used in daily cooking and water boiling by solar energy and therewith avoid CO_2 emission that would have been generated by fossil fuel consumption.

The first solar cooker equipment contract was signed on 28/05/2011 which is verified via checking the solar cookers sales contract/SCSC/ and the proposed project started full operation on 01/08/2011. This was verified via checking the commissioning confirmation/CC/ against the previous verification report/VER/.

The location of the project activity is an ideal area for solar energy utilization.

The detailed geographic coordinates of the project included in this monitoring period is listed as below:

<table>
<tr><th>No.</th><th>Project Location</th></tr>
<tr><td>Host Country</td><td>P. R. China</td></tr>
<tr><td>Region:</td><td>Henan Province</td></tr>
<tr><td>Project location address:</td><td>7 townships (Jingziguan, Siwan, Xihuang, Maotang, Dashiqiao, Shangji and Jinhe) of Xichuan County
<table>
<tr><th>Township</th><th>Longitude</th><th>Latitude</th></tr>
<tr><td>Jingziguan</td><td>110.9790°E - 111.0316°E</td><td>33.2323°N - 33.2513°N</td></tr>
<tr><td>Siwan</td><td>111.1273°E - 111.1651°E</td><td>33.1588°N - 33.1651°N</td></tr>
<tr><td>Xihuang</td><td>111.1390°E - 111.1713°E</td><td>33.2393°N - 33.2461°N</td></tr>
<tr><td>Maotang</td><td>111.2805°E - 111.4480°E</td><td>33.1502°N - 33.2697°N</td></tr>
<tr><td>Dashiqiao</td><td>111.2509°E - 111.2592°E</td><td>33.0524°N - 33.0575°N</td></tr>
<tr><td>Shangji</td><td>111.4803°E - 111.4878°E</td><td>33.1289°N - 33.1352°N</td></tr>
<tr><td>Jinhe</td><td>111.3979°E～111.4020°E</td><td>33.1024°N - 33.1030°N</td></tr>
</table></td></tr>
</table>

During the onsite verification, it is confirmed that the actual implementation of the project is in line with the project technical description in the registered PDD. And the project complies with all relevant statutory requirements.

48,000 sets of solar cookers have been distributed and installed in 7 townships (Jingziguan, Siwan, Xihuang, Maotang, Dashiqiao, Shangji and Jinhe). The rated output of each solar cooker is

773.5W_{th} as per the registered PDD, which can also be confirmed through the solar cookers sales contract/SCSC/ and the solar cookers usage agreements/SCUA/ and the onsite visit/PHT/.

The project activity started operation on 01/08/2011 as per the commissioning confirmation/CC/. There are no redistribution of the solar cookers as confirmed through the onsite visit, and checking the user information registration form/UIRF/ and the survey result/SR/ during this monitoring period.

However, via checking the sales contract and invoice of the solar cookers/SCSC/ and the survey result of the total solar cooker number of this monitoring period/SR/, it is confirmed that the numbers of the solar cooker in operation during this monitoring period is 48,000, which is equal to the number of sales contract. However, via interview with the monitoring team and checking the operation logs/LOG/, Survey records/SR/, it is confirmed that in year 2018, 2019 and 2020 during this monitoring period, when the monitoring team conduct the monitoring of number of solar cookers engaged in the proposed project, there were 37 households for year 2018, 1,165 for 2019 and 2,779 for 2020 with nobody at home, thus the value of 47,963 (48,000–37) is used as the number of solar cookers engaged in the proposed project for year 2018, 46,835 (48,000–1,165) is used as the number of solar cookers engaged in the proposed project for year 2019 and 45,221 (48,000–2,779) is used as the number of solar cookers engaged in the proposed project for year 2020. This is deemed as conservative for the monitoring parameter n.

The fixed crediting period (10 years) started on 02/05/2012 and ends on 01/05/2022.

Basic technical details of the project are summarized in below table.

Parameters	Unit	Test Results
Focus	mm	667 - 684
Aperture area	m^2	1.75 - 1.82
Rated Power	W_{th}	815.7 - 823.5
Thermal Efficiency	%	66.5% - 68.8%
The area with temperature over 400°C	cm^2	73 - 105
Maximum operational height	m	1.13 - 1.19
Maximum operational distance	m	0.67 - 0.73
Technical life of equipment	years	> 10

The technical parameters of the solar cookers are consistent with the registered PDD, also consistent with the solar cookers sales contract/SCSC/ and the testing report of focus type solar cookers/TRSC/.

In CTI's opinion, the GHG emission reductions reported for the project in the 6th monitoring report are fairly stated. It is confirmed that the GHG emission reductions were calculated correctly on the basis of the approved monitoring methodologies AMS-I.C. ver. 19/AMS-I.C/ and the monitoring plan contained in the PDD (Version 07 dated 16/04/2012)/PDD/.

CTI confirms that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI is able to certify that emission reductions from the project **"Nanyang Danjiang River Solar Cooker Project Phase I"** during the indicated monitoring period.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader & Verifier	IR	Du	Wenjun	CTI	√	√	√	√

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Wang	Guolian	CTI
2.	Approver	IR	Zhou	Lu	CTI

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human error in the quantification of emissions	Low	Human error is likely to occur if personnel are unfamiliar with, or not well trained regarding, emissions processes or data recording	Depending on the monitoring period being verified, conduct increased verifying during the months when there is a greater likelihood of errors and issues with data quality control due to project participants' leave schedules
2.	Undue reliance on a poorly designed information system, which may have few effective quality controls	Low	Use of spreadsheets without adequate controls related to data changes/updates, version tracking, traceability, security	Depending on how data is generated, processed, and reported, place greater emphasis on verifying data captured and processed manually and/or in spreadsheets versus those that are generated from an automated system
3.	Omissions and misstatements in data transfer from hand written notes into digital Excel ER spreadsheet	Medium	Ineffective quality control of data transfer due to unclear QA/QC procedure	Check QM procedure/manual. PP may demonstrate how to transfer data and how this is crosschecked. Conduct interview with related personnel whether procedure is actually conducted but not adequately described.
4.	Sample	Medium	Sample size is not suitable; or the surveyed end users are not random	Cross-check the procedure to identify the sample size against the sample guideline/GSS/ and sample standard/SSS/, and confirm the sample size is calculated correctly, and chose 38 in a standard approach, compared 313 (calculated result of sample size). Furthermore, the relative error of the 313 sample results is lower and the statistical quality is sufficient. CTI conducted a random sample following the sample standard during site-visit period, visited 38 end users who are partial sourced from the sample conducted by PP. Based on the result of acceptance sampling, the monitoring records are deemed acceptable.

On the basis of the risk analysis the verification has been planned. A detailed audit/verification plan has been prepared and submitted to the project participant(s) in due time before the site visit.

C.2. Consideration of materiality in conducting the verification

The errors identified in the project are below the threshold limit of materiality and hence not material. The GHG emission reductions are calculated without material misstatements.

SECTION D. Means of verification

D.1. Desk/document review

Desk review of all documents provided by PP and publicly available documents relevant for the verification including monitoring plan, monitoring report, monitoring methodology, project design document, applicable tools in particular attention to the frequency of measurements, QA/QC procedures and other relevant documents was conducted by CTI.

The Monitoring Report Version 1 dated 16/05/2020/MR/ submitted by the client was web hosted on the UNFCCC-CDM website on 22/05/2019 and available in the public domain.

The main documents are listed below:

(i) the last revision of the PDD including the monitoring plan/PDD/,
(ii) the last revision of the validation report/VAL/,
(iii) the documentation of previous verifications/VER/,
(iv) the emission reduction calculation spreadsheet/XLS/.

Other supporting documents, such as publicly available information on the UNFCCC website and background information were also reviewed.

D.2. On-site inspection

Duration of on-site inspection: 06/07/2020 - 08/07/2020				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Opening meeting ➢ Round of introduction ➢ Scope of Audit ➢ Introduction of Verification Process ➢ confirming focus area for the audit ➢ Final confirmation of audit plan ➢ Attendance Register	No.109 of Zhongzhou Road, Nanyang City Henan Province, P. R. China	06/07/2020	Wenjun Du
2	On-site inspection ➢ Visit randomly selected end users to conduct physical inspection to the household solar cookers in order to verify the monitoring information presented in the monitoring report ➢ Verify whether the project implementation is in line with the description in the registered PDD ➢ Interview with monitoring staff to verify how they manage the end users in project and how to collect the monitoring data by sampling method ➢ Interview with end users, getting relevant information by filling questionnaires to compare with the monitoring data in monitoring report Interview with PP Representative and Local end Users ➢ The local development of this industry and relevant policy ➢ Technology utilized, Technical equipment and operation ➢ Starting date of project and crediting period ➢ Management Procedure and Method taken by PP ➢ Involved personnel and responsibilities ➢ Emission reduction, Monitoring Plan and implementation of project for this monitoring	Jingziguan, Siwan, Xihuang, Maotang, Dashiqiao, Shangji and Jinhe town, Xichuan County, Nanyang City, Henan Province, P. R. China	06/07/2020-08/07/2020	Wenjun Du

	period ➢ Sampling Plan and implementation of taken by PP for this monitoring period ➢ Training and detailed procedures ➢ Monitoring Data collection and archive procedure and method			
3	Documents check (As provided in the Appendix 3)	No.109 of Zhongzhou Road, Nanyang City Henan Province, P. R. China	08/07/2020	Wenjun Du
4	Finding Summary	No.109 of Zhongzhou Road, Nanyang City Henan Province, P. R. China	08/07/2020	Wenjun Du
5	Close Meeting ➢ Presenting audit findings ➢ Introduce following procedures after site visit	No.109 of Zhongzhou Road, Nanyang City Henan Province, P. R. China	08/07/2020	Wenjun Du

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Su	Fanglei	Sirreon Technology & Development (Beijing) Co., Ltd / General Manager	06/07/2020-08/07/2020	- General aspects of the project - Changes since validation / previous verifications - Project implementation status - Quality management system - Involved personnel and responsibilities - Training and practice of the monitoring personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - Procedural aspects of the verification - Maintenance - Environmental aspects	Wenjun Du
2.	Yao	Zheng	Sirreon Technology & Development (Beijing) Co., Ltd / CDM Project Manager	06/07/2020-08/07/2020	- General aspects of the project - Changes since validation / previous verifications - Project implementation status - Quality management system - Involved personnel and responsibilities - Training and practice of the monitoring personnel - Implementation of the monitoring plan - Monitoring data management	Wenjun Du

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
					- Data uncertainty and residual risks - Procedural aspects of the verification - Maintenance - Environmental aspects	
3.	Ji	Ming	Sirreon Technology & Development (Beijing) Co., Ltd / Monitoring Manager	06/07/2020-08/07/2020	- Project implementation status - Quality management system - Involved personnel and responsibilities - Training and practice of the monitoring personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - Procedural aspects of the verification - Maintenance	Wenjun Du
4.	Zhang	Yixiang	Sirreon Technology & Development (Beijing) Co., Ltd / Monitoring Data Surveyor	06/07/2020	- Monitoring data survey - Monitoring data collection - Monitoring data record - Monitoring data verify - Monitoring data check - Monitoring data management	Wenjun Du
5.	Luo	Ye		06/07/2020		
6.	Ding	Yunxi		06/07/2020		
7.	Zhang	Bang	Sirreon Technology & Development (Beijing) Co., Ltd / Monitoring Data Recorder	06/07/2020		
8.	Yu	Fuquan		06/07/2020		
9.	He	Bang		06/07/2020		
10.	Xu	Zhi	Sirreon Technology & Development (Beijing) Co., Ltd / Monitoring Data Verifier	06/07/2020		
11.	Rong	Xiang		06/07/2020		
12.	Kang	Hua		06/07/2020		
13.	Shen	Wenqiong	Local women's federation/Staff	06/07/2020	- local stakeholder comments - Benefit to Woman	Wenjun Du
14.	Cao	Lei	Bureau of Ecology and Environment in Nanyang City	06/07/2020	- Environmental Impacts	Wenjun Du
15.	Hao	Feng	Jieyuan Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
16.	Ren	Jiaolan	Luogang Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
17.	Sheng	Yuansu	Chenjiashan Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation	Wenjun Du

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
					- Data collection procedure	
18.	Jia	Teng	Shangzhuang Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
19.	Fan	Jing	Zhang Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
20.	Rong	Tengzhen	Shan'gen Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
21.	Wang	Cai	Liuzhuang Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
22.	Yu	Xiu	Daping Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
23.	Li	Zezhong	Shuidianyu Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
24.	Yu	Yanhuan	Songxihe Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
25.	Luo	Hua	Yaoxiang Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
26.	Wang	Shan	Shangmeichi Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
27.	Kang	Lei	Zigou Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
28.	Qiu	Yu	Zhangxiang Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
29.	Yan	Longdong	Laotian Village/Solar Cooker Users	06/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
30.	Jing	Jie	Jiajing Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
31.	Ke	Qin	Douling Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
32.	Qiang	Junyi	Banshangou Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
33.	Yuan	An	Zhujiaying Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
34.	Song	Shuping	Heimazhuang Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
35.	Piao	Piaolan	Laogou Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation	Wenjun Du

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
					- Data collection procedure	
36.	Xing	Xu	Dongyuemiao Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
37.	He	Mingshuan	Suntai Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
38.	Zang	Yi	Shibanhe Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
39.	Min	Shuoai	Liuyingshequ Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
40.	Dong	Guangyong	Dacaigou Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
41.	Rui	Qiu	Dongyuemiao Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
42.	Yu	Yunting	Dongyuemiao Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
43.	Zhu	Linghua	Beigang Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
44.	Yin	Shaodong	Jinyuanshequ Village/Solar Cooker Users	07/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
45.	Su	Qinxin	Shiwa Village/Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
46.	Qi	Huaying	Houhe Village/ Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
47.	Ba	Yongyu	Laomiao Village/Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
48.	Dong	Baixiang	Qingliangsi Village/Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
49.	Ling	Zecheng	Xuling Village /Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
50.	Yu	Bo	Guangou Village /Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
51.	Diao	Chen	Donggou Village/Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
52.	Dai	Yanxiong	Gangshan Village/Solar Cooker Users	08/07/2020	- Project implementation - Project operation - Data collection procedure	Wenjun Du
53.	Li[I3]	Mengnan	Profit Carbon (Shanghai) Environment	06/07/2020-08/07/2020	- Monitoring data management	Wenjun Du

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
			Co., Ltd./ Consultant		- Monitoring data collection - Data uncertainty and residual risks - Monitoring report preparing - GHG emission reduction calculation	

D.4. Sampling approach

Sampling design

The sampling design carried out by the project is demonstrated as below:

As per registered PDD/PDD/ the project activity applies simple random sampling for monitoring the monthly operating time of each solar cooker, t_i, and the sample size is 312.

Each district sample size is thus calculated and determined as following formula in line the "Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities", /GSS/:

$$n_i = \frac{g_i}{N} \times n$$

Where:

n_i is the sample size in the district;
g_i is the number of households in district given solar cooker;
N is the population total, which is 48,000;
n is sample size in the registered PDD, which is 312.

Thus, sample size each district is calculated in the table below:

District	Number of households (g_i)	Calculated sample size (n_i=g_i/48,000*312)	Actual sample size
Jingziguan	6,000	39	39
Siwan	6,000	39	39
Xihuang	8,000	52	52
Maotang	8,000	52	52
Dashiqiao	7,000	45.5	46
Shangji	7,000	45.5	46
Jinhe	6,000	39	39
Total	**48,000**	**312**	**313**

In the registered PDD, simple random sampling size is 312, however, based on the above calculation results, the sample size in district Dashiqiao and Shangji is 45.5. In the MR, the sample size in district Dashiqiao and Shangji is rounded up to 46. Thus 313 samples are surveyed. This is deemed conservative.

The sample is randomly selected within each district using excel at the beginning of each year following the operation start date of 01/08/2011 and deemed representative of the population.

The sample records/SAM/ have been provided to the verification team. No missing or damaged record is revealed by the verification team. Adequate reason is recorded along with the significantly high data as per the registered PDD/PDD/. The maintenance is also in place as per the registered PDD.

Sampling approaches during verification

1) Verifier's Action

Following "Sampling and Surveys for CDM Project Activities and Programme of Activities" version 08.0/SSS/, the verifier conducted the verification of sampling results with the following steps:

(a) Take a random sample of the project's sample records;

In order to determine the size of the sample for field/onsite check, the acceptable quality level

(AQL), i.e. the proportion discrepancies between the PP sample records and the DOE sample records that are acceptable is determined as 0.5% and the proportion of discrepancies between the PP sample records and DOE sample records that are unacceptable (UQL) is determined as 10% according to “Sampling and Surveys for CDM Project Activities and Programme of Activities” version 08.0/SSS/.

The maximum errors associated with the determination indicated above should remain at levels indicated below as per “Sampling and Surveys for CDM Project Activities and Programme of Activities” /SSS/:

(1) A 10% chance that the DOE will wrongly reject the PPs records (producer’s risk);

(2) A 10% chance that the DOE will wrongly accept the PPs records (consumer’s risk).

With the AQL of 0.5%, the UQL of 10%, the producer’s risk of 10% and the consumer’s risk of 10%, the size of the acceptance sampling is determined as 38 and the acceptance number is determined as 1 according to Table 2 of “Sampling and Surveys for CDM Project Activities and Programme of Activities” /SSS/.

Take a random sample of the PPs sample records, i.e. the monthly operating time of solar cookers sampled by project participants/SAM/ and the onsite check of the 38 solar cookers sampled by the verifier. The original daily operating hour records of solar cookers for 38 samples selected by verification team/DOHR/ and the monthly operating time of solar cookers sampled by project participants were cross checked by verification team too.

(b) Check the acceptability of the data for each record in the sample records based on the expertise;

The sample records, i.e. the monthly operating time of solar cookers sampled by project participants/SAM/ is found to be consistent with the original daily operating hour records of solar cookers for 38 samples selected by verification team/DOHR/. Also, no discrepancy is found between the sample records (313 solar cookers) and the DOE sample records (38 solar cookers).

(c) Based on the number of records where is agreement, determine if the sample records meet the requirements.

As there are no discrepant records, i.e. the discrepant record is less than the acceptance number of 1, the sample records/SAM/ is accepted as per “Sampling and Surveys for CDM Project Activities and Programme of Activities” /SSS/.

2) Reliability Check

a. Mean value and standard deviations for strata

Table below summarize the verified results for mean monthly operation hour and standard deviations for each district:

Town / Month	Jingziguan		Siwan		Xihuang		Maotang		Dashiqiao		Shangji		Jinghe	
	Sample mean	Sample standard deviation	Sample mean	Sample standard deviation	Sample mean	Sample standard deviation	Sample mean	Sample standard deviation	Sample mean	Sample standard deviation	Sample mean	Sample standard deviation	Sample mean	Sample standard deviation
	m_i	SD_i	m_i	SD_i	m_i	SD_i	m_i	SD_i	m_i	SD_i	m_i	SD_i	m_i	SD_i
12/2018	117.18	13.5119	118.21	13.2946	120.08	10.7171	117.50	10.9356	118.13	13.0871	116.87	12.7708	117.69	12.2263
01/2019	118.74	12.7356	121.41	13.6259	122.10	13.6544	122.27	14.8220	116.61	15.1782	124.20	15.0061	123.23	14.7085
02/2019	122.38	13.3172	121.38	12.9419	119.98	13.0617	122.85	15.3219	122.98	13.9594	123.65	14.2349	121.51	13.2841
03/2019	128.54	14.8817	122.92	13.6137	126.15	13.1259	125.58	14.5876	129.37	12.0192	122.91	13.6737	124.36	13.2992
04/2019	119.74	14.0445	128.67	12.7729	125.10	13.7545	123.73	14.2363	124.28	13.0855	126.22	11.6159	126.97	12.8052
05/2019	126.26	12.4176	125.44	12.5454	124.69	12.0254	123.37	13.1537	125.00	12.4722	127.57	12.6256	121.82	14.0635
06/2019	123.77	12.9075	121.67	11.5694	122.73	12.1512	123.06	11.8046	127.22	14.8353	123.02	11.9359	123.36	13.7582
07/2019	127.79	12.9679	126.69	13.7031	125.85	12.6140	126.02	12.9516	128.24	13.7811	122.91	13.7450	124.36	11.7663
08/2019	122.67	11.7772	126.41	12.8831	128.56	13.0420	125.02	13.0812	126.11	13.1051	129.67	12.8410	124.10	12.8079
09/2019	130.00	13.1469	127.36	11.1316	127.06	11.0975	125.00	11.3362	127.67	11.9537	127.28	11.8127	131.44	12.7254
10/2019	128.62	12.2143	131.33	9.7032	128.77	10.3746	129.50	10.8384	128.80	11.0063	132.20	11.5443	129.49	10.6496
11/2019	122.49	9.3861	120.49	9.7032	120.38	9.2528	120.69	7.8828	121.20	9.6301	123.22	7.8114	119.64	8.7253
12/2019	118.38	8.1098	120.36	9.7032	122.44	9.4213	123.37	8.5864	122.74	8.5438	123.46	8.6196	119.49	9.0142
01/2020	122.41	9.0458	122.51	9.7032	120.06	9.6800	120.96	8.9068	119.30	8.8490	120.37	9.7191	121.21	9.0443

02/2020	121.44	9.2247	121.77	9.7032	120.27	9.1225	123.75	8.7422	120.91	9.5308	119.91	9.1063	121.33	9.0505
03/2020	125.59	11.3548	120.85	9.7032	125.75	10.8210	123.08	10.2667	123.98	9.5394	125.22	9.8295	125.46	10.1589
04/2020	125.28	12.5425	124.49	9.7032	123.40	12.0151	125.10	11.0387	122.13	12.1062	123.30	11.6769	123.85	12.0929

b. The stratified estimated overall mean:

The sample estimated of the overall mean operation hours is confirmed to be calculated with the equation below as per "Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities" (version 04.0) /GSS/:

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

Where:

m_{stra} is the stratified estimated overall mean;
g_i is the size of the i^{th} district where i=a,…,k;
N is the population total (48,000);
m_i is the mean of the i^{th} district where i=a,…,k.

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

The standard error of the stratified estimated overall mean is confirmed to be calculated as per "Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities" /GSS/:

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

Where:

s.e.(m_{strat}) is the standard error of the stratified estimated overall mean;
g_i is the size of the i^{th} district where i=a,…,k;
N is the population total (48,000);
n_i is the number of sampled units the i^{th} district where i=a,…,k;
SD_i^2 is the variance of the ith district where i=a,…,k.

d. t-value:

T-value 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 confirmed to be 1.6497 as derived in Microsoft Excel using the TINV function following "Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities" /GSS/.

e. Precision:

The precision associated with an estimate is confirmed to be: t-value × standard error of the mean as per "Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities" /GSS/.

The precision of the mean monthly solar cooker operation hours, assuming 90% confidence, is therefore confirmed to be:

Period	t-value	m_{strat}	s.e.(m_{strat})	Precision	Relative Precision
01/12/2018 - 31/12/2018	1.6497	118.00	0.6932	1.1437	0.97%
01/01/2019 - 31/01/2019	1.6497	121.25	0.8059	1.3295	1.10%
01/02/2019 - 28/02/2019	1.6497	122.10	0.7779	1.2833	1.05%
01/03/2019 - 31/03/2019	1.6497	125.74	0.7668	1.2650	1.01%
01/04/2019 - 30/04/2019	1.6497	124.92	0.7468	1.2320	0.99%
01/05/2019 - 31/05/2019	1.6497	124.86	0.7179	1.1843	0.95%
01/06/2019 - 30/06/2019	1.6497	123.57	0.7172	1.1832	0.96%
01/07/2019 - 31/07/2019	1.6497	125.97	0.7379	1.2174	0.97%
01/08/2019 - 31/08/2019	1.6497	126.22	0.7229	1.1925	0.94%
01/09/2019 - 30/09/2019	1.6497	127.78	0.6673	1.1009	0.86%
01/10/2019 - 30/10/2019	1.6497	129.78	0.6148	1.0142	0.78%
01/11/2019 - 30/11/2019	1.6497	121.15	0.5023	0.8286	0.68%
01/12/2019 - 31/12/2019	1.6497	121.66	0.5000	0.8248	0.68%

Period	t-value	m_{strat}	s.e.(m_{strat})	Precision	Relative Precision
01/01/2020 - 31/01/2020	1.6497	120.88	0.5235	0.8637	0.71%
01/02/2020 - 29/02/2020	1.6497	121.36	0.5180	0.8545	0.70%
01/03/2020 - 31/03/2020	1.6497	124.30	0.5778	0.9532	0.77%
01/04/2020 - 30/04/2020	1.6497	123.91	0.6550	1.0806	0.87%

The relative precision is less than 10%. The data are within the required specification. Therefore, it is verified that the required confidence/precision has been met.

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	-	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	CL 01	-	-
Compliance of monitoring activities with the registered monitoring plan	-	CAR 01 CAR 02 CAR 03	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	CAR 04	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (scale of small-scale)	-	CAR 05	-
Total	**1**	**5**	**0**

SECTION E. Verification findings

E.1. Compliance of the monitoring report with the monitoring report form

Means of verification	According to para 352&353 of VVS for project activities version 02.0, the verification team crosschecked and compared the MR by employing the valid version of the applicable monitoring report form listed in UNFCCC website. - The MR used the latest valid version of the applicable at UNFCCC website. - The MR is completed and meets all relevant requirements of instructions for filling out the Monitoring Report Form (version 07.0)/MRF/ for CDM project activities.
Findings	**N/A**
Conclusion	As per requirement of VVS for project activities version 02.0/VVS/, based on the findings above, it is confirmed that the final version of MR was in compliance with relevant valid version of monitoring report form/MRF/ and instructions therein for filling out MR.

E.2. Remaining forward action requests from validation and/or previous verifications

This is the 6th periodic verification of the project. There is no FAR from previous verifications via checking the previous verification reports/VER/.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	According to VVS for project activities version 02.0, CTI conducted an on-site

	inspection to assess that all physical features (technology, project equipment, and monitoring procedures) of the project in the registered PDD are in places and the PP have operated the project as per the PDD. It was found that: The project involves distribution and installation of 48,000 sets of solar cookers for rural households/SCUA/. The project activity involves dissemination of solar cooker in 7 townships (Jingziguan, Siwan, Xihuang, Maotang, Dashiqiao, Shangji and Jinhe) of Xichuan County, Henan Province, China. The rated and maximum total installed capacity of the project is 37.128 MW_{th} and 42.073 MW_{th} respectively/TRSC/. The project activity enables rural households to efficiently substitute fossil fuel used in daily cooking and water boiling by solar energy and therewith avoid CO_2 emission that would have been generated by fossil fuel consumption, finally provides the affordable and clean Energy to rural households in China. The solar cooker reduces fuel consumption through using clean solar energy. The technology to be employed is environmentally safe and sound as well as state of the art. PP purchased the solar cookers from manufacturer/SCSC/ and distributed them to households by free/SCUA/. By implementing the project PP has provided an opportunity for local community to generate steady and continual income for their livelihood. The project is applicable to the applied CDM Methodology AMS-I.C "Thermal energy production with or without electricity" (Version 21)/31/. The start date of operation of the project activity was 01/08/2011, when all the 48,000 solar cookers completely distributed for the crediting period began which has been confirmed in the PDD and validation report/PDD/,/VAL/. According to the PDD and validation report/PDD/,/VAL/, the project participant has adopted for the fixed crediting period of 10 years with the start date of crediting period of 02/05/2012. During on-site visit, the verification team checked the solar cookers in each sampled household. 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}/TRSC/. Verification team is able to confirm that the solar cookers were equipped in line with the registered PDD. Therefore, based on this on-site visit and the reviewed project documentation, the verification team confirms that the realized technology, the project equipment, included household number, as well as the PP name/responsibility are consistent with the description in the registered PDD and MR. There is no information (data and variables) provided in the monitoring report that is different from that stated in the registered PDD.
Findings	CL 01 was raised.
Conclusion	CL 01 was raised and closed. Refer to Appendix 4 for detail assessment. According to para 354~356 of VVS version 02.0, it is confirmed that the implementation and operation of the project has been conducted in accordance with the description contained in the registered PDD and MR. There is no deviation or the proposed or actual changes in the implementation or operation of the project comply with the requirements of the Project standard. All physical features (technology, project equipment, and monitoring procedures) of the project specified in the PDD and MR are in place and that PP has operated the registered CDM project as per the latest approved PDD.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents[1]

There is no temporary deviation observed prior to or during this monitoring period.

[1] Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

E.4.2. Corrections

There is no correction observed prior to or during this monitoring period.

E.4.3. Change to the start date of the crediting period

There is no change to the start date of crediting period prior to this monitoring period.

E.4.4. Inclusion of a monitoring plan

There is no inclusion of a monitoring plan observed prior to this monitoring period.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

There is permanent change from registered monitoring plan observed prior to or during this monitoring period.

E.4.6. Changes to the project design

There is change to the project design observed prior to or during this monitoring period.

E.4.7. Changes specific to afforestation and reforestation project activities

Not applicable.

E.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents

Means of verification	By means of comparison of the MR with the applied CDM methodology and all applicable CDM Meth tools, the verification team has checked whether the monitoring system is in compliance with the monitoring plan related requirements of the applied methodology and tools. All required equipment and procedures are available and implemented in an appropriate manner. All monitoring parameters, monitoring procedures follow the methodology requirements as below assessment: **Monitoring for Monthly solar irradiance intensity in project region, R_i** For the parameter R_i, as per the PDD, the value is derived from official source meteorological data and monitored once per year, hence during this monitoring period, the value was issued by Nanyang Meteorological Bureau for the whole monitoring period from Dec 2018 to Apr 2020/SII/. It is confirmed that the monthly value in the MR is consistent with the official source meteorological data/SII/, thus is verified as correct. **Monitoring for Number of solar cookers engaged in the proposed project, n** The number of solar cooker engaged in the proposed project (*n*) is monitored, recorded and archived annually/MRSC/. The monitoring of total number of operating solar cookers is conducted at annually. This is consistent with the registered PDD/PDD/. Via interview with the monitoring team and checking the operation logs/LOG/, survey result of the total solar cooker number of this monitoring period/SR/, it is confirmed that in year 2018, 2019 and 2020 during this monitoring period, when the monitoring team conduct the monitoring of number of solar cookers engaged in the proposed project annually at the last quarter of each year. Via checking the Monitoring records of solar cooker/MRSC/ and survey result of the total solar cooker number of this monitoring period/SR/ in 2018, it is confirmed that

	there were 37 households with nobody at home, and others end users used the solar cookers normally, thus the value of 47,963 (48,000–37) is used as the number of solar cookers engaged in the proposed project for year 2018. Via checking the Monitoring records of solar cooker/MRSC/ survey result of the total solar cooker number of this monitoring period/SR/ in 2019, it is confirmed that there were 1,165 households with nobody at home, and others end users used the solar cookers normally, thus the value of 46,835 (48,000–1,165) is used as the number of solar cookers engaged in the proposed project for year 2019. Via checking the Monitoring records of solar cooker/MRSC/ survey result of the total solar cooker number of this monitoring period/SR/ in 2020, it is confirmed that there were 2,779 households with nobody at home, and others end users used the solar cookers normally, thus the value of 45,221 (48,000–2,779) is used as the number of solar cookers engaged in the proposed project for year 2020. This is deemed as conservative for the monitoring parameter *n*. **Monitoring for the monthly operating time of each solar cooker, t_i** The monthly operating time of each solar cooker (t_i) is monitored and recorded daily within the selected sample solar cooker users as per the registered PDD/PDD/. The monitored data is summarized, analyzed and archived monthly/SAM/&/DOHR/. Refer to section E.6.3 and D.4 of this report for sampling method. **Monitoring for the CO2 emission factor of coal, $EF_{FF,CO2}$** CO2 emission factor of coal ($EF_{FF,CO2}$) is derived from IPCC default value and the revision of IPCC is monitored as per the registered PDD/PDD/&/IPCC/. Emission Factor is derived from IPCC 2006, page 2.22, Table 2.5. IPCC default value is used as per AMS-I.C. (version 19), and there is no revision of the IPCC Guidelines need to be taken into account for this monitoring period. **Sales Record and User information registration form** PP has created and maintained the Solar cookers usage agreements/SCUA/ and User information registration form/UIRF/. The related information of household and solar cooker is included in the database/UIRF/ which has been confirmed by checking the Solar cookers usage agreements/SCUA/. For this project, all 48,000 solar cookers had been completely distributed and no more units will be added into the project with the progress of the project. **Quality Assurance and Quality Control** The related QA/QC procedure has been conducted by PP for the monitoring process including data verification and cross check by monitoring team and project owner which has been verified by checking the monitoring manual/MM/ and Monitoring records of solar cooker/MRSC/ and Sample Records/SAM/. It is confirmed that the QA/QC procedure has been implemented by PP properly during this monitoring period and the data management is confirmed as effective.
Findings	CAR 01 and CAR 02 were raised.
Conclusion	CAR 01 and CAR 02 were raised and closed. Refer to Appendix 4 for detail assessment. The monitoring plan complies with the applied methodology and the monitoring system and all applied procedures are completely in compliance to the latest approved monitoring plan and the methodology AMS-I.C. (version 19).

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	By means of comparison of the MR and the ER calculation with the latest version of the registered PDD the verification team has checked whether all parameters fixed ex-ante have been applied correctly. The parameters that are fixed ex ante are following:

Parameters	Source of data	Values applied	Demonstration by Verification team
R	Data from	700	This is an ex-ante fixed value

		registered PDD, validation report and national industrial standard, NY/T219-2003, focusing solar cooker.	W_{th}/m^2	during the crediting period, the value is verified as consistent among the registered PDD/PDD/, the validation report/VAL/ and the national industrial standard, NY/T219-2003/NYT/, focusing solar cooker.
	A	Data from registered PDD, validation report and solar cookers sales contract.	$1.7m^2$	This is an ex-ante fixed value during the crediting period, the value is verified as consistent among the registered PDD/PDD/, the validation report/VAL/ and the technical specifications in the solar cookers sales contract/SCSC/.
	H	Data from registered PDD, validation report and testing report of focus type solar cookers	65%	This is an ex-ante fixed value during the crediting period, the value is verified as consistent among the registered PDD/PDD/, the validation report/VAL/ and the testing report of focus type solar cookers/TRSC/.
	$\eta_{BL,thermal}$	Data from registered PDD, validation report and Clean Energy for Development and Economic Growth: Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations.	15%	This is an ex-ante fixed value during the crediting period, the value is consistent among the registered /PDD/, the validation report/VAL/ and the Clean Energy for Development and Economic Growth: Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations issued by UNDP/undp/.
Findings	N/A			
Conclusion	The parameters fixed ex ante have been indicated in the latest approved PDD. And the MR is checked as in line with the PDD.			

E.6.2. Data and parameters monitored

Means of verification	In accordance with PS for project activities (version 02.0)/PS/, VVS for project activities(version 02.0)/VVS/, sample standard/guideline and applied methodologies included the applied tools, the verification team reviewed the MR, registered PDD, crosschecked against the other available data and documents, verified whether monitored parameters in accordance with all relevant applicable requirements in the PS; whether the MR list all data and parameters to be monitored, as required by the applied methodologies (AMS-I.C.) and whether the data and parameters obtained in a reasonable way, whether the sample plan conducted accordingly, the source and the applied value of the monitored parameter is acceptable; whether the parameters monitored explain the operational and management structure, responsibilities and institutional arrangement for data collection/archiving, QA/QC procedures. The information flow and the values in the monitoring report were verified as follows: **1. n**

Data/Parameter	**n**
Description	Number of solar cookers engaged in the proposed

		project
	Value applied for this monitoring period	<table><tr><th>Year</th><th>Number</th></tr><tr><td>2018</td><td>47,963</td></tr><tr><td>2019</td><td>46,835</td></tr><tr><td>2020</td><td>45,221</td></tr></table>
	Measuring /Reading /Recording frequency	n is the number of solar cookers engaged in the proposed project is measured by checking the solar cookers sales contract/SCSC/ and monitoring records/MRSC/.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the data were measured and recorded once per year, which is in accordance with the registered monitoring plan/PDD/ and the monitoring methodology/AMS-I.C/.
	Monitoring equipment with accuracy	N/A
	Is the installed monitoring equipment has been duly calibrated for this entire monitoring period? (Yes / No)	N/A
	How were the values in the monitoring report verified?	The verification team has verified the data in monitoring report against the monitoring records/MRSC/ and the solar cookers sales contract/SCSC/ (the monitoring records/MRSC/ and the solar cookers sales contract/SCSC/ are used as the data source of this parameter as reported in the MR), which are consistent among each other. However, via checking the sales contract and invoice of the solar cookers/SCSC/ and the survey result of the total solar cooker number of this monitoring period/SR/, it is confirmed that the numbers of the solar cooker in operation during this monitoring period is 48,000, which is equal to the number of sales contract/SCSC/. However, via interview with the monitoring team and checking the operation logs/LOG/, survey result of the total solar cooker number of this monitoring period/SR/, it is confirmed that in year 2018, 2019 and 2020 during this monitoring period, when the monitoring team conduct the monitoring of number of solar cookers engaged in the proposed project annually at the last quarter of each year. Via checking the Monitoring records of solar cooker/MRSC/ and survey result of the total solar cooker number of this monitoring period/SR/ in 2018, it is confirmed that there were 37 households with nobody at home, and others end users used the solar cookers normally, thus the value of 47,963 (48,000–37) is used as the number of solar cookers engaged in the proposed project for year 2018. Via checking the Monitoring records of solar cooker/MRSC/ survey result of the total solar cooker number of this monitoring period/SR/ in 2019, it is confirmed that there were 1,165 households with nobody at home, and others end users used the solar cookers normally, thus the

	value of 46,835 (48,000–1,165) is used as the number of solar cookers engaged in the proposed project for year 2019. Via checking the Monitoring records of solar cooker/MRSC/ survey result of the total solar cooker number of this monitoring period/SR/ in 2020, it is confirmed that there were 2,779 households with nobody at home, and others end users used the solar cookers normally, thus the value of 45,221 (48,000–2,779) is used as the number of solar cookers engaged in the proposed project for year 2020. This is deemed as conservative for the monitoring parameter *n*. Furthermore, the verification team checked the CDM training records/TCR/ and confirms that the CDM monitoring team are well trained and are competent for the data management, which was in line with the requirements of the registered monitoring plan and the applied monitoring methodology. In addition, during the onsite visit, the verification team has randomly selected 38 solar cookers for acceptance sampling for the parameter "t_i", the verification team have visited all these 38 solar cookers and found them in normal using, which further convinced that the reported value of sets of solar cookers are appropriate and reliable.
If applicable, has the reported data been cross-checked with other available data? (Yes / No)	Yes. The number of solar cookers engaged in the proposed project n during this monitoring period is reported in the MR based on the monitoring records/MRSC/ and the solar cookers sales contract/SCSC/ and operation log/LOG/, and Survey Results/SR/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, QA/QC procedures were found to be appropriate and reliable.

2. **t_i**

Data/Parameter	**t_i**
Description	The monthly operating time of each solar cooker
Value applied for this monitoring period	

Month	**Using hour**
2018.12	118
2019.01	121
2019.02	122
2019.03	126
2019.04	125
2019.05	125
2019.06	124
2019.07	126
2019.08	126
2019.09	128
2019.10	130

		2019.11 121 2019.12 122 2020.01 121 2020.02 121 2020.03 124 2020.04 124
	Measuring /Reading /Recording frequency	t_i is the monthly operating time of each solar cooker measured by checking the monthly aggregation of the daily operating hour records (measured and summed up by the monitoring team)/SAM/, which is aggregated from the original daily operating hour records/DOHR/ measured by the CDM monitoring team.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes, the data were measured and recorded daily by the CDM monitoring team, and then aggregated monthly, which is in accordance with the registered monitoring plan/PDD/ and the applied monitoring methodology/AMS-I.C/.
	Monitoring equipment with accuracy	Clock or watch
	Is the installed monitoring equipment has been duly calibrated for this entire monitoring period? (Yes / No)	There is no requirement of calibration on the monitoring equipment in the registered PDD/PDD/ nor in the applied methodology AMS-I.C version 19/AMS-I.C/.
	How were the values in the monitoring report verified?	Monitoring parameter of $\mathbf{t_i}$ was determined by conducting sampling survey which measured daily and recording the daily operating time of the solar cookers finally aggregate to the monthly value. The usage survey has been conducted in 313 sample households daily in this monitoring period by solar cookers users filling the related monitoring forms designed by PP/DOHR/. The end users were trained by monitoring team by how to measure the time of using by clock and watch before filling the forms which has been confirmed by interview with the 38 sample users. Furthermore, monitoring team reminded the users to record the monitoring forms daily via phone calls and follow-up visits, then collected the paper documents periodically from the users and the paper documents were converted into electronic form sent to PP at the end of each month. The quality of data was checked by the data verification group to ensure the data records were legible and correct, and double check with sampled users for the data out of normal range which has been verified by interview with the monitoring team members during site visit. For sampling survey as designed in the PDD/PDD/, 313 end users of solar cooker have been selected to monitor the operating time daily. Stratified sampling method and Random sampling approach has been applied for selection of samples as per the PDD sampling design. It is confirmed that the sample size fulfils the requirement of the guideline of the sampling as stated in the PDD/PDD/. Via checking the sampling method as stated in the

		monitoring manual/MM/, it is verified that the method is in line with the PDD sampling plan/PDD/. All measurements of the operating time have been conducted by end users, and monitoring forms have been used to record the time which has been confirmed by checking the filled monitoring forms by users/DOHR/ and on-site interview with the users. The results show that all the sampled record the operating time accordingly by watch or clock, the monthly operating time has been calculated correctly which has been checked and confirmed in ER calculation sheet/ER/ against the original forms filled by sample households/DOHR/. Above mentioned evidences were provided to the verification team during site verification. To check if the PP sample data is correct, the verifier conducted the sampling approach during the site visit. 38 samples were selected by verifier and interviewed during site inspection. Refer to section C.4 of this report for VVB's sampling action. Via checking the above evidence, it is confirmed that t_i for this monitoring period is correct and reasonable.
	If applicable, has the reported data been cross-checked with other available data? (Yes / No)	Yes. The verification team has verified the data in monitoring report against the monthly operating time of solar cookers sampled by project participants as the aggregation of the daily operating hour records/SAM/ and found they are consistent between each other. The verification team further cross checked the original daily operating hour records of solar cookers for 38 samples randomly selected by verification team/DOHR/ and the survey result of the local coordinator/SR/ in this monitoring period, which are consistent among each other, and was in line with the requirements of the registered monitoring plan and the applied monitoring methodology.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, QA/QC procedures were found to be appropriate and reliable.

3. $EF_{FF,CO2}$

Data/Parameter	**$EF_{FF,CO2}$**
Description	CO_2 emission factor of coal
Value applied for this monitoring period	87.3 tCO_2/TJ
Measuring /Reading /Recording frequency	$EF_{FF,CO2}$ is an IPCC default value. The data is sourced from IPCC 2006.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring	Yes, the value will be updated upon revision of the IPCC/IPCC/, which is in accordance with the registered monitoring plan/PDD/ and the monitoring methodology AMS-I.C version 19/AMS-

methodology? (Yes / No)	I.C/.
Monitoring equipment with accuracy	N/A
Is the installed monitoring equipment has been duly calibrated for this entire monitoring period? (Yes / No)	N/A
How were the values in the monitoring report verified?	The verification team has verified the data in monitoring report against the value in the IPCC 2006/IPCC/, which are consistent between each other, and was in line with the requirements of the registered monitoring plan/PDD/ and the applied monitoring methodology AMS-I.C version 19/AMS-I.C/. And through checking the IPCC website/ipcc/, it is confirmed that no revision of the IPCC from the 2006 version.
If applicable, has the reported data been cross-checked with other available data? (Yes / No)	Yes. $EF_{FF,CO2}$ is an IPCC default value. The data is sourced from IPCC 2006/IPCC/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, QA/QC procedures were found to be appropriate and reliable.

4. R_i

Data/Parameter	**R_i**
Description	Monthly solar irradiance intensity in project region
Value applied for this monitoring period	See table below
Measuring /Reading /Recording frequency	R_i is the monthly solar irradiance intensity in project region measured by checking the monitoring records of solar irradiance/SII/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring	The data were derived from Nanyang Meteorological Bureau/SII/, and recorded by the PP yearly, which is in accordance with the registered monitoring plan/PDD/ and the

Month	**R_i**
2018.12	430.87
2019.01	414.58
2019.02	443.78
2019.03	457.26
2019.04	465.82
2019.05	537.23
2019.06	616.33
2019.07	632.40
2019.08	671.66
2019.09	667.95
2019.10	587.43
2019.11	497.50
2019.12	437.89
2020.01	435.27
2020.02	458.23
2020.03	468.55
2020.04	497.21

	methodology? (Yes / No)	monitoring methodology AMS-I.C version 19/AMS-I.C/.
	Monitoring equipment with accuracy	N/A
	Is the installed monitoring equipment has been duly calibrated for this entire monitoring period? (Yes / No)	N/A
	How were the values in the monitoring report verified?	The verification team has verified the data in monitoring report against the monitoring records of solar irradiance/SII/ issued by Nanyang Meteorological Bureau, which are consistent between each other, and was in line with the requirements of the registered monitoring plan/PDD/ and the monitoring methodology AMS-I.C version 19/AMS-I.C/.
	If applicable, has the reported data been cross-checked with other available data? (Yes / No)	Yes. The monthly solar irradiance intensity in project region R_i during this monitoring period is reported in the MR based on the monitoring records of solar irradiance/SII/ derived from Nanyang Meteorological Bureau.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, QA/QC procedures were found to be appropriate and reliable.
Findings	CAR 03 was raised.	
Conclusion	CAR 03 was raised and closed, Refer to Appendix 4 for detail assessment. It can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements.	

E.6.3. Implementation of sampling plan

Means of verification	The monitoring has been carried out in accordance with the sampling plan contained in the PDD/PDD/. **Sampling Design/Target Population/Sampling Frame/Reliability**: Sampling plan was provided by PP and has demonstrated in the PDD/PDD/. The following will be monitored by sampling method. i. Sampling survey for t_i The project activity applies stratified sampling method and simple random sampling for monitoring the monthly operating time of each solar cooker, t_i, and the sample size is 313. The sample size is confirmed as correct which has been verified according to "Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities"/GSS/. The sample size of each township was decided on the method of proportional distribution and the monitoring will be conducted at the beginning of each year during the crediting period. The sampling plan is confirmed as in line with the GS requirement, CDM sampling standard and guideline and applied methodology. **Sampling Frame:** All the end users with the solar cookers installed and operational are considered as the sampling frame. **Sampling Method and selection:**

	The PP has applied Stratified Sampling Method and Simple Random Sampling for t_i all over the population (48,000 household with solar cookers). The samples have been chosen randomly screenshots of random generator of Excel. **Sample Size for Parameter of Interest:** The sample size is chosen using the equation inline to CDM Guidelines for Sampling and surveys for CDM project activities and programmes of activities/GSS/ for t_i In this regard, sample size calculation as stated in the PDD was checked and found correct as per registered monitoring plan. The complete details are given in PDD. **Implementation of Sampling Survey and Field Test Records:** Based on interviews with the PP and surveyors during the site visit, in addition to asking this question to the end users. Therefore, the implementation of surveys was considered reliable. **The monitoring team were trained by PP during the current monitoring period which has been verified by checking the training record/TCR/.** The monitoring survey for t_i (field survey / tests) was carried out by users daily during this monitoring period. The users and the monitoring personnel were trained by PP before the starting of the project operation to ensure that they are fully aware of and able to strictly follow this conservative principle. **Reliability and precision calculation:** Refer to section D.4 for the details of assessment of reliability and precision calculation.
Findings	CAR 03 was raised
Conclusion	CAR 03 was raised and closed, Refer to Appendix 4 for detail assessment. The sampling plan was required to determine the monitored parameter t_i in accordance with the registered PDD. Via the onsite verification and documents check, it is confirmed by the verification team that the required confidence/precision has been met. The monitoring parameter t_i is correctly determined.

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	According to para 365 to 371, VVS (version 02.0), DOE shall determine whether the calibration of the measuring equipment that has an impact on the claimed GHG emission reductions or net anthropogenic GHG removals is conducted by PP at a frequency specified in the applied methodologies, the applied standardized baselines and/or the registered monitoring plan. As there is no measuring equipment stated in the registered PDD, only the t_i using clock or watch which need no calibration in PDD and applied methodology, while all the parameters values are applied default values or public data or calculated based on sample survey results, thus this compliance requirement is not applicable of the project.
Findings	N/A
Conclusion	N/A

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	According to the registered PDD and applied methodology "AMS-I.C", "Thermal energy production with or without electricity" version 19/AMS-I.C/, the baseline GHG emissions have been calculated based on the following formula: $BE_y = BE_{thermal,CO2,y}$ $= n \times \Sigma[773.5 \times (R_i/700) \times t_i \times 3.6 \times 10^{-9}] \times EF_{FF,CO2}/\eta_{BL,thermal}$ (i=1,2,...,12) Where:

BE_y : the baseline emission (tCO_2e)
R_i : the actual solar irradiance intensity in month *i* in W_{th}/m^2;
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;
$EF_{FF,CO2}$: the CO_2 emission factor of coal(tCO_2e/TJ);
$\eta_{BL,thermal}$: the efficiency of the coal-fired stove that would have been used in the absence of project activity.

The result is summarized each month in the table below:

Month	R_i	P_i	t_i	n	BE_y
	W_{th}/m^2	W_{th}	h	-	tCO_2e
01/12/2018 - 31/12/2018	430.87	476.11	118	9.70	5,646
01/01/2019 - 31/01/2019	414.58	458.11	121	9.37	5,451
01/02/2019 - 28/02/2019	443.78	490.38	122	10.10	5,875
01/03/2019 - 31/03/2019	457.26	505.27	126	10.71	6,233
01/04/2019 - 30/04/2019	465.82	514.73	125	10.84	6,310
01/05/2019 - 31/05/2019	537.23	593.64	125	12.50	7,273
01/06/2019 - 30/06/2019	616.33	681.04	124	14.19	8,258
01/07/2019 - 31/07/2019	632.40	698.80	126	14.84	8,637
01/08/2019 - 31/08/2019	671.66	742.18	126	15.79	9,192
01/09/2019 - 30/09/2019	667.95	738.08	128	15.90	9,255
01/10/2019 - 31/10/2019	587.43	649.11	130	14.20	8,267
01/11/2019 - 30/11/2019	497.50	549.74	121	11.23	6,535
01/12/2019 - 31/12/2019	437.89	483.87	122	9.92	5,776
01/01/2020 - 31/01/2020	435.27	480.97	121	9.46	5,509
01/02/2020 - 29/02/2020	458.23	506.34	121	10.00	5,822
01/03/2020 - 31/03/2020	468.55	517.75	124	10.48	6,098
01/04/2020 - 30/04/2020	497.21	549.42	124	11.08	6,450
Total					**116,585**

Then the baseline emissions are calculated as 116,585 tCO_2e which is confirmed as correct.

The input to calculate baseline emissions are taken from the related monitoring surveys records/SR/ and for operation time t_i /DOHR/ done during monitoring period.

The values monitored during such surveys are transparently shown in the Monitoring Report Section D.2. During onsite, the verification team cross-checked these values in detail using various supporting records and documents. Refer to the section E.6.1 and E.6.2 of this report for parameters assessment.

The Baseline emission calculation is provided in the Emission reduction calculation spreadsheet/ER/ in a transparent manner and the calculation found correct. There is no material error noted in the accounting and application of various data against monitored parameters.

Findings

CAR 04 was raised.

Conclusion

CAR 04 was raised and closed, Refer to Appendix 4 for detail assessment.
According to Para. 372 to 374 of VVS version 02.0/VVS/, the verification team checked and recalculated the baseline emission calculation sheet and confirms that:

1. A complete set of data for the specified monitoring period was available and is duly reported.
2. As indicated above, the description with regard to cross-check of reported data is included under respective parameter.
3. Appropriate methods and formulae for calculating baseline GHG emissions or baseline net GHG removals were followed.

	4. Appropriate emission factor, IPCC default values, GWP value and other reference values have been correctly applied. The sheet is reproducible and calculation was correctly applied. The confirmed value of baseline emissions is 116,585 tCO_2e.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	In accordance with AMS-I.C ver. 19/AMS-I.C/, registered PDD/PDD/ and validation report/VAL/, the project emission is zero.
Findings	N/A
Conclusion	It can be confirmed that project emissions were considered to be zero.

E.8.3. Calculation of leakage GHG emissions

Means of verification	In accordance with AMS-I.C ver. 19/AMS-I.C/, registered PDD/PDD/ and validation report/VAL/, leakage of the project activity is zero.
Findings	N/A
Conclusion	It can be confirmed that no leakage emissions were to be considered.

E.8.4. Summary of calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification

The verification team has checked if the MR includes a summary table of the emission reductions calculation specifying separately

- Total baseline emissions,
- Total project emissions,
- Total leakage,
- Total emission reductions.

It has been assessed whether the values are correct or need to be revised as a consequence of issues identified above.

Summary of emission reductions during the monitoring period:

$ER_y = BE_y - PE_y - LE_y$

$= BE_y - 0 - 0$

$= BE_y$

Where:

ER_y	Emission reductions (t CO_2e)
BE_y	Baseline Emissions (t CO_2e)
PE_y	Project Emissions (t CO_2e)
LE_y	Project Leakages (t CO_2e)

Emission reduction calculation

Period \ Value	BE_y (tCO_2e)	PE_y (tCO_2e)	LE_y (tCO_2e)	ER_y (tCO_2e)
01/12/2018 - 31/12/2018	5,646	0	0	5,646
01/01/2019 - 31/01/2019	5,451	0	0	5,451
01/02/2019 - 28/02/2019	5,875	0	0	5,875
01/03/2019 - 31/03/2019	6,233	0	0	6,233
01/04/2019 - 30/04/2019	6,310	0	0	6,310
01/05/2019 - 31/05/2019	7,273	0	0	7,273
01/06/2019 - 30/06/2019	8,258	0	0	8,258
01/07/2019 - 31/07/2019	8,637	0	0	8,637
01/08/2019 - 31/08/2019	9,192	0	0	9,192
01/09/2019 - 30/09/2019	9,255	0	0	9,255
01/10/2019 - 31/10/2019	8,267	0	0	8,267
01/11/2019 - 30/11/2019	6,535	0	0	6,535
01/12/2019 - 31/12/2019	5,776	0	0	5,776

	01/01/2020 - 31/01/2020 | 5,509 | 0 | 0 | 5,509 01/02/2020 - 29/02/2020 | 5,822 | 0 | 0 | 5,822 01/03/2020 - 31/03/2020 | 6,098 | 0 | 0 | 6,098 01/04/2020 - 30/04/2020 | 6,450 | 0 | 0 | 6,450 **Total** | **116,585** | **0** | **0** | **116,585** All the figures as per the monitoring report were cross-checked by the verification team against all monitored data.
Findings	Refer to CAR 04
Conclusion	According to Para. 372 to 374 of VVS version 02.0/VVS/, the verification team checked and recalculated the ER calculation sheet and confirms that: 1. A complete set of data for the specified monitoring period was available and is duly reported. 2. As indicated above, the description with regard to cross-check of reported data is included under respective parameter. 3. Appropriate methods and formulae for calculating GHG emission reductions or net GHG removals were followed. 4. Appropriate emission factor, IPCC default values, GWP value and other reference values have been correctly applied. 5. The sheet is reproducible and calculation was correctly applied. The confirmed value of emission reductions is **116,585** tCO_2e.

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	Compared the monitoring report with the registered PDD, and found the actual value achieved during this monitoring period is 116,585 tCO_2e, which is 8.75% less than values (127,768 tCO_2e) estimated according to the PDD calculated as below, 127,768 tCO_2e=90,204 tCO_2e/ 365day× 517day
Findings	N/A
Conclusion	The MR includes a comparison of the calculated actual emission reductions with the ex-ante calculated values in the latest approved CPA-DDs. It is confirmed that the ex-post determined value was found to be proportionally lower than the ex-ante estimated value.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	On the basis of the above comparison of actual values of the monitoring period/MR/ with the estimations in the registered PDD/PDD/, the verification team has checked whether an appropriate explanation is included in the MR if ex-post determined value was higher than the ex-ante estimated value.
Findings	N/A
Conclusion	It is confirmed that the actual emission reductions are lower than the ex-ante estimated values in the latest approved PDD. No further justification or explanation is deemed required.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	The verification team has checked chapter E.4 of the MR and the emission reduction calculation sheet /XLS/. The MR in section E.4 includes a summary table of the ER breakdown *a) ER up to 2012-12-31 and* *b) ER from 2013-01-01 onwards* The ERs have completely been generated from 01/01/2013 onwards, and the actual value achieved during this monitoring period is 116,585 tCO_2e
Findings	N/A
Conclusion	The data provided in the MR is correct as well as the related breakdown. The pro-rata approach was correctly applied to the calculations of GHG emission reductions or net anthropogenic GHG removals in accordance with the project standard, as the

	monitoring period starts after 01/01/2013.

E.9. Assessment of reported sustainable development co-benefits

Means of verification	There is no sustainable development co-benefits monitored by the project participants for the registered CDM project activity.
Findings	N/A
Conclusion	N/A

E.10. Global stakeholder consultation

Means of verification	The project MR was published for GSC on 22/05/2020 and comment period is ended on 12/06/2020. There is no comments received during stakeholder consultation conducted after the publication of the 6th monitoring report.
Findings	N/A
Conclusion	N/A

SECTION F. Internal quality control

The final verification report was undergone a technical review by a qualified independent reviewer before requesting issuance of the project activity. The technical review was performed by a technical reviewer qualified in accordance with CTI's qualification scheme for CDM validation and verification that meets the criteria of EB guidelines for qualification.

SECTION G. Verification opinion

The verification team assigned by the DOE (CTI) concludes that the 6th periodic verification of CDM project “Nanyang Danjiang River Solar Cooker Project Phase I” in Henan Province, China, as described in the registered PDD (Version 07, 16/04/2012) and monitoring report (version 02, 10/08/2020), meets all relevant requirements of the UNFCCC for CDM Project Activities including article 12 of the Kyoto Protocol, the modalities and procedures for CDM (Marrakesh Accords) project activities including carbon dioxide capture and storage in geological formation and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification is conducted in-line with the VVS requirements.

The project activity was correctly implemented according to selected monitoring methodology and monitoring plan. The collected monitoring data allowed to verify the amount of achieved GHG emission reductions. Thus, CTI is pleased to issue a positive verification opinion.

SECTION H. Certification statement

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the 6th periodic verification of the emission reductions that have been reported for the CDM project "Nanyang Danjiang River Solar Cooker Project Phase I" in Henan Province, P. R. China for the period 01/12/2018 to 30/04/2020.

The verification is based on the baseline and monitoring methodology AMS-I.C. "Thermal energy production with or without electricity" (Version 19), the registered PDD (Version 07, 16/04/2012) and monitoring report (version 02, 10/08/2020). The verification consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up on-site visit and interviews with project participants; iii) resolution of outstanding issues and the issuance of the final verification and certification report.

The PP are responsible for the collection, calculation and determination of the GHG data in accordance with the monitoring plan and the reporting of GHG emission reductions on the basis set out within the project monitoring report.

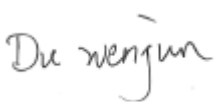
It is CTI's responsibility to provide an independent verification statement on the reported GHG emission reductions for the project. Based on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these, CTI planned and performed our work to obtain the information and explanations that we considered necessary to provide reasonable assurance that reported GHG emission reductions are fairly stated.

CTI confirms that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI confirms that the emission reductions from the "Nanyang Danjiang River Solar Cooker Project Phase I" in Henan Province, P. R. China during the monitoring period 01/12/2018 to 30/04/2020 as follows:

Monitoring Period Number: 6th

Monitoring period: 01/12/2018 to 30/04/2020

Emission reductions: 116,585 tCO_2e



Mr. Du Wenjun
Team Leader
11/08/2020

Ms. Wang Guolian
Technical Reviewer
11/08/2020

Appendix 1. Abbreviations

Abbreviations	Full texts
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CL	Clarification Request
CO_2	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
DverR	Draft Verification Report
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
MP	Monitoring Plan
MR	Monitoring Report
PA	Project Activity
PDD	Project Design Document
PP	Project Participant
PRC	Post Registration Change
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet

Appendix 2. Competence of team members and technical reviewers

Mr. Wenjun DU

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	-	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 13: Waste handling and disposal	TA 13.1: Solid waste and wastewater
	TA 13.2: Manure

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Wu LIN Wu Lin

Technical Competent Manager

Shenzhen, 01/01/2018

Ms. Guolian WANG

Satisfies the requirements of competence management system of CTI Certification, and is hereby appointed as:

Qualification						
Status	GHG Auditor	Validator	Verifier	Team Leader	Technical Reviewer	Technical Expert
Date	√	√	√	√	√	√

Scope	Technical Area
SS 1: Energy industries (renewable/non-renewable sources)	TA 1.2: Energy generation from renewable energy sources
SS 3: Energy demand	TA 3.1: Energy demand
SS 5: Chemical industry	TA 5.1: Chemical industry
	TA 5.2: Caprolactam, nitric and adipic acid
SS 11: Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride	TA 11.1: Emissions of fluorinated gases
	TA 11.2: Refrigerant gas production
SS 12: Solvents use	TA 12.1: Chemical industry

This appointment is valid for 3 years from its date of approval below and is bound by internal requirements of management system of the Certification Body of CTI.

Approved by:

Wu LIN Wu Lin

Technical Competent Manager

Shenzhen, 10/10/2019

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1.	Sirreon Technology & Development (Beijing) Co., Ltd	Monitoring Report/MR/	Monitoring Report of Nanyang Danjiang River Solar Cooker Project Phase I • version 01, dated 16/05/2020 • version 02, dated 10/08/2020	Project Owner
2.	Sirreon Technology & Development (Beijing) Co., Ltd	Emission Reduction Calculation Sheets/XLS/	Emission Reduction Calculation sheets (related to MR) • version 01, dated 16/05/2020 • version 02, dated 10/08/2020	Project Owner
3.	UNFCCC	Project Design Document/PDD/	Registered Project Design Document for CDM project: "Nanyang Danjiang River Solar Cooker Project Phase I", version 07, dated 16/04/2012	UNFCCC website
4.	TÜV Rheinland	Validation Report/VAL/	Validation Report for CDM project "Nanyang Danjiang River Solar Cooker Project Phase I" Revision No. 02.2, dated 17/04/2012.	UNFCCC
5.	DOE	Verification Report/VER/	Previous Verification Report, 1st – 5th monitoring period https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1335494252.18/view	UNFCCC
6.	Beijing City Administrative Bureau for Industry and Commerce	Business License/BL/	Business License of Sirreon Technology & Development (Beijing) Co., Ltd issued on 2010-09-03 valid to 2030-09-02	Project Owner
7.	Sirreon Technology & Development (Beijing) Co., Ltd & Nanyang City Jinlong Solar Technology Co., Ltd.	Commissioning Confirmation/CC/	Commissioning Confirmation issued dated 31/07/2011	Project Owner
8.	Solar cooker users	Daily operating hour records/DOHR/	Original daily operating hour records of solar cookers for 38 samples randomly selected by verification team	Project Owner
9.	Sirreon Technology & Development (Beijing) Co., Ltd	Monitoring records of solar cooker/MRSC/	Monitoring records of number of solar cookers for year 2018, 2019 and 2020	Project Owner
10.	Sirreon Technology & Development (Beijing) Co., Ltd	Sample Records/SAM/	Monthly operating time of solar cookers sampled by project participants as the aggregation of the daily operating hour records during this monitoring period	Project Owner
11.	Sirreon Technology & Development (Beijing) Co., Ltd & Nanyang City Jinlong Solar Technology Co., Ltd	Solar cookers sales contract/SCSC/	Solar cookers sales contract signed dated 28/05/2011	Project Owner
12.	Sirreon Technology & Development (Beijing) Co., Ltd & local residents	Solar cookers usage agreements/SCUA/	Solar cookers usage agreements signed dated 31/05/2011	Project Owner
13.	Nanyang City Quality and	Testing report of focus type solar	Testing report of focus type solar cookers issued dated 05/12/2011	Project Owner

No.	Author	Title	References to the document	Provider
	Technology Supervision and Testing Centre	cookers/TRSC/		
14.	Sirreon Technology & Development (Beijing) Co., Ltd	User information alternation form/UIAF/	User information alternation form during this monitoring period	Project Owner
15.	Sirreon Technology & Development (Beijing) Co., Ltd	User information registration form/UIRF/	User information registration form during this monitoring period	Project Owner
16.	Nanyang Meteorological Bureau	Monthly solar irradiance intensity/SII/	Monthly solar irradiance intensity, dated 03/01/2019 (for year 2018) and 03/05/2020 (for year 2019 and 2020) covering this monitoring period	Project Owner
17.	Local coordinator	Survey Result/SR/	Survey result of the local coordinator during this monitoring period	Project Owner
18.	Sirreon Technology & Development (Beijing) Co., Ltd	Training and Competence Records/TCR/	Project Responsibilities, Training and Competence Records • Project Organization Chart and responsibilities • Staff Training Records • Users Training Records for measuring solar cooker using time • Internal audit record covering this monitoring period	Project Owner
19.	Sirreon Technology & Development (Beijing) Co., Ltd	LOG/LOG/	Operation and management of project logs covering this monitoring period	Project Owner
20.	Sirreon Technology & Development (Beijing) Co., Ltd	Monitoring Manual/MM/	CDM Monitoring, sampling & Management Manual for the project activity and CDM project site management rules and regulations	Project Owner
21.	On-site Verification Team	Photographs of Project Site/PHT/	Photographs of solar cookers, solar cooker users taken by Verification team during the on-site verification	On-site Verification Team
22.	UNFCCC	Applied methodology /AMS-I.C/	Approved small-scale methodology AMS-I.C: “Thermal energy production with or without electricity” (Version 19)	UNFCCC Website
23.	UNFCCC	Methodological Tool/TA/	“Tool for the demonstration and assessment of additionality” (Version 07.0.0)	UNFCCC Website
24.	UNFCCC	“Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities”/GSS/	“Guidelines for Sampling and Surveys for CDM Project Activities and Programme of Activities”, version 04.0	UNFCCC
25.	UNFCCC	“Sampling and Surveys for CDM Project Activities and Programme of Activities” /SSS/	“Sampling and Surveys for CDM Project Activities and Programme of Activities” version 08.0	UNFCCC
26.	UNFCCC	Project Standard/PS/	CDM project standard for project activities (Version 02.0)	UNFCCC
27.	UNFCCC	Validation and Verification Standard/VVS/	CDM validation and verification standard for project activities (Version 02.0)	UNFCCC
28.	UNFCCC	Kyoto Protocol/KP/	Kyoto Protocol (1997)	UNFCCC
29.	UNFCCC	Marrakesh – Accords/MA/	Decision 3/CMP. 1 (Marrakesh – Accords)	UNFCCC
30.	UNFCCC	Monitoring Report	Monitoring Report Form (F-CDM-MR),	UNFCCC

No.	Author	Title	References to the document	Provider
		Form/MRF/	Version 07.0	
31.	Ministry of Agriculture of the People's Republic of China	NY/T219-2003/NYT/	National industrial standard, Focusing Solar Cooker, NY/T 219-2003,	Website
32.	Intergovernmental Panel on Climate Change	IPCC Guidelines/IPCC/	2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book	www.ipcc-nggip.iges.or.jp
33.	UNDP: Clean Energy for Development and Economic Growth	UNDP/undp/	Biomass and Other Renewable Energy Options to Meet Energy and Development Needs in Poor Nations dated 2002 http://www.undp.org/energy/publications/2002/2002b.htm http://content.undp.org/go/cmsservice/download/publication/?version=live&id=2102581	Website
34.	-	DNA of China/dna/	http://www.mee.gov.cn/	Website
35.	UNFCCC	UNFCCC/unfccc/	http://cdm.unfccc.int	Website

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verification

FAR ID	N/A	**Section no.**		**Date:** DD/MM/YYYY
Description of FAR				
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

Table 2. CL from this verification

CL ID	01	**Section no.**	B.1	**Date:** 10/07/2020
Description of CL				
In section B.1 of the MR, it stated that "during the visit to the cooker users by the monitoring team, there were 37(2018), 1,165(2019), 2,779(2020) households with nobody at home", so these non-home users number deducted, however, there is no description about the conditions of check the users who were at home. Clarification is requested.				
Project participant response				**Date:** 05/08/2020
According to the solar cooker purchase agreement, the total amount of solar cookers engaged in the proposed project is 48,000. During the visit to the cooker users by the monitoring team, there were 37(2018), 1,165(2019), 2,779(2020) households with nobody at home and 47,963(2018), 46,835(2019), 45,221(2020) households with the solar cookers on operation. For the cooker users with nobody at home, 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 situation of users who were at home has added in the MR.				
Documentation provided by project participant				
/MR/-V02 /LOG/ /SR/				
DOE assessment				**Date:** 10/08/2020
The MR is revised accordingly, it is confirmed that besides the households with nobody at home, all the other cooker users with nobody at home used the solar cookers normally, which is also verified by checking the operation logs/LOG/ and Survey records/SR/. CL 01 is closed.				

Table 3. CAR from this verification

CAR ID	01	**Section no.**	C	**Date:** 10/07/2020
Description of CAR				
The description of parameter $EF_{FF,CO2}$ is not same to the section D.2 and methodology.				
Project participant response				**Date:** 05/08/2020
As per paragraph 13 of methodology AMS-I.C (version 19), the description of parameter $EF_{FF,CO2}$ in this project is the CO_2 emission factor of coal. The description of this parameter $EF_{FF,CO2}$ in MR has been modified.				
Documentation provided by project participant				
/MR/-V02				
DOE assessment				**Date:** 10/08/2020
The revised description of parameter $EF_{FF,CO2}$ is checked, verifier confirmed it is consistent with the applied methodology and has been consistent in the whole MR. CAR 01 is closed.				

CAR ID	02	**Section no.**	C&D.3	**Date:** 10/07/2020
Description of CAR				
In section C and D.3, for monitoring the parameter ***n***, it is stated that the sampling survey method is used for the monitoring of n, however in section D.2 of MR, it stated that "the monitoring of total number of operating solar cookers will be conducted annually at the last quarter of each year" and no sampling description in section D.2 for this parameter, it is not consistent, revision is requested.				
Project participant response				**Date:** 05/08/2020
As the description of Monitoring number of solar cookers operating in B.7.2 of PDD, For the number of operation systems, CDM Monitoring Team will track all the number of operating solar cookers. The monitoring of total number of operating solar cookers will be conducted annually at the last quarter of each year. We modified the description of Monitoring number of solar cookers operating in section C and D.3 of MR.				
Documentation provided by project participant				
/MR/-V02				
DOE assessment				**Date:** 10/08/2020
The revised description in MR is checked, it is confirmed that for the monitoring the parameter ***n***, the related information about using sampling survey method has been deleted, and the actual monitoring approach of CDM Monitoring Team will track all the number of operating solar cookers has been added which is verified by checking the operation logs/LOG/ and Survey records/SR/ and is confirmed line with the method in the registered PDD. CAR 02 is closed.				

CAR ID	03	**Section no.**	D.2	**Date:** 10/07/2020
Description of CAR				
In section D.2, for monitoring the parameter t_i, it stated that 313 sample users measured and recorded their daily usage time, however, how to make sure the users measured and recorded the daily time correctly is not clarified in QA/QC procedure.				
Project participant response				**Date:** 05/08/2020
Before implementing the project, the project owner will train the users of solar cookers on how to properly measure and record the daily usage time. The monitoring personnel will distribute monitoring form to users to record the daily operating time of solar cooker and will make phone calls and follow-up visits to ensure the normal recording of data. 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.				
Documentation provided by project participant				
/MR/-V02 /DOHR/				
DOE assessment				**Date:** 10/08/2020
The usage survey has been conducted in 313 sample households daily in this monitoring period by solar cookers users filling the related monitoring forms designed by PP/DOHR/. The end users were trained by monitoring team by how to measure the time of using by clock and watch before filling the forms which has been confirmed by interview with the 38 sample users. Furthermore, monitoring team reminded the users to record the monitoring forms daily via phone calls and follow-up visits, then collected the paper documents periodically from the users and the paper documents were converted into electronic form sent to PP at the end of each month. The quality of data was checked by the data verification group to ensure the data records were legible and correct, and double check with sampled users for the data out of normal range which has been verified by interview with the monitoring team members during site visit. CAR 03 is closed.				

CAR ID	04	**Section no.**	E.1&E.4, ER sheet	**Date:** 10/07/2020
Description of CAR				
1. It is observed that for ER calculation, in the ER sheet, the t_i value for Mar 2019 is not correct, it used the Apr. 2019 value replace Mar 2019, revision is requested and ER results need to be adjusted in both ER sheet and MR. 2. It is observed that in section E.1, the R_i and P_i values in table is not consistent with ER sheet, revision is requested.				
Project participant response				**Date:** 05/08/2020
1. The t_i value for Mar 2019 in the ER sheet had been modified and the ER result in both ER sheet and MR have been adjusted. 2. It is a copy mistake, R_i and P_i values in table is revised according to ER sheet				

Documentation provided by project participant	
/MR/-V02 /ER/-V02	
DOE assessment	**Date:** 10/08/2020
1. It is observed that for ER calculation, in the ER sheet, the t_i value for Mar 2019 is not correct, it used the Apr. 2019 value replace Mar 2019, revision is requested and ER results need to be adjusted in both ER sheet and MR. 2. It is observed that in section E.1, the R_i and P_i values in table is not consistent with ER sheet, revision is requested. CAR 04 is closed.	

CAR ID	05	**Section no.**	E.7	**Date:** 10/07/2020
Description of CAR				
In section E.7 of the MR, the demonstration on scale of small-scale project activity is not in line with the request in MR FORM. Type it missing				
Project participant response				**Date:** 05/08/2020
According to the "CDM project standard for project activities", the type I means "Renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent)". For this project activities, the appropriate equivalent is 45 MW_{th}. The maximum calculated power of single solar cooker is 876.512W_{th} and the maximum total installed capacity of the project is 42.073MW_{th} (876.512W_{th}×48,000×10^{-6}) which is under the small-scale limit of 45MW_{th}.The distribution of 48,000 sets solar cookers is done at one time, and no new solar cookers will be distributed during the operation of the project. Thus, the project activities belong to type I, and the installed capacity under the limit of that type I every year during the crediting period.				
Documentation provided by project participant				
/MR/-V02 /TRSC/				
DOE assessment				**Date:** 10/08/2020
The revised description in MR is checked, verifier confirmed that the project belongs to type I and maximum total installed capacity of the project is verified as 42.073MW_{th}/TRSC/ which is below the small-scale limit of 45MW_{th} for type I. Therefore, the demonstration in section E.7 of the MR is confirmed as in line with the MR FORM. CAR 05 is closed.				

Table 4. FAR from this verification

FAR ID	N/A	**Section No.**		**Date:** DD/MM/YYYY
Description of FAR				
Project participant response				**Date:** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

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Document information

Version	*Date*	*Description*
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM validation and verification standard for project activities" (CDM-EB93-A05-STAN); • Make structural and editorial improvements.
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the "CDM validation and verification standard for project activities" (version 01.0).
01.0	23 March 2015	Initial publication.

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