

Gold Standard

Verification & Certification Report

Project Title
Orb Energy Solar Project, India
GS Ref. No. 696

Monitoring Period: 01/01/2013 to 31/12/2014

For
Orb Energy Private Limited

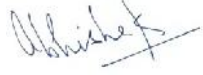
Report Ref No. & Version
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Executive Summary:

A) Basic information			
Project title	Orb Energy Solar Project, India		
GS registration number	GS 696		
UNFCCC ref number	Not applicable		
Date of registration	12/09/2012		
Sectoral scope	1		
Methodology/ies applied	AMS IA Version 14 & AMS IC Version 19		
Project participant	Orb Energy Private Limited		
B) Verification			
Start date of crediting period	12/09/2012		
Monitoring Period	01/01/2013 to 31/12/2014		
Vintage	2013 & 2014		
Emission Reductions verified	26,516 tCO₂		
C) Monitoring report	Version	Date	
Submitted to Earthood	01	18/11/2014	
Final	2.1	29/12/2014	
D) Verification report	Version	Date	
Draft	01.0	05/12/2014	
Final	01.1	12/01/2015	
E) Verification Team			
Team Leader	Kaviraj Singh		
Verifier	Kaviraj Singh		
Technical Experts	Kaviraj Singh & Ashok Kumar Gautam		
F) Approvals			
Technical Reviewer	Shreya Garg	Date	09/01/2015
Technical Expert	Shreya Garg and Pankaj Mohan		
G) Final opinion			
<p>Earthood has performed the verification of the GS project "Orb Energy Solar Project, India" GS Ref. Number GS 696. The verification includes confirming the implementation of the monitoring plan of the registered PDD (Version 8.1) and Passport (3.1) and the application of the monitoring methodology 'AMS-I.A. Electricity generation by the user, Version 14 & AMS -I.C. Thermal Energy production with or without electricity, Version 19. Earthood confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. The emission reductions from the GS project activity 696 "Orb Energy Solar Project, India" in India during the period 01/01/2013 to 31/12/2014 (including both days) amount to 26,516 tonnes of CO₂.</p>			
H) Authorization			
Quality Manager	Abhishek Mahawar		
Signature			
Date	12/01/2015		
I) Distribution			
No public distribution without written confirmation from client.			

Abbreviations

CAR	Corrective Action Request
CDM	Clean Development Mechanism
GS	Gold Standard
EB	Executive Board
CER	Certified Emission Reduction
CL	Clarification Request
DoE	Designated Operational Entity
DNA	Designated National Authority
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
IPCC	Intergovernmental Panel on Climate Change
PDD	Project Design Document
RMP	Revised Monitoring Plan
UNFCCC	United Nations Framework Convention on Climate Change

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1. INTRODUCTION

1.1 Objective

'Orb Energy Private Limited' has contracted Earthood Services Private Limited (Earthood) to conduct the verification and certification of emission reductions reported for the GS project activity GS 696 "Orb Energy Solar Project, India" in India for the period 01/01/2013 to 31/12/2014. This report contains the findings of the verification process and a certification statement for the certified emission reductions.

The verification is the periodic independent review and ex-post determination by Earthood of the monitored reductions in GHG emissions that have occurred as a result of the registered GS project activity during a defined monitoring period. Certification is the written assurance by Earthood that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the "Orb Energy Solar, Project" for the period 01/01/2013 to 31/12/2014.

1.2 Scope

The scope of the verification is to establish and verify that;

- a) The project activity has been implemented and operated as per the registered PDD and passport or any approved revised PDD, and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- b) The monitoring report and other supporting documents provided are complete in accordance with the latest applicable version of the completeness checklist for requests for issuance of CERs, verifiable, and in accordance with applicable GS requirements;
- c) The actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan, any revised approved monitoring plan, the approved methodology including applicable tool(s) and/or, where applicable, the approved standardized baseline;
- d) The data recorded and stored as per the monitoring methodology including applicable tool(s) and, where applicable, the standardized baseline.

The verification report will report on the following;

- a) Emission reduction
- b) Leakages
- c) Changes to the key sustainable development indicators
- d) Achievement and implementation of mitigation/compensation measures, according to the success indicators established in the monitoring plan of registered PDD and passport
- e) Response by project participants to the grievances raised by local stakeholders

2. METHODOLOGY

2.1 Desk Review

The verification is performed primarily as a document review of the documents submitted at various stages of assessments. The review is performed by assessment team using dedicated protocols. The assessment team cross checks the information provided in the documents (PDD, MR, GS passport) and information from sources other than those used, if available, and also conducts independent background investigations. Earthood conducted a desk review as under;

- a) A review of the data and information presented to verify their completeness;

- b) A review of the monitoring plan, the monitoring methodology including applicable tool(s) and, where applicable, the applied standardized baseline, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- c) An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions;

The complete list of documents reviewed is included under Section 5.

2.2 Site Visits

A site visit was undertaken by Earthood between 02/12/2014 to 05/12/2014 to carry out the following:

- a. An assessment of the implementation and operation of the registered project activity as per the registered PDD or any approved revised PDD;
- b. A review of information flows for generating, aggregating and reporting the monitoring parameters;
- c. Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;
- d. A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- e. A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- f. A review of calculations and assumptions made in determining the GHG data and emission reductions;
- g. An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.3 Reporting of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and nonconformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

- a) Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient
- b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants
- c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions
- d) Change to the key sustainable development indicators
- e) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable GS requirements have been met. All CARs and CLs raised by the Earthood during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

All the findings that are raised and communicated to project participant during the verification are included under Section 6. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.4 Quality Control & Technical Review

A draft verification report that is prepared by assessment team is reviewed by an independent technical review team (one or more members) to confirm if the internal procedures established and implemented by Earthood were duly complied with and such opinion/conclusion is reached in an objective manner that complies with the applicable Gold Standard and CDM requirements. The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team. This report is approved and authorized by Quality Manager on behalf of Earthood.

3. VERIFICATION FINDINGS

The section below summarises the findings of the verification.

3.1 Remaining Issues (FAR(s) from validation or previous verification)

There are no FAR(s) from validation or previous verification that need to be closed during this verification.

3.2 Project implementation

The project activity includes the installation of solar thermal and lighting system distribution for heating and lighting purposes, respectively in the state of Karnataka of India /7/. The project implementation, with reference to registered PDD /1/, was checked on site to confirm the following:

- The geographical boundaries of the project are limited to Karnataka state only & the data reported in monitoring report /5/ and physical implementation of the project in this regard was found inline to the registered PDD. In the current monitoring period 8,395 SWH and 3,399 SPV systems were disseminated and in all 21,407 SWH and 14,645 SPV. The project implementation has been completed in this monitoring period as confirmed from the sales data record /15/ and the project activity remain just below the allowed cap of 15 MWe.
- The project activity only distributed two technologies;
 - a) Solar Water Heating System (SWH) and
 - b) Solar Photovoltaic System (SPV).
- The monitoring system including the measurement of parameters, data collection and archiving were also implemented and operated inline to the registered PDD /1&7/.
- The emission reduction calculation was carried in compliance with applied methodology /8/ and registered PDD.
- The actual emission reductions (26,516 tCO₂e) achieved in the current monitoring period were found to be within the estimated quantity given in the registered PDD for comparable period (29,052 tCO₂e).

3.3 Project Design Change (non-material), if any

There are no changes (material or non-material) observed in project design during the site visit and project was found implemented inline with the registered PDD.

3.4 Verification of monitoring parameters (Carbon)

The tables below describe how each parameter, which is to be measured according to the monitoring plan, has been verified to confirm that the actual monitoring complies with the monitoring plan, monitoring data has been thoroughly assessed and that the calibration requirements are met.

3.4.1 Thermal Unit Sales (Numbers)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The values of thermal unit sales are monitored by Orb at all branch offices and recorded in the SAP system maintained at head office whenever any sales of Solar Water Heating (SWH) units happens /9/.

Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	The thermal unit sales is measured on site from the Order Form (OF)/10/ generated and checked from the invoice /11/ raised against the booked OF and can also be verified from the installation report generated for all units /12/. The details of the OF, invoice and installation report (IR) with their unique serial numbers are recorded in SAP System to monitor the number of thermal unit sold /13/. The measurement and reporting frequency was found in-line to the requirement of registered PDD and applied methodologies /1,7,9/.
Monitoring equipment	There is no specific equipment installed for the monitoring of the parameters because the monitoring of the parameter is done through the sales records as maintained in SAP system.
Is accuracy of the monitoring equipment same as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	No monitoring equipment is applicable, however, for recording and archiving SAP system is used /9/.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	NA
Calibration frequency /interval:	No monitoring parameters are involved therefore calibration frequency is not applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	No monitoring parameters are involved therefore calibration is not applicable
Is the calibration of measuring equipment carried out by an accredited person or institution?	No monitoring parameters are involved therefore calibration is not applicable
Is(are) calibration(s) valid for the whole reporting period?	No monitoring parameters are involved therefore calibration is not applicable
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	No monitoring parameters are involved therefore calibration is not applicable
How were the values in the monitoring report verified?	The records of sales (thermal units) are maintained in SAP Business system (8.81) which was installed on 01 st September 2011 and currently maintained by internal team /7&13/. Whenever sales happen for thermal units the Order Form (OF) is generated by the Orb representative of Branch Office (or any other

office for sales). All these OF have a unique identification number mentioned on top left corner of the document /09/. The representative at branch office fills in the form with the required information like name, address and phone number of client along with the capacity of the thermal unit to be installed at client premises, he signs it and also gets it signed from the customer. The same information, about the sale, is fed into the SAP system by the branch office which is connected to the main server at Head Office (HO)/9/. This is the first event when initial information about any sale of thermal unit is recorded in the SAP system. The hard copies of the order form are also couriered to the HO once in every week for archiving at HO /10/. The random samples of such copies were verified from the archived records at HO and were found okay. The General Manger, (Operations) assisted by Assistant Manager (Sales), is responsible for maintaining and archiving the hard copies of OF at the HO record room /7/. The procedure of maintaining and uploading the records is documented as 'Module 18 Branch SOP in details' Version 05, November, 2013 /14/.

The information uploaded in SAP is received by HO (Operations department) and General Manager, checks the completeness of the information with regards to sales made and approve (or dis-approve and ask for more information) to pass it over to account for raising the invoice. The invoice, which has also got a unique identification number, is then generated by the SAP. The invoice also refers to OF unique number along with details of customer and product /11/. The logistics department on receipt of the invoice hard copies, releases the booked thermal unit to the concerned branch. The local branch then does the installation of the unit at customer premises.

Every unit has got a name plate, with a unique Serial Number (SN) of every unit manufactured, pasted on it in the form of a sticker. The local branch, after successful installation of the unit, filled in an Installation Report (IR) which includes the date of installation, SN of the installed unit, OF Number, customer name, address, phone number, model number of device etc. /12/. The Orb branch representative also feed in the same information in the SAP system which is received by the HO in real time /7 & 13/. The customer care department (Asst. Manager, Customer Care) then checks, in the SAP, if all information (like SN of the device, name, phone number, installation date etc.) required has been filled in correctly and finally approves it. At this stage, every sale is given a unique customer identification number by the SAP System which is used for all record and archiving purpose including the after sales service/maintenance by Orb.

The hard copies of the IR are also sent to the HO for

	<p>record and archiving. The records (OF, invoice, installation report with SN sticker with warrantee card) are combined together and archived monthly in the head office by customer care department.</p> <p>The SAP was installed on 01/09/2011 and the practice followed from 28/11/2007 to the date of SAP installation is described as follows. The Orb representative at branch generates the OF with unique number (for example CKM/OF/XX wherein CKM is the code for branch and OF stand for order form) and sends a fax copy to the account department at HO. The account representative will then feed in the information into tally software and generate the invoice which refers to the OF unique number. The invoice will go to branch and logistics department which release the product to local branch. The technicians goes on site and installs the device and fill up the IR which refers to invoice number and mentioned date of installation, capacity and specs of device with few other quality parameters /12/. The IR is signed by the technician and customer and the report is couriered to HO with the all other original documents like Invoice, PO etc. On receipt of such courier, HO feed in the information into customer registered (Microsoft Access software) which includes, OF number, invoice details, customer name and address, product name and capacity and for every sale a unique customer identification number is given /15/.</p> <p>The data recorded in SAP System and Microsoft Access is extracted into a spread sheet and used for calculation of emission reduction achieved by installed and operational devices in a given time /6/. The archived records and data was verified and found satisfactory.</p>
<p>If applicable, has the reported data been cross-checked with other available data?</p>	<p>The values of sales recorded in the spread sheet used for ER calculation was verified with the SAP records and MS Access record vis-à-vis with hard copies of OF , Invoice and IR archived in the head office. The records received from different branches are segregated and placed in the order of invoice released from the head office. The records are bound together and the files are named with a unique code and placed in the dedicated room designed for record keeping. General Manager (Operations), assisted by Asst. Manager Customer Care, is responsible for correctly archiving the records /7/.</p>
<p>Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</p>	<p>The data of sales is recorded online in SAP system and information fed by the branches are checked at two places; a. before the approval of invoice by General Manager (Operations) and, b. at the final upload of information in SAP about installation by Asst Manager Customer Care. The SAP data is extracted using SQL into a spread sheet mentioning the unique codes of invoices, OF and installation records, space of technology, capacity of the technology, name and address with phone number of the client and the same sheet is used for ER</p>

	calculations /6/. Total 21,407 thermal units were sold during this monitoring period (01/01/2013 to 31/12/2014) and random sample was check for the installation records was done for hard copies archived via-a-vis the values reported in MR and SAP /9,12/.
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3.4.2 Photo Voltaic (PV) Unit Sales (number)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The values of PV unit sales are monitored by Orb at all branch offices and recorded in the SAP system maintained at head office. Whenever any sale of Solar PV unit happens, the data is recorded /9/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	The PV unit sales is measured on site from the Order Form /16/ generated and checked from the invoice /17/ raised against the booked OF and can also be verified from the installation report generated for all units /18/. The details of the OF, invoice and installation report (IR) with their unique serial numbers are recorded in SAP System to monitor the number of PV units sold /13/. The measurement and reporting frequency was found in-line to the requirement of registered PDD and applied methodologies /1,7,9/.
Monitoring equipment	There is no specific equipment installed for the monitoring of these parameters because the monitoring of the parameter is done through the sales records as maintained in SAP system.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	No monitoring equipment is applicable.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	NA
Calibration frequency /interval:	No monitoring parameters are involved therefore calibration frequency is not applicable
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	No monitoring parameters are involved therefore calibration is not applicable

<p>Is the calibration of measuring equipment carried out by an accredited person or institution?</p>	<p>No monitoring parameters are involved therefore calibration is not applicable</p>
<p>Is(are) calibration(s) valid for the whole reporting period?</p>	<p>No monitoring parameters are involved therefore calibration is not applicable</p>
<p>Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?</p>	<p>No monitoring parameters are involved therefore calibration is not applicable</p>
<p>How were the values in the monitoring report verified?</p>	<p>The records of sales (PV units) are maintained in SAP Business system (8.81) which was installed on 01/09/2011 and currently maintained by internal team /7&13/. Whenever sales happen for PV units the Order Form (OF) is generated by the Orb representative of Branch Office (or any other office for sales). All these OF has got a unique identification number mentioned on top left corner of the doc /09/. The representative at branch office filled in the form with the required information like name, address and phone number of client along with the capacity of the PV unit to be installed at client premises, he signs it and also get it signed from the customer. The same information, about the sale, is fed into the SAP system by the branch office which is connected to the main server at Head Office (HO)/9/. This is the first event when initial information about any sale of PV unit is recorded in the SAP system. The hard copies of the order form are also couriered to the HO once in every week for archiving at HO /16/. The random samples of such copies were verified from the archived records at HO and found okay. The General Manager (Operations), assisted by Assistant Manager (Sales) is responsible for maintaining and archiving the hard copies of OF at the HO record room /7/. The procedure of maintaining and uploading the records is documented as 'Module 18 Branch SOP in details' Version 05, November, 2013 /14/.</p> <p>The information uploaded in SAP is received by HO (Operations department) and General Manager, checks the completeness of the information with regards to sales made and approve (or dis-approve and ask for more information) to pass it over to account for raising the invoicing. The invoice, which has also got a unique identification number, is then generated by the SAP. The invoice also refers to OF unique number along with details of customer and product /17/. The logistics department on receipt of the invoice hard copies, releases the booked PV unit to the concerned branch. The local branch then does the installation of the unit at customer premises.</p> <p>Every unit has got a name plate, with a unique Serial Number (SN) of every unit manufactured, pasted on it in the form of a sticker. The local branch, after</p>

	<p>successful installation of the unit, filled in an Installation Report (IR) which includes the date of installation, SN of the installed unit, OF Number, customer name, address, phone number, model number of device etc /18/. The Orb branch representative also feed in the same information in the SAP system which is received by the HO in real time /7 & 13/. The customer care department (Asst. Manager Customer Care) then checks, in the SAP, if all information (like SN of the device, name, phone number, installation date etc.) required has been filled in correctly and finally approves it. At this stage, every sale is given a unique customer identification number by the SAP System which is used for all record and archiving purpose including the after sales service/maintenance by Orb.</p> <p>The hard copies of the IR are also sent to the HO for record and archiving. The records (OF, invoice, installation report with SN sticker with warrantee card) are combined together and archived monthly in the head office by customer care department.</p> <p>The SAP was installed on 01/09/2011 and the practice followed from 28/11/2007 to the date of SAP installation is described as follows. The Orb representative at branch generates the OF with unique number (for example CKM/OF/XX wherein CKM is the code for branch and OF stand for order form) and sends a fax copy to the account department at HO. The account representative will then feed in the information into tally software and generates the invoice which refers to the OF unique number. The invoice will go to branch and logistics department which release the product to local branch. The technicians goes on site and installs the device and fill up the IR which refers to invoice number and mentioned date of installation, capacity and specs of device with few other quality parameters /18/. The IR is signed by the technician and customer and the report is couriered to HO with the all other original documents like Invoice, PO etc. On receipt of such courier, HO feed in the information into customer registered (Microsoft Access software) which includes, OF number, invoice details, customer name and address, product name and capacity and for every sale a unique customer identification number is given /15/.</p> <p>The data recorded in SAP System and Microsoft Access is extracted into a spread sheet and used for calculation of emission reduction achieved by installed and operational devices in a given time /6/. The archived records and data was verified and found satisfactory.</p>
<p>If applicable, has the reported data been cross-checked with other available data?</p>	<p>The values of sales recorded in the spread sheet used for ER calculation was verified with the SAP records and MS Access record vis-à-vis with hard copies of FO, Invoice and IR archived in the head office. The records received from different branches</p>

	are segregated and placed in the order of invoice released from the head office. The records are bound together and the files are named with a unique code and placed in the dedicated room designed for record keeping. General Manager (Operations), assisted by Asst. Manager Customer Care, is responsible for correctly archiving the records /7/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>The data of sales is recorded online in SAP system and information fed by the branches are checked at two places; a. before the approval of invoice by General Manager (Operations) and, b. at the final upload of information in SAP about installation by Asst Manager (Customer Care). The SAP data is extracted using SQL into a spread sheet mentioning the unique codes of invoices, OF and installation records, space of technology, capacity of the technology, name and address with phone number of the client and the same sheet is used for ER calculations /6/.</p> <p>Total 14,645 PV units were sold during this monitoring period (01/01/2013 to 31/12/2014) and random sample check was done for hard copy records archived vis-a-vis the values reported in MR and SAP /18,13/.</p>

3.4.3 Number of units not operating (Numbers)

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The number of units (Thermal & PV) not operating is determined by conducting a sample survey. The survey was conducted by the project developer (Orb Energy Solar Project India). The survey records were verified on site and found okay /19/.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	<p>The survey is conducted biennial (once in two years) and the survey was conducted in November 2014. Considering that the registered PDD doesn't prescribe any specific frequency to conduct the survey, approach adopted of doing biennial survey by PP was accepted, with reference to the CDM requirements, by assessment team /20/.</p> <p>In order to arrive at a representative sample for the total population of unit sold, the statistical analysis was carried out at 95% confidence level with 5% error margin using online statistical software and tool /21/. The response distribution was assumed to be 95% based on previous surveys results. 180 number of samples (90 each for thermal and PV) were selected as random using the online random sample selection tool /22/.</p> <p>The number of sample selected was found conservative because for the given number of units, the minimum sample size comes as 73 using standard statistical tools /21/. Also, after applying CDM applicable tool for sampling, the sample size</p>

	comes out to be 82 /20/. The sample size selected was found appropriate.
Monitoring equipment	NA
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	NA
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	NA
Calibration frequency /interval:	NA
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	NA
Is the calibration of measuring equipment carried out by an accredited person or institution?	NA
Is(are) calibration(s) valid for the whole reporting period?	NA
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	NA
How were the values in the monitoring report verified?	<p>A dedicated team of technical supervisors was led by Mr. B.R. Gururaj to conduct the filed survey for determination of the units in operation. A survey form "Monitoring Survey Questionnaire" was designed which includes the following information;</p> <ol style="list-style-type: none"> a) Sample number b) Date of survey c) Name of surveyor d) Name of user/respondent e) Address and contact number of customer f) Type of system installed (Unit) g) Model/Type/Capacity of the technology h) Date of Sale i) Date of installation j) Is the system operational k) If no, last date when system was in operation l) Signature (Surveyor & Customer) <p>In totality 12 number of surveyors were allocated the task to collect the data of units in operations in</p>

	<p>different geographical boundaries in the state of Karnataka /7,19/. The schedule of survey conducted by surveyor, as stated in monitoring report, was verified from the hard copies of 'Monitoring Survey Questionnaire' archived at HO and found consistent /19/.</p> <p>The reported % fraction of values not operating (SWH- 1.00 and SPV-0.943) were found consistent with the records.</p>
<p>If applicable, has the reported data been cross-checked with other available data?</p>	<p>The data reported in the MR for the units in operations was cross verified on site by the following efforts;</p> <ol style="list-style-type: none"> a) The assessment team randomly selected 21 numbers of units out of the units surveyed by Orb Energy, to cross verify the reported information based on 1% Acceptable Quality Level and keeping the Unacceptable Quality Level of 10% (the same size for verification using these came out between 18-21, in accordance with para 25 and 26 Sampling and surveys for CDM PAs and PoAs /20/). The surveyed household was again visited by assessment team to verify the information about units reported in operations and found consistent /7/ b) The persons who worked as surveyor (example Harish K) was interviewed by the assessment team and response was found satisfactory /7/. c) The household owner, within the survey, was also interviewed to confirm if he was surveyed by Orb team and the response received was found consistent with the reported data in MR /7/. d) The survey was organised by the branch offices. The branch representatives, responsible for survey, were interviewed to cross verify their participation as an organising person and the obtained information was found consistent. Mr. Prakash Shetty (branch office at Tumkur) was interviewed in this regard /7/
<p>Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?</p>	<p>Total 180 unit (thermal and PV) were sampled and the below results were verified;</p> <ol style="list-style-type: none"> a) 90 units of each thermal and PV were sampled b) 6 units (3 each) remains non responsive for the reasons viz. customer not available to respond, he changed the house etc. Therefore, these numbers were rejected from the final sample size as it still met the minimum requirement of 73 samples each. c) 87 units (thermal and PV each) samples has been considered complete in terms of

	<p>information collection and used for data extrapolation for CER calculation.</p> <p>d) 5 units of solar PVs were not found to be operational but all units sampled for thermal were, found to be operational.</p>
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3.5 Verification of parameters (Sustainability)

3.5.1 Quality of employment (Numbers)

Criteria/Requirements	Assessment/Observation
Type of parameter	Quality of employment is monitored for the type of job created (permanent or temporary).
Units of parameters	Total numbers of job created and if these are temporary or permanent are monitored.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	The quality of job generated is being monitored in real time basis by the HR department of the company /23/. Whenever, any person is employed by the company, the employee database which is part of SAP system is updated, by Executive of HR, for the type of job offered to him along with the date of his joining. In the current monitoring period, the maximum jobs (99) generated are for Sales, followed by Technical (58) and Operations (36). The GS passport required the parameters to be monitored on annual basis therefore the monitoring frequency which is real time is found inline with the validated frequency /24/.
How were the values in the monitoring report verified?	The quality of employment is recorded in SAP system. The information which is maintained about the employee is as follows; employee ID, name, date of joining, designation, status of his employment, location and the department of the person employed in. Total numbers of 291 people were found employed full time during the monitoring period in the SAP records /23/.
If applicable, has the reported data been cross-checked with other available data?	The employment records as verified from the SAP were also cross verified from the monthly sheet which is called 'Man Power Report'/25/. This report is sent to CEO every month and includes, but not limited to, the summary of HR data, total employment, new joined person, retraction, salary dispersed etc. The random samples of archived copies of monthly sheet available with HR were verified and found consistent with the information provided in MR. Also, in order to further verify the information, the salary slips of some of the people was also randomly checked and found consistent with SAP records archived on site /26/.
Does the data management ensure	All information regarding the employee and employment is

correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	maintained by HR department and recorded in SAP System. Executive HR maintains the data in SAP and reports to General Manager HR who is over all responsible for recording and archiving all information related to employees in SAP system. The information used in the MR is directly exported from the SAP and used for reporting after consistency check/5/.
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3.5.2 Quantity of employment (Numbers)

Criteria/Requirements	Assessment/Observation
Type of parameter	Quantity of employment is monitored for the number of job created by Orb Energy as a result of GS project
Units of parameters	Total numbers of job created
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	The quantity of job created is being monitored in real time basis by the HR department of the company /23/. Whenever, any person is employed by the company, the employee data base which is part of SAP system is updated, by Executive of HR, along with the date of his joining. The GS passport required the parameters to be monitored on annual basis therefore the monitoring frequency which is real time is found in line with the validated frequency /24/.
How were the values in the monitoring report verified?	The quantity of employment is recorded in SAP system. The information which is maintained about the employee is as follows; employee ID, name, date of joining, designation, status of his employment, location and the department of the person employed in. Total numbers of 291 new persons were found employed during the monitoring period as per the SAP records in Karnataka/23/. However, company has already expanded the services in other states and actual number of job created out-side project boundary (Karnataka) is much higher.
If applicable, has the reported data been cross-checked with other available data?	The employment records as verified from the SAP were also cross verified from the monthly sheet which is called 'Man Power Report'/25/. This report is sent to CEO every month and includes, but not limited to, the summary of HR data, total employment, new joined person, retraction, salary dispersed etc. The random samples of archived copies of monthly sheet available with HR were verified and found consistent with the information provided in MR. Also, in order to further verify the information the salary slips of some of the persons were also randomly checked and found consistent with SAP records archived on site /26/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC	All information regarding the number of employee is maintained by HR department and recorded in SAP System. Executive HR maintains the data in SAP and reports to General Manager HR who is over all responsible for recording and archiving all information related to employees in SAP system. The

processes in place?	information used in the MR is directly exported from the SAP and used for reporting after consistency check/5/.
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3.5.3 Access to affordable clean energy service (number)

Criteria/Requirements	Assessment/Observation
Type of parameter	The total number of clean energy units sold is monitored and accounted as access of affordable clean energy service to individuals/households
Units of parameters	Number of total units sold and installed
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	The total numbers of solar thermal units as well as PV units are monitored by the SAP system and data is archived following the procedure defined in section 3.4.1 and 3.4.2 above. The monitoring frequency defined in passport is annual however the values are recorded as and when sold and ongoing basis. The frequency of monitoring was found consistent with the passport /24 & 13/.
How were the values in the monitoring report verified?	The total number of thermal and solar unit installed is verified as 21407 and 14645, respectively. The verification efforts for the values are defined in section 3.4.1 & 3.4.2. Project developer has also opened 15 new branches in the current monitoring period and the total number of branch for Orb Energy is 97 /7/.
If applicable, has the reported data been cross-checked with other available data?	Please refer section 3.4.1 & 3.4.2
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Please refer section 3.4.1 & 3.4.2

3.5.4 Disposal mechanism of the used batteries

Criteria/Requirements	Assessment/Observation
Type of parameter	The parameter is used to monitor if the used batteries are recycled properly.
Units of parameters	Number of old batteries recycled
Is measuring and reporting frequency in accordance with the monitoring plan and	The registered passport requires the annual monitoring of this parameter which was found consistent with the onsite

monitoring methodology?	monitoring practices /7/.
How were the values in the monitoring report verified?	At the time of installation of the units, the clients are made aware, through the leaflet which is given to him along with the warranty card, about the monetary benefits of recycling the batteries with Orb Energy/27/. On receiving any request from client, the technician collects the old battery from client and will send it to warehouse house at head office. The batteries are then sent from warehouse to manufacturers for recycling. The manufacturers issues the credit note on receipt of the old batteries to Orb energy.
If applicable, has the reported data been cross-checked with other available data?	Total numbers of 28 batteries (of various AH capacities) were recycled in this monitoring period. The credit notes issued by batteries manufacturer was verified and found satisfactory /27/.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The parameter is not used for emission reduction calculation. The person responsible is Senior Manager- Procurements and position is currently held by Mr. B. P. Suresh who was interviewed to ensure that the procedure of recycling of batteries is followed on site.

3.5.5 Preventive maintenance service (number)

Criteria/Requirements	Assessment/Observation
Type of parameter	The preventive maintenance service done by Orb Energy for the installed units.
Units of parameters	Numbers of such services is monitored.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology?	The monitoring frequency required by passport is annual which is found consistent with the practice followed on site/7,24/.
How were the values in the monitoring report verified?	The SAP system maintains the records of service done per year. Orb energy provides three free services in first year as a business strategy and part of their sales agreement with client.
If applicable, has the reported data been cross-checked with other available data?	The branch which provides such services fill up a form (Service Visit report) and also get is signed after completion of the service from the client. All such forms are sent to HO for record and archiving. The random sample of form was verified and found satisfactory /28/
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary	General Manager-Operations is responsible for ensuring that all three services are provided to client free of cost.

QA/QC processes in place?	
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3.6 Data not monitored (ex-ante or external parameters)

3.6.1 Sunshine days in a year

What is the value applied?	300 days
How it was checked and is it correctly applied?	The values considered for calculation is taken from Ministry of New and Renewable Energy, Govt of India and found consistent and registered PDD.

3.6.2 Daily bulb usage

What is the value applied?	3.5 hours/day
How it was checked and is it correctly applied?	The value is taken from the applied methodology AMS IA paragraph 7 and registered PDD.

3.6.3 Specific heat capacity of water

What is the value applied?	4.187 kJ/ (kg °C)
How it was checked and is it correctly applied?	It is a standard value and consistent with registered PDD.

3.6.4 T (°C)

What is the value applied?	40
How it was checked and is it correctly applied?	The value is taken from registered PDD and was validated at the time of registration. The value used is originally sourced from a third party study conducted by Madurai Kamaraj University commissioned by Orb Energy /1/.

3.6.5 $NCV_{\text{fossil fuel}}$

What is the value applied?	Kerosene: 0.0438 TJ/t Diesel: 0.043 TJ/t LPG: 0.0473 TJ/t
How it was checked and is it correctly applied?	The values are taken from IPCC 2006 methodology report. (2006 IPCC Guidelines for National Greenhouse Gas Inventories)

3.6.6 $EF_{\text{fossil fuel}}$

What is the value applied?	Kerosene: 71.9 tCO ₂ /TJ Diesel: 74.1 tCO ₂ /TJ LPG: 63.1 tCO ₂ /TJ
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How it was checked and is it correctly applied?	The values are taken from IPCC 2006 methodology report.
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3.6.7 EF_{grid}

What is the value applied?	0.852 tCO ₂ e/MWh
How it was checked and is it correctly applied?	The values are taken from CIA data base.

3.6.8 Average number of bulbs per household

What is the value applied?	5
How it was checked and is it correctly applied?	The values calculated by Orb energy and validated at the time of registration in the PDD.

3.6.9 Average mass of fossil fuel for water heating

What is the value applied?	Kerosene: 0.15 kg/day LPG: 0.28 kg/day
How it was checked and is it correctly applied?	These values are based on the survey conducted and validated during registration and fixed ex-ante in the PDD for the crediting period /1/

3.6.10 Average mass of fossil fuel for lighting

What is the value applied?	Kerosene: 0.153 Kg/day LPG: 0.20 Kg/day Diesel: 0.617 Kg/day
How it was checked and is it correctly applied?	These values are based on the survey conducted and validated during registration and fixed ex-ante in the PDD for the crediting period /1/

3.6.11 Volume of water heated

What is the value applied?	50% of thermal capacity
How it was checked and is it correctly applied?	These values are based on the survey conducted and validated during registration and fixed ex-ante in the PDD for the crediting period /1/

3.7 Assessment of data and calculation of emission reductions

The baseline emission per household for lighting based on electricity is calculated as:

$$\begin{aligned}
 BE_{EL,y} &= (\text{Daily bulb usage in hours} * \text{Average number of bulbs per household} * \text{Average bulb size in W} * 365 \text{ sunshine days in a year}) * EF_{CMGrid,y} \text{ in tonne/ MWh.} \\
 &= 3.5 \text{ Hrs/day} * 5 \text{ Bulbs / House} * 0.000060 \text{ MW/Bulb} * 365 \text{ days/year} * 0.852 \text{ tCOe/MWh} \\
 &= 0.3265 \text{ tCO}_2\text{e / year / House}
 \end{aligned}$$

Baseline emission per household for lighting based on fossil fuel is calculated as:

$$\begin{aligned}
 BE_{Fossil\ fuel,y} &= \text{Average mass of fuel (Kg/day)} * NCV_{fossil\ fuel}(\text{TJ/t}) * EF_{fossil\ fuel}(\text{tCO}_2/\text{TJ}) * 365 \\
 &\text{ sunshine days in a year} \\
 \text{Similarly, } BE_{Fossil\ fuel,y} &\text{ per household is determined as under;} \\
 \text{Kerosene} &= 0.142 \text{ tCO}_2\text{e/year/house} \\
 \text{LPG} &= 0.218 \text{ tCO}_2\text{e/year/house} \\
 \text{Diesel} &= 0.610 \text{ tCO}_2\text{e/year/house}
 \end{aligned}$$

Thereafter, a weighted average emission factor is determined as 0.2872 tCO₂e/year/household that is multiplied with total SPV installed and operational fraction.

The baseline emission per house hold for thermal energy based on electricity is calculated as:

$$BE_y = \text{Average mass of water heated per day (Kg/day)} * T(\text{C}) * \text{the specific heat capacity of water (kJ per Kg per } ^\circ\text{C)} * 300 \text{ sunshine days in an year} / (\text{kJ to kWh conversion}) * EF_{CM,grid,y} \text{ in tCO}_2/\text{MWh}$$

Baseline emissions per household for thermal energy based on fossil fuels are calculated as:

$$\begin{aligned}
 BE_{Fossil\ fuel,y} &= \text{Average mass of fuel (Kg/day)} * NCV_{fossil\ fuel}(\text{TJ/t}) * EF_{fossil\ fuel}(\text{tCO}_2/\text{TJ}) \\
 &* 300 \text{ sunshine days in a year.} \\
 &= M_{water} * 40 * (4.18/3600) * 300 * ((365 - \text{annual days before installation})/365) * 0.852
 \end{aligned}$$

For the fossil fuels baseline thermal heating, the baseline emissions per household are calculated as:

$$BE_{Fossil\ fuel,y} = \text{Average mass of fuel (Kg/day)} * NCV_{fossil\ fuel}(\text{TJ/t}) * EF_{fossil\ fuel}(\text{tCO}_2/\text{TJ}) * 300 \text{ sunshine days in a year}$$

Project Emissions: 0

Leakage: 0

Emission Reductions

$$ER_y = BE_y - PE_y - LE_y$$

Where;

- ER_y: Emission Reductions in year y (tCO₂e / year)
- BE_y: Baseline Emissions in year y (tCO₂e / year)
- PE_y: Project Emissions in year y (tCO₂e / year)
- LE_y: Leakage in year y (tCO₂e/year)

$$ER = 26,516 - 0 - 0$$

$$ER = 26,516 \text{ tCO}_2\text{e}$$

Earthood confirm that appropriate method and formulae for calculating baseline emissions, project emissions and leakage have been used to calculate the emission reduction for the period from 01/01/2013 to 31/12/2014. The assumptions, emission factors and default values that were applied in the calculation have been justified and acceptable.

4. CERTIFICATION STATEMENT

Earthood Services Private Limited, contracted by Orb Energy Private Limited, has performed the independent verification of the emission reductions for the GS project activity 696 “Orb Energy Solar Project” in India for the monitoring period 01/01/2013 to 31/12/2014 as reported in the Monitoring Report Version 2.1 dated 29/12/2014. Orb Energy Private Limited is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

It is our responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity

Earthood commenced the verification on the basis of the baseline and monitoring methodology AMS IA Version 14 and AMS-IC Version 19, the monitoring plan contained in the PDD Version 8.1 dated 19/02/2013, Monitoring Report Version 2.1 dated 29/12/2014 as per the methodology described under Section 2 of this report.

Earthood's verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Earthood planned and performed the verification by obtaining evidence and other information and explanations that Earthood considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 01/01/2013 to 31/12/2014 are fairly stated in the Monitoring Report (final) Version 02.1 dated 29/12/2014. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS IA version 14 and AMS IC version 19 and the monitoring plan contained in the PDD Version 8.1 dated 19/02/2013.

Earthood Services Private Limited is able to certify that the emission reductions from the GS project activity “Orb Energy Solar Project, India” during the period 01/01/2013 to 31/12/2014 (including both days) amount to **26,516 tCO₂** for the following the vintage years;

- **01/01/2013 to 31/12/2013 = 13,120 tCO₂**
- **01/01/2014 to 31/12/ 2014 = 13,396 tCO₂**

5. REFERENCES

5.1 Referred documents and evidences

S. No.	Title of Document
1	PDD version 8.1 dated 19/02/2013
2	Validation Report version 03 dated 10/03/2013
3	Verification report for first verification period (dated 15/11/2013)
4	Monitoring Report (first submission) dated 18/11/2014
5	Monitoring Report (final submission) dated 29/12/2014
6	ER spreadsheet (final)
7	On site verification activities including physical inspection and interviews of the personnel
8	Methodologies AMS IA (V14) & AMS IC(V19)
9	SAP System installed at HO and branch offices
10	Order Form (Thermal Units) hard copies archived at the head office
11	Invoices (Thermal Units) archived at the head office
12	Installation report (Thermal Units) archived at the head office
13	SAP Business System version 8.81 installed at Orb Energy Private Limited (records and archives)
14	'Module 18 Brach SOP in details' Version 05, November, 2013 (Procedures for operation and maintenance of sales data)
15	Sales data records in Microsoft Access Software for the period from 01/01/2013 to 31/12/2014
16	Order Form (PV Units) hard copies archived at the head office
17	Invoices (PV Units) archived at the head office
18	Installation report (PV Units) archived at the head office
19	Records of survey conducted (Filled-in Forms 'Monitoring Survey Questionnaire')
20	Sampling and surveys for CDM project activities and programme of activities (Version 4.0). General guidelines for SSC CDM methodologies Version 21.0
21	http://www.raosoft.com/samplesize.html , using 95% response distribution
22	http://stattrek.com/statistics/random-number-generator.aspx (PDF copy of screen shot of random sample selected)
23	SAP System records of HR departments for the monitoring period (01/01/2013 to 31/12/2014)
24	GS passport V3.1 dated 15/01/2013
25	Man-Power Reports of Orb Energy (2013 & 2014)
26	Salary records (slips) of the employees of Orb Energy for the various months during the period starting from Jan, 2013 to Dec, 2014.
27	Credit note from Sakthi Enterprises (N.SE/CN/001 dated 16/07/2013)
28	Service Visit report records for thermal and PV units

29	Verification report for the monitoring period from 12/09/2010 to 31/12/2012
30	Monitoring report for the monitoring period from 12/09/2010 to 31/12/2012
31	GS queries asked for monitoring period from 12/09/2010 to 31/12/2012

5.2 List of person interviewed & interacted

S. No.	Name	Organisation	Issues discussed
1	Damian Miller	Orb Energy Solar Project, India	Management commitment towards GS project monitoring
2	V.V. Krishnandas	Orb Energy Solar Project, India	Project implementation and monitoring
3	B.R. Gururaj	Orb Energy Solar Project, India	Project implementation and monitoring
4	Prakash Shetty	Orb Energy Branch Head	Project implementation and monitoring
5	Santosh	Orb Energy Solar Project, India	Project implementation and monitoring
6	Mamtha	Orb Energy Solar Project, India	Record keeping and archiving
7	Rohit Lohia	Climate Secure Services	ER calculation, sampling, questionnaire etc.
8	Hanumantappa	Household owner	Project installation and maintenance
9	Gandamma	Household Owner	Project installation and maintenance
10	Kumaraswamy	Household Owner	Project installation and maintenance
11	Y. Chandershekharah	Household Owner	Project installation and maintenance
12	Umesh S	Household Owner	Project installation and maintenance
13	Rjeshekaraiah	Household Owner	Project installation and maintenance
14	Shivakumar	Household Owner	Project installation and maintenance
15	Veena Vasudevan	Household Owner	Project installation and maintenance
16	Leela Vijay Shankar	Household Owner	Project installation and maintenance
17	Badrinath K H	Household Owner	Project installation and maintenance
18	Sripiriya	Household Owner	Project installation and maintenance

19	Niranjan Murti	Household Owner	Project installation and maintenance
20	Srinivas Venkatesh Hebbae	Household Owner	Project installation and maintenance
21	Vinedra	Household Owner	Project installation and maintenance
22	Umesh S	Household Owner	Project installation and maintenance
23	Harish K	Orb Energy Solar Project, India	Project installation and maintenance
24	Prakash Shetty	Orb Energy Solar Project, India	Project installation and maintenance

6. FINDINGS (CAR/CL/FAR)

Type	Date	Reference																								
CL 01	05/12/2014	Section D2																								
Description of the non conformance																										
<p>The .xls used for calculating the emission reduction doesn't include the customer code for some of the units, for example cell C 176 to 180 & 191 (PV sales data) and C35 to 700 (most of the cells in this range for thermal sales data). How the identification of the units were ensured in absence of such unique identification numbers. This is not inline to VVS para 262 (a & b)</p>																										
Response from PP	Date	05/12/14																								
<p>At present, as per Standard Operating Procedure (SOP), unique system serial number is assigned to each installation. The sales referred to in CL 01 pertain to the initial years of sales under the project activity before installation of SAP software BITS (Sep 2011). The number of the units installed with no system serial number (customer code) as per the sales database is given below:</p> <table border="1"> <thead> <tr> <th>Year of Installation</th> <th>No. of installations (thermal)</th> <th>No. of installations (PV)</th> </tr> </thead> <tbody> <tr> <td>2007</td> <td>1</td> <td>0</td> </tr> <tr> <td>2008</td> <td>756</td> <td>396</td> </tr> <tr> <td>2009</td> <td>48</td> <td>36</td> </tr> <tr> <td>2010</td> <td>13</td> <td>45</td> </tr> <tr> <td>2011</td> <td>1</td> <td>8</td> </tr> <tr> <td>Total</td> <td>822</td> <td>485</td> </tr> <tr> <td>% Population</td> <td>3.84%</td> <td>3.31%</td> </tr> </tbody> </table>			Year of Installation	No. of installations (thermal)	No. of installations (PV)	2007	1	0	2008	756	396	2009	48	36	2010	13	45	2011	1	8	Total	822	485	% Population	3.84%	3.31%
Year of Installation	No. of installations (thermal)	No. of installations (PV)																								
2007	1	0																								
2008	756	396																								
2009	48	36																								
2010	13	45																								
2011	1	8																								
Total	822	485																								
% Population	3.84%	3.31%																								
<p>Thus, the number of such instances in the total database is very low and is not deemed material. Besides, in all the aforesaid cases, there are other sources of information available to uniquely identify the installations. As per SOP, an Order Form with a unique order number is issued for each order placed by the customer. Based on the same, an invoice with a unique invoice number is issued to the customer. The details of the Order Form (OF No.) and Invoice No (Inv No.) have been already mentioned in the sales database in the ER calculator. After the invoice is issued and the requisite pre-payment is received from customer, the technicians install the unit at the customer location. As an order may have more than one unit hence, for each unit installed under a given order, a separate mandatory installation report document filled by the installing technician and signed by the customer is generated and archived. Thus, even if there a common order form / invoice for a multiple unit order, for each unit within an order a separate installation report is available. The installation report includes all relevant information like date of installation, name and address of user, contact detail and detail of system being installed and unique system serial number. In cases where the system serial number was not available, the technicians were adequately trained to record in the installation report/warranty card other unique identification numbers of critical equipments like PV serial number, charge controller serial number in case of PV and Tank Serial number in case of SWH. For example, refer the installation report submitted for sample number 378 for SPV which clearly mentions the serial number for PV module, battery and charge controller. Similarly, refer to warranty card for sample number 326 for SWH which mentions the tank serial number.</p> <p>Also, a hardcopy record of order form, invoice, installation report and warranty card for each unit is archived at head office. The same was verified by the DoE on sampling basis during the site visit with complete audit trail.</p> <p>Besides, as part of SoP, each installed unit is provided with 3 free preventive maintenance services in the first year. A service visit report document is generated for each maintenance visit to a given household bearing the signature of the customer as well as the servicing technician. The date of visit is uploaded on the BITS which is reviewed by senior management. Also, one hard-copy of each service visit is archived in the head office. Again, these were checked by the DoE during the site visit on a sampling basis. The fact that three maintenance visits are carried out after installation of each unit itself substantiates that there has never been any issue with uniquely identifying a unit even in rare cases when the system serial numbers were not there. Thus, the aforesaid system ensures that each of the installed unit is uniquely identified.</p>																										
Assessment team opinion	Date	10/12/2014																								
<p>The information about customer ID was mainly spotted before the installation of SAP on 01/11/2011, and has happened because of manual entries in the system. However, there are other ways and means available to verify the information that the device was sold and in operation at the customer premises like invoice and installation records. Assessment team has verified the information of unit</p>																										

sold and in operation for most of the missing cells and in opinion that units are in operation. Also, the current monitoring system installed (SAP) was found robust and with minimum chances or such errors in future therefore the raised CL has been closed.

Type	Date	Reference	
CL 02	05/12/2014	Section D2	
Description of the non conformance			
<p>Few inconsistencies were spotted between survey reports and plant records (SAP) for the date of installation for example; SN number 15259 & 17556 for thermal units and 378 for PV units.</p> <p>The inconsistencies observed between the survey report and MR spread sheet for the status of devices for SN 6616 (survey report reads non response whereas .xls report it as not operational) & SN1102 (Survey report reads not operational whereas xls reads no response).</p> <p>This is not inline to VVS para 262 (a & b)</p>			
Response from PP	Date	05/12/14	
The following details the inconsistencies identified and corrective action taken towards the same.			
Sample Number	Description	Corrective action	Reference
15259 (SWH)	Installation date is mentioned as 09 May 2012 in installation report but the worksheet 'Operational status (Thermal)' mentions 19 May 2012	The same has been corrected in the revised ER calculator being submitted	Orb Energy VER Workbook MP#2 v2.0 05122014
17556 (SWH)	Installation date is mentioned as 20 Oct 2012 in installation report but the worksheet 'Operational status (Thermal)' mentions 21 Oct 2012		
378 (PV)	Installation date is mentioned as 28 Apr 2008 in installation report but the worksheet 'Operational status (PV)' mentions 29 Apr 2008		
1102 (PV)	The survey form mentions the unit as 'Not Operational' whereas the worksheet 'Operational status PV' mentions as 'Non Response'		
6616 (PV)	The survey form mentions the unit as 'Non Response' whereas the worksheet 'Operational status PV' mentions as 'Not Operational'		
Assessment team opinion	Date	10/12/2014	
The identified inconsistencies were corrected in the revised MR version 02 and therefore the CL is closed.			

Type	Date	Reference
CL03	05/12/2014	Section D2
Description of the non conformance		
The schedule of survey including dates the information was collected has not been included in the monitoring report. This is not inline to VVS para 262 (a)		
Response from PP	Date	05/12/14
The Schedule of the survey including dates has been included in the revised monitoring report being submitted. Kindly refer 'Orb Energy VER MR MP#2 v2.0 05122014'		
Assessment team opinion	Date	10 /12 /2014
The schedule has been included in the revised MR version 02. CL is closed.		

7. CV OF VERIFICATION TEAM

Competence Statement			
Name	Dr. Kaviraj Singh		
Country	India		
Education	Masters (Environment) Masters (Energy & Environment) Doctorate (Environmental Engg.)		
Experience	7+ Years in CDM at different roles. Completed more than 100 CDM projects as auditor & 4 GS projects		
Field	Climate Change, Environment, Energy, Waste Management		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
TA Expert (13.1)	YES		
Reviewed by	Abhishek Mahawar	Date	06/04/2014
Approved by	Ashok K Gautam	Date	06/04/2014

Competence Statement			
Name	Ashok Gautam		
Country	India		
Education	M. Sc. (Environmental Sciences) M. Tech. (Energy & Environmental Management)		
Experience	14 Years overall 6+ yrs in CDM and completed more than 200 projects Worked on 4 GS projects		
Field	Energy, Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.1)	YES		
TA Expert (3.1)	YES		
TA Expert (13.1)	YES		
Reviewed by	Abhishek Mahawar	Date	06/04/2014
Approved by	Kaviraj Singh	Date	06/04/2014

Competence Statement			
Name	Shreya Garg		
Country	India		
Education	M. Sc. (Climate Science and Policy)		
Experience	3+ Years Completed more than 15 CDM projects and 2 GS projects		
Field	Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	YES		
TA Expert (1.2)	YES		
Reviewed by	Ashok Gautam	Date	14/11/2014
Approved by	Kaviraj Singh	Date	14/11/2014

Competence Statement			
Name	Pankaj Mohan		
Country	India		
Education	BE (Electronics and Telecommunication) M.B.A (Specialization in project management) Qualified Energy Auditor (BEE, Govt. of India)		
Experience	18 Years Completed more than 100 CDM projects and 4 GS projects		
Field	Energy Audit and Conservation Climate Change & Environment		
Approved Roles			
Team Leader	YES		
Validator	YES		
Verifier	YES		
Financial Expert	NO		
Technical Reviewer	NO		
TA Expert (1.1, 1.2, 3.1 & 13.1)	YES		
Reviewed by	Ashok Gautam	Date	18/09/2014
Approved by	Kaviraj Singh	Date	19/09/2014

History of the document						
Version	Date	Nature of Revision	Prepared by		Reviewed by	
			Name	Date	Name	Date
1.0	24/11/2014	Initial adoption	Abhishek Mahawar	23/11/2014	Ashok K Gautam	23/11/2014