# BUNDLED SOLAR POWER PROJECT BY MAHINDRA SUSTEN PRIVATE LIMITED

Document Prepared By: 4K Earth Science Private Limited

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## Summary:

4K Earth Science Private Limited (4KES) has performed the verification of the project "Bundled Solar Power Project by Mahindra Susten Private Limited" VCS ID 1767, against VCS Standard Version 4. The project involves installation of various solar power projects with total installed capacity of 205 MW implemented in different states of India. The project is developed by SPVs of 'Mahindra Susten Private Limited'. The electricity generated by the project activity displaces the grid electricity and there by avoid associated CO2 emission.

The scope of verification includes confirming the implementation of the monitoring plan of the approved VCS PD (version 02) dated 22/06/2018 and the application of the monitoring methodology "ACM0002 version 18: "Grid-connected electricity generation from renewable sources".

The monitoring period covered in the verification is 24-May-2018 to 23-December-2019 (including both days)

The verification is consisted of three phases: i) desk review of the project; ii) follow-up onsite visit and/or interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted following 4KES internal quality procedures.

During the verification process 05 CARs, 01 CL and 00 FARs were raised. All the findings have been closed satisfactorily and the same has been discussed in Appendix II.

4KES confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. The emission reductions from the project activity "Bundled Solar Power Project by Mahindra Susten Private Limited" in India during the period 24-May-2018 to 23-December-2019 (including both days) amount to 611,586 tonnes of $CO_2e$.

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# 1 INTRODUCTION

## 1.1 Objective

EKI Energy Services Limited has contracted 4K Earth Science Pvt. Ltd (4KES) to perform VCS Verification of the 'Bundled Solar Power Project by Mahindra Susten Private Limited' in India (hereafter called project). This project has already been registered as a VCS project (VCS ID 1767). The objective of this verification is a thorough and independent assessment of registered project activities against the applicable VCS requirement by the DOE. The verification process shall determine whether the proposed project activity complies with the requirements of latest VCS guidelines, applicability conditions of the selected methodology, relevant host country regulations and guidance issued by the VCS Board.

## 1.2 Scope and Criteria

The scope of verification is to assess the claims and assumptions made in the VCS monitoring report (MR) against the VCS criteria, including but not limited to, VCS standard, applied methodology and other relevant rules and requirements established for VCS project activities.

The Verification is not meant to provide any consulting towards the project participants. However, stated requests for clarification and/or correction actions request may have provided inputs for improvement of the project design

## 1.3 Level of Assurance

The verification team verified the complete monitoring data for all the parameters of the monitoring plan and confirms that the reported emission reductions are free from any type of material errors. Therefore, 4KES confirms that the verification is conducted with reasonable level of assurance

## 1.4 Summary Description of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy sources. The project activity aims to harness solar energy through installation of solar power projects with total installed capacity of bundled project is 205 MW installed in different states of India through SPVs of Mahindra Susten Private Limited. All the projects are already commissioned. The capacity, promoter and location of each projects are given below:

| Name of SPVs | Capacity in MW | | COD | Connection with Grid | State |
|---|---|---|---|---|---|
| | AC | DC | | | |
| Cleansolar Renewable Energy Private Limited | 30 MW | 36.6 MW | 29/06/2016 | Indian Grid | Telangana |
| Divine Solren Private Limited | 50 MW | 59.8 MW | 22/07/2017 | Indian Grid | Telangana |
| Astra Solren Private Limited | 40 MW | 52 MW | 31/03/2017 | Indian Grid | Gujarat |
| | 25 MW | 32.49 MW | 23/05/2017 | Indian Grid | Gujarat |
| Mahindra Susten Private Limited | 60 MW | 78.01 MW | 31/03/2017 | Indian Grid | Rajasthan |

As per MR, the electricity generated from the project is sold to respective state DISCOM which is confirmed form approved VCS PD/4/ and interview with PP.

The commissioning dates of the projects are verified against the approved VCS PD/4/ and commissioning certificates/7/.

Location of the project was verified through Google Map (https://maps.google.com/maps) and found consistent with the data provided in the registered PD/4/

The Project activity is a new facility (Greenfield) and the electricity delivered by the project activity is exported to the Indian electricity grid. The project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.

As per registered PDD, the project activity results in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 329,360 $tCO_2e$ per year, thereon displacing 341,202 MWh/year amount of electricity from the gird.

During the monitoring period from 24-May-2018 to 23-December-2019 (including both days), the project replaced 611,586 tonnes of $CO_2e$ by displacing the 633,629.62 MWh electricity.

# 2 VERIFICATION PROCESS

The registered VCS project is undergoing 2nd verification under VCS (1stCrediting period), the approach adopted to ensure the quality of emission reductions is described in the following sections.

## 2.1 Method and Criteria

4KES assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the criteria and relevant guidance provided by the VCS Board. The validation/verification process consist of the following three phases;

- A desk review of the VCS PD and VCS MR
- Site visit and/or follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion.

The prepared verification report and other supporting documents then undergo an internal quality control before being submitted to the VCS executive board for issuance of credits as per VCS standard version 4.

## 2.2 Document Review

The verification is performed primarily as a document review of the approved VCS PD, previous MR and Verification report and associated documents as stated in detail in appendix 1 of this document. The assessment is performed by a verification team using a protocol. The cross checks between information provided in the Monitoring report, VCS PD and information from sources other than those used, if available, the team's sectoral or local expertise and, if necessary, independent background investigations

## 2.3 Interviews

Due nationwide lockdown due to COVID-19 spread, the site visit was not conducted. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the verification team performed the telephonic interview with the site person and reviewed documents to achieve a reasonable level of assurance in the verification. This is in line with Section 4.1.2 of the VCS Standard, v4.0 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications.

No sampling procedures were adopted in document verification and all the document were cross checked to ensure conservative estimation of emission reduction. Kindly find below names of the persons interviewed (telephonic interview).

| Sr. No | Name of the person | Role/Designation |
|---|---|---|
| 1 | Mr. Damodar Singh | O&M In-charge |
| 2 | Mr. Mandeep | Site In-charge |
| 3 | Mr. Baldev Singh | Safety officer |
| 4 | Mr. Kingshuk Das | Project Manager, EKI Energy Services Limited |

## 2.4 Site Inspections

Due nationwide lockdown due to COVID-19 spread, the site visit was not conducted. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the verification team performed the video conference and telephonic interview with the PP, Consultant and the site person and reviewed documents to achieve a reasonable level of assurance in the verification. This is in line with Section 4.1.2 of the VCS Standard, v4.0 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications

## 2.5 Resolution 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 non-conformities, which may be of following types;

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

- 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;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

- 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 CDM requirements have been met. All CARs and CLs raised by the 4KES 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.

During the Verification process, total 05 CAR and 01 CL were raised and resolved satisfactorily. No FAR has been raised in the verification. The list of CARs/CLs/FARs raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix II of this report.

### 2.5.1 Forward Action Requests

The project activity is undergoing second verification of 1st crediting period under VCS; there were no FARs raised during the validation or previous verification.

## 2.6 Eligibility for Validation Activities

The Validation and verification body holds accreditation to carry out both validation and verification activities. The accreditation scope can be checked from the below link:

http://cdm.unfccc.int/DOE/list/DOE.html?entityCode=E-0069

# 3 VALIDATION FINDINGS

## 3.1 Participation under Other GHG Programs

The project activity is registered under the VCS only (VCS Project ID 1767) and is not registered under any other emissions trading program or any other mechanism that includes GHG allowance trading. PP also confirms that net GHG emission reductions or removals generated during this monitoring period shall not be used for compliance under any such programs or mechanisms. This was confirmed through a declaration/16/ submitted by the PP and hence accepted by the assessment team.

## 3.2 Methodology Deviations

There is no methodology deviation applied during the current monitoring period.

## 3.3 Project Description Deviations

There is no project description deviation applied during the current monitoring period.

## 3.4 Grouped Project

Not applicable. The project activity is not a grouped project.

# 4 VERIFICATION FINDINGS

## 4.1 Project Implementation Status

The bundled project activity involves installation of 205 MW solar power projects installed in different states and promoted by SPVs of 'Mahindra Susten Private Limited'. The purpose of the project activity is to generate clean electricity with utilization of solar energy. The commissioning date and location of the each project activity is given below:

| Name of SPVs | Capacity in MW | | COD | Location | Geo coordinates |
|---|---|---|---|---|---|
| | AC | DC | | | |
| Cleansolar Renewable Energy Private Limited | 30 MW | 36.6 MW | 29/06/2016 | Gingurthi Village, Tandur Tesil Vikarabad District | 17° 21' 36.0" N<br>77° 31' 48.0" E |

| | | | | | |
|---|---|---|---|---|---|
| | | | | Telangana State | |
| Divine Solren Private Limited | 50 MW | 59.8 MW | 22/07/2017 | Mallapur & Mujgi Village, Nirmal & Dilawarpur Thesil, Nirmal District, Telangana State | 19° 02' 24.0" N 78° 16' 48.0" E |
| Astra Solren Private Limited | 40 MW | 52 MW | 31/03/2017 | Charanka Village, Santalpur Thesil, Patan District, Gujarat State | 23° 54' 00.0" N 71° 12' 00.0" E |
| | 25 MW | 32.49 MW | 23/05/2017 | | |
| Mahindra Susten Private Limited | 60 MW | 78.01 MW | 31/03/2017 | Goyalri / Gajner Village, Kolayat Thesil, Bikaner District, Rajasthan State | 27° 54' 00.0" N 73° 00' 00.0" E |

Starting date of the operation of the project activity is 29-June-2016 which is the date of commissioning/commercial operation of the 1st solar project and since then it is in continuous operation.

The technical specifications of the projects are given below:

**30 MW project by Cleansolar Renewable Energy Private Limited**

| **Sl. No.** | **Technical details of the equipment** | **Description** |
|---|---|---|
| 1 | Technology Used | Multi-crystalline and Thin Film |
| 2 | Make of modules installed | Trina Solar and Solar Frontier |
| 3 | Model of the modules installed | Trina Solar TSM-310PC14; Solar Frontier SF170-S |
| 4 | Make & Model of Invertor | SMA - Sunny Central 2200 |
| 5 | Number of Inverters | 14 |
| 6 | Make & Number of Transformers | Power transformer- 1, make-CGL ; Inverter duty transformers-14, make-Danish |

**50 MW project by Divine Solren Private Limited:**

| Sl. No. | Technical details of the equipment | Description |
|---|---|---|

| | | |
|---|---|---|
| 1 | Technology Used | Multi-crystalline |
| 2 | Make of modules installed | Hanwha Solar |
| 3 | Model of the modules installed | Hanwa Solar HSL 72 P6-PC-1-315/320 |
| 4 | Make & Model of Invertor | SMA - Sunny Central 1000CP-XT |
| 5 | Number of Inverters | 46 |
| 6 | Make & Number of Transformers | Power transformer- 2, make-CGL ; Inverter duty transformers-12, make-Danish |

**40 MW project by Astra Solren Private Limited:**

| Sl. No. | Technical details of the equipment | Description |
|---|---|---|
| 1 | Technology Used | Multi-crystalline and Thin Film |
| 2 | Make of modules installed | Canadian Solar and First Solar |
| 3 | Model of the modules installed | Canadian Solar 320 P Mix, First Solar FS 4117A-3 |
| 4 | Make & Model of Inverter | SMA - Sunny Central 1000CP-XT, GE Power – LV5 1000kW |
| 5 | Number of Inverters | 40 |
| 6 | Make & Number of Transformers | Power transformer- 2, make-CGL ; Inverter duty transformers-11, make-Danish |

**25 MW project by Astra Solren Private Limited:**

| Sl. No. | Technical details of the equipment | Description |
|---|---|---|
| 1 | Technology Used | Multi-crystalline |
| 2 | Make of modules installed | Hanwha Solar |
| 3 | Model of the modules installed | Hanwa Solar HSL 72 P6-PC-1-320 |
| 4 | Make & Model of Inverter | SMA - Sunny Central 1000CP-XT |
| 5 | Number of Inverters | 25 |
| 6 | Make & Number of Transformers | Power transformer- 1, make-CGL ; Inverter |

| | | |
|---|---|---|
| | | duty transformers-7, make-Danish |

60 MW project by Mahindra Susten Private Limited

| Sl. No. | Technical details of the equipment | Description |
|---|---|---|
| 1 | Technology Used | Multi-crystalline and Thin Film |
| 2 | Make of modules installed | Canadian Solar and First Solar |
| 3 | Model of the modules installed | Canadian Solar 320 P Mix, First Solar FS 4117A-3 |
| 4 | Make & Model of Inverter | SMA - Sunny Central 1000CP-XT, GE Power – LV5 1000kW |
| 5 | Number of Inverters | 60 |
| 6 | Make & Number of Transformers | Power transformer- 1, make-BharatBijlee ; Inverter duty transformers-18, make-Danish |

The installation and specification of solar power plants has been checked with Plant Technical Specification/6/ and commissioning certificates/7/. The commissioning has also been duly validated in the VCS validation report of the project activity/04/. There was no major breakdown or shutdowns during the monitoring period which might affect the applicability of methodology or might cause material errors in emission reductions.

Assessment team concludes the following:

a) There is no material discrepancies between project implementation and the project description provided in the registered PD/04/.
b) The monitoring plan is implemented completely and monitoring system (i.e., process and schedule for obtaining, recording, compiling and analysing the monitored data and parameters) is appropriate.
c) There is no material discrepancies between the actual monitoring system, and the monitoring plan set out in the project description and the applied methodology/08/.
d) The GHG emission reductions or removals generated by the project have not included in an emissions trading program or any other mechanism that includes GHG allowance trading/16/.
e) The project has not received or sought any other form of environmental credit, or has become eligible to do so since validation or previous verification.
f) The project is registered under VCS only.

g) The project activity is comply with indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India as discussed under section 1.11 of MR.

In view of the information's as verified above the assessment team is able to conclude that the project has been implemented as described in the project description.

## 4.2 Safeguards

### 4.2.1 No Net Harm

The project is a solar power project which is a cleaner source of power generation. The solar power project does not emit any GHG or any other toxic gases. Hence, solar project has no significant impact on the environment. As per the EIA notification dated 14thSeptember 2006, the solar power projects are exempted from environmental clearance. Hence, Environmental impact assessment is not required for this project activity.

The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013 also confirms that solar power project activity operations do not result in direct air pollution, noise pollution. Hence verification team confirms that there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

### 4.2.2 Local Stakeholder Consultation

As per the section 2.2 of the MR, the projects have continuous feedback mechanism and kept a grievance register to receive any feedback/grievances from stakeholder. Verification team conducted telephonic interview with site in-charge and found that the continuous feedback mechanism is implemented effectively.

As verified from the copy of grievances registers from each site/19/ no grievances/feedback received on the operation of the project activity. Verification team also discussed with the site in-charge and confirmed that no grievances/feedback received from any stakeholder during the monitoring period.

## 4.3 AFOLU-Specific Safeguards

Not Applicable.

## 4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the MR. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the monitoring plan of the VCS PD and MR.

In detail the following has been verified:

Transparency: It has been checked whether the calculation of baseline emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae.

Parameter consistency: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet.

Correctness: It has been checked whether the applied formulae and methods for calculating baseline emissions are in accordance with the monitoring plan and the approved methodology.

Completeness: It has been checked whether all calculations are complete and without omissions

Baseline emission: The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. The grid in this case would be the 'Indian Grid'

Formula Used:-

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

$BE_y$: Baseline emissions in year y ($tCO_2e/yr$)

$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y (MWh/yr)

$EF_{grid,CM,y}$: Combined margin $CO_2$ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" ($tCO_2e/MWh$)).

The verification team has checked the entire monthly JMR reports and invoices applicable for the monitoring period as per the project activity applied for verifications and found all the parameters are monitored and recorded as per the monitoring plan in the approved PD. The verification team has crosschecked the emission reduction sheet and monitoring report data with the JMR sheet and invoice bills and found all the values are matching.

Project Emission: As per the applied methodology, para 37 of ACM0002 version 18, "For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected". Since the project is a solar power project, $PE_y = 0$.

Leakage: As per methodology and registered PDD the leakage is zero. $LE_y = 0$.

Emission Reduction:

Emission reduction is calculated as below:

$ER_y = BE_y - PE_y - LE_y$

PP has submitted emission reduction the calculation in the excel sheet/2/. The emission reduction calculation in the excel sheet is checked whether the calculation is in accordance with the formula given in the approved PD/4/ and the selected methodologies/8/.

The verification team confirms the following:

- The calculations of emission reduction have been carried out in accordance with the equations and methods described in the registered monitoring plan and applied methodology.
- The emission factor applied is an ex-ante value valid for the fixed crediting period.
- Any assumptions used in emission or removal calculations have been justified.
- Appropriate emission factor and other reference values have been correctly applied. It can be confirmed that the emission reduction calculation is overall correct.
- The ER calculation sheet provided is clear, transparent and the calculations provided in the sheet are reproducible.
- Hence, the emission reduction reported in the monitoring report for the monitoring period is verified to be correct

## 4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The only monitoring parameter in the project activity is "Quantity of net electricity generation supplied by the project (Solar) plant/unit to the grid in year y" (**$EG_{PJ, y}$**). This parameter is monitored through energy meters installed in the respective site. The energy meters at the pooling substation records both export and import electricity and monthly reading is recorded by personal from respective state DISCOM. The net electricity export **$EG_{PJ, y}$** is estimated from the difference of export & import (ie, $EG_{PJ, y}$ = Export – Import). The monthly export, import and net export are recorded in the Joint meter reading (JMR) report which is signed by respective DISCOM and PP representative. The appropriateness of reading is assessed as below:

| Criteria/Requirements | Assessment/Observation |
|---|---|
| Measuring /Reading /Recording frequency | The electricity exported to the grid is measured through energy meters at site location on continuous basis and reported monthly. |
| Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No) | Yes. The reporting frequency is in line with the monitoring plan as outlined in the approved PD/04/ and monitoring methodology/8/. |
| Monitoring equipment | Energy meters (main & Check) installed at pooling substation. |
| 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? | All the energy meters are two-way tri-vector meters of accuracy class 0.2s.<br><br>Accuracy of the monitoring equipment's is in accordance with the monitoring plan as outlined in the PD. |
| Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges? | Yes the accuracy valid for the entire measuring range. |
| Calibration frequency /interval: | 5 year |
| 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? | There was no delay in meter calibration. |
| Is the calibration of measuring equipment carried out by an accredited person or institution? | Calibration of the measuring equipment's is carried out by an accredited entity. |
| Is(are) calibration(s) valid for the whole reporting period? | There was no delay in meter calibration and hence the calibration is valid for whole reporting period. |
| Is the calibration carried out for a measuring | Yes, calibration carried out for a measuring |

| | |
|---|---|
| range comparable with the range for which measurements have been carried out? | range comparable with the range for which measurements have been carried. |
| How were the values in the monitoring report verified? | Reported values of this parameter have been verified with monthly joint metering report/12/. Value of this parameter for the current monitoring period is verified as 633,629.62 MWh.<br><br>Furthermore monthly values of this parameter is reported in the ER calculation sheet/02/ are also verified with the MR/01/ and found to be consistent. |
| If applicable, has the reported data been cross-checked with other available data? | The monthly reported values of this parameter were further cross checked with the monthly invoices raised by the PP /13/ and found to be consistent. |
| Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place? | Yes, the adequate QA/QC procedures were implemented by all the stakeholders, namely, the Grid Authority, the PP and the O&M Contractor. The data transfer process for the said parameter is as follows:<br><br>Joint monthly meter reading is taken at the pooling substation meters & GSS substation by representative of DISCOM and O&M team/service provider (on behalf of the project proponent). It must be noted here that the meter readings as mentioned above shall be calculated as the product of meter multiplication factor and the difference of the current and previous meter readings |
| In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard? | No such issues. |

**Parameter fixed ex-ante:**

$EF_{grid,OM,y}$; $tCO_{2e}$/MWh: it is the operating margin emission factor of Indian grid fixed at the time of project registration and mentioned value of 0.9843 $tCO_{2e}$/MWh is consistent with the PD/04/.

$EF_{grid,BM,y}$; $tCO_{2e}$/MWh: it is the build margin emission factor of Indian grid fixed at the time of project registration and mentioned value of 0.9083 $tCO_{2e}$/MWh is consistent with the PD/04/.

$EF_{grid,CM,y}$; $tCO_{2e}$/MWh: it is the combined margin emission factor Indian grid fixed at the time of project registration and mentioned value of 0.9653 $tCO_{2e}$/MWh is consistent with the PD/04/.

**Calibration of meters:**

During the verification assessment of the project activity, accuracy of all the metering have been checked and found appropriate. As per the approved PD, the calibration frequency of energy meter is 5 years. Details of meter calibration are provided in below table:

| Particular | Meter Serial No. | Accuracy Class | Calibration Date | Validity Till |
|---|---|---|---|---|
| **30 MW solar project by Cleansolar Renewable Energy Private Limited** | | | | |
| **Main Meter** | APX00619 | 0.2 s | 28-May-2016 | 27-May-2021 |
| **Check Meter** | APX00620 | 0.2 s | 28-May-2016 | 27-May-2021 |
| **50 MW solar project by Divine Solren Private Limited** | | | | |
| **Main Meter** | APZ00292 | 0.2 s | 01-June-2017 | 31-May-2022 |
| **Check Meter** | APZ00293 | 0.2 s | 01-June-2017 | 31-May-2022 |
| **Standby Meter** | APZ00294 | 0.2 s | 01-June-2017 | 31-May-2022 |
| **40 MW solar project by Astra Solren Private Limited** | | | | |
| **Meter 1** | GJ 3830 A | 0.2 s | 24-March-2017 | 23-March-2022 |
| **Meter 2** | GJ 3831 A | 0.2 s | 24-March-2017 | 23-March-2022 |
| **Meter 3** | GJ 3832 A | 0.2 s | 24-March-2017 | 23-March-2022 |
| **Meter 4** | GJ 3833 A | 0.2 s | 24-March-2017 | 23-March-2022 |
| **25 MW solar project by Astra Solren Private Limited** | | | | |
| **Main Meter** | Y0319340 | 0.2 s | 24-March-2017 | 23-March-2022 |
| **Check Meter** | Y0319341 | 0.2 s | 24-March-2017 | 23-March-2022 |
| **60 MW solar project by Mahindra Susten Private Limited** | | | | |

| | | | | |
|---|---|---|---|---|
| **Main Meter** | 15624818 | 0.2 s | 21 to 23-December-2016 | 22-December-2021 |
| **Check Meter** | 15624819 | 0.2 s | 21 to 23-December-2016 | 22-December-2021 |

The energy meter calibration certificates/14/ are checked and found that the calibration details provided in the MR is correct. Verification team also confirms that the energy meters are calibrated as per the frequency mentioned in the PD and during the monitoring period calibration all the energy meters are valid.

The assessment team has verified the monthly joint meter reading report issued by respective state utility and confirmed that only the data recorded through main meters is used to calculate net electricity supplied to the grid by the projects belongs to particular developer and consequently for ER calculations. As verified through the calibration certificates, that meters were working satisfactorily during the current monitoring period.

In view of the above discussion the assessment team able to confirm that evidence used to determine the GHG reductions and removals are sufficient and appropriate with respect to quality and quantity.

**GHG Calculations**

The emission reduction as per the applied methodology equals the baseline emissions (project emissions and leakage emissions for such project activities is considered zero). The formula provided for the calculation of baseline emissions is:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

$$BE_y = EG_{facility,y} * EF_y$$

Since project emission and leakage are zero, baseline emission is equal to emission reduction.

$$ER_y = BE_y$$

The emission reduction is estimated for each month in ER calculation sheet, and the summary of emission reduction is as below:

| Project | Year 2018- Emission Reduction (tCO2e)* | Year 2019- Emission Reduction (tCO2e)* | Total Emission Reduction (tCO2e) |
|---|---|---|---|
| Cleansolar Renewable Energy Private Limited (CREPL) | 30,328 | 48,856 | 79,184 |
| Divine Solren Private Limited (DSPL) | 51,870 | 87,840 | 13,9710 |
| Astra Solren Private Limited (ASPL) 40 MW | 45,509 | 81,604 | 127,113 |

| | | | |
|---|---|---|---|
| Astra Solren Private Limited (ASPL) 25 MW | 28,493 | 50,818 | 79,311 |
| Mahindra Susten Private Limited (MSPL) | 62,993 | 123,275 | 186,268 |
| **Total** | **219,193** | **392,393** | **611,586** |

The verification team confirms that appropriate methods and formulae for calculating baseline emissions have been followed. The assumptions, emission factors and default values that were applied in the calculations are justified. All the data were made available and have monitored as per required monitoring frequency. The means of verification for the values of parameters, used for baseline emission calculation, is described above.

However, verification team has observed that the actual ER achieved during the current monitoring period is 17% higher than the estimated ER as per registered PD for the comparable period. This comparison is submitted in the ER sheet along with a justification confirming that this event of higher power generation was an unforeseen situation and also not under the direct control of PP. The verification team has reviewed and verified the facts and supporting provided by PP and able to conclude that justification is valid and such condition is an unforeseen event which is not a regular affair in the project activity, moreover PP does not have any direct control on it. However, PP has re-estimated the equity IRR with the actual PLF achieved (estimated from actual energy generation achieved in this monitoring period) for all the projects to check the impact of the additionality and the results are below:

| Name of the SPVs | Actual PLF obtained during the current monitoring period | Equity IRR as per registered VCS PD | Equity IRR based on actual PLF | Benchmark |
|---|---|---|---|---|
| Cleansolar Renewable Energy Private Limited | 20% | 9.87% | 12.2% | 15.17% |
| Divine Solren Private Limited | 21% | 8.37% | 12.38% | 15.17% |
| Astra Solren Private Limited | 24% | 4.34% | 11.62% | 15.39% |
| | 24% | 4.34% | 11.62% | 15.39% |
| Mahindra Susten Private Limited | 23% | 4.48% | 10.58% | 15.39% |

From the above assessment, it is clear that the even with the actual generation, the equity IRR is lesser than the selected benchmark in the PDD. Hence, the increase in generation does not affect the additionality of the project.

## 4.6 Non-Permanence Risk Analysis

Not applicable.

# 5 VERIFICATION CONCLUSION

4K Earth Science Pvt. Ltd (4KES), contracted by EKI Energy Services Limited, has performed the independent verification of the emission reductions for the VCS project activity (VCS ID-1767) "Bundled Solar Power Project by Mahindra Susten Private Limited" in India for the monitoring period 24-May-2018 to 23-December-2019 as reported in the Monitoring Report Version 02 dated 31/03/2020. The EKI Energy Services Limited and the respective project proponent are 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

4KES commenced the verification on the basis of the baseline and monitoring methodology ACM0002 version 18, the monitoring plan contained in the registered PD Version 02 dated 22/06/2018 and VCS guidelines version 4, Monitoring Report Version 02 dated 31/03/2020 as per the process described under Section 2 of this report.

4KES 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. 4KES planned and performed the verification by obtaining evidence and other information and explanations that 4KES considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

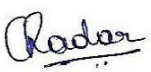
In our opinion the GHG emissions reductions reported for the project activity for the period 24-May-2018 to 23-December-2019 are fairly stated in the Monitoring Report Version 02 dated 31/03/2020. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002 version 18, and the VCS standard.

Verification period: From 24-May-2018 to 23-December-2019

Verified GHG emission reductions and removals in the above verification period:

| Year | Baseline emissions or removals ($tCO_2e$) | Project emissions or removals ($tCO_2e$) | Leakage emissions ($tCO_2e$) | Net GHG emission reductions or removals ($tCO_2e$) |
|---|---|---|---|---|
| 2018 | 219,193 | 0 | 0 | 219,193 |
| 2019 | 392,393 | 0 | 0 | 392,393 |
| **Total** | **611,586** | **0** | **0** | **611,586** |

**Approved by**
Chandrakala R.
Director



4K Earth Science Private Limited

Date: 02-May-2020

Place: Bangalore, India

# APPENDIX I: LIST OF DOCUMENTS

| Ref. No | Title of Document | Version | Date |
|---|---|---|---|
| 1 | Monitoring Report | 1.0 | 14/03/2020 |
| | | 2.0 | 31/03/2020 |
| 2 | Emission Reductions Calculation Spread sheet | 1.0 | 14/03/2020 |
| | | 2.0 | 31/03/2020 |
| 3 | VCS Project page: https://registry.verra.org/app/projectDetail/VCS/1767 | - | - |
| 4 | Project Description (combined PD & MR) | 2 | 22/06/2018 |
| | Validation Report (combined validation & Verification) | 2 | 28/06/2018 |
| 5 | Previous Monitoring Report (1st Monitoring) (combined PD & MR) | 2 | 22/06/2018 |
| | Previous Verification Report (1st Verification) (combined validation & Verification) | 2 | 28/06/2018 |
| 6 | Technical specifications of the projects | | |
| 7 | Commissioning certificates of the Solar power plants implemented in the project site. | - | - |
| 8 | CDM Methodology: ACM0002, "Grid-connected electricity generation from renewable sources" | 18.0 | - |
| 9 | VCS Standard | Version 4 | 19/09/2019 |
| | VCS Program Guide | Version 4 | 19/09/2019 |
| 10 | Clean Development Mechanism Validation and Verification Standard | 02.0 | 29/11/2018 |
| 9 | Grievances Registers | - | - |
| 12 | Joint Meter Reading for the monitoring period | - | - |
| 13 | Invoices for the electricity sold for the monitoring period | - | - |
| 14 | Energy meter Calibration Certificates | | |
| 15 | Break down details of the complete monitoring period | - | - |
| 16 | Declaration regarding no participation in other GHG program for the concerned monitoring period | - | - |
| 17 | Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013 | - | - |
| 18 | MOEF Notification http://envfor.nic.in/legis/eia/so1533.pdf | | 14/09/2006 |

# APPENDIX II: VERIFICATION FINDINGS

**Clarification Requests**

| CL ID | 01 | Section no. | | Date: 27/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| As per the description in the section 5.4 of the MR it is noticed that actual emission reduction achieved during the monitoring period is 17% higher than the estimated emission reduction as per approved PD. This is due to increase in electricity generation during the monitoring period.<br><br>PP is requested to clarify how the how the increase in generation will have impact over additonality of the project. | | | | |
| **Project participant response** | | | | **Date:** 31/03/2020 |
| *During the current monitoring period, the actual generation is found to be 17% higher than the estimated generation. The impact on additionality was checked and it was observed that due to the increase in the generation, the equity IRR was still below the benchmark value.* | | | | |
| **Documentation provided by project participant** | | | | |
| *Revised MR, version-2.* | | | | |
| **DOE assessment** | | | | **Date:** 01/05/2020 |
| PP has estimated equity IRR with actual PLF achieved for all the projects and found that the equity IRR is still below the respective benchmark specified in the registered PD. Hence, validation team confirms that there is no impact in additionally of the project.<br>CL is closed. | | | | |

**Corrective Action Requests**

| CAR ID | 01 | Section no. | | Date: 27/03/2020 |
|---|---|---|---|---|
| **Description of CAR** | | | | |
| In the MR, PP shall follow instruction of completing Monitoring report. In specific, the shall following the following instruction:<br><br>• The table in title page should be completed using Arial or Century Gothic 10.5 point, black, regular (non-italic) font<br>• All other sections should be completed using Arial or Franklin Gothic Book 10.5 point, black, regular (non-italic) font | | | | |
| **Project participant response** | | | | **Date:** 31/03/2020 |
| *The font size and font style have now been corrected throughout the Monitoring Report.* | | | | |
| **Documentation provided by project participant** | | | | |
| *Revised MR, Version-2.* | | | | |
| **DOE assessment** | | | | **Date:** 01/05/2020 |
| The font size and font style has been corrected now in the monitoring report.<br>CAR is closed. | | | | |

| CAR ID | 02 | Section no. | | Date: 27/03/2020 |
|---|---|---|---|---|

| Description of CAR | |
|---|---|
| In section 2.2 of the MR (Local Stakeholder Consultation), the following details are missing:<br>• Grievances received during the monitoring period<br>• How due account of all and any input received during ongoing communication/ Grievances has been taken | |
| **Project participant response** | **Date:** 31/03/2020 |
| *The grievance related details have now been provided in section 2.2 of the Monitoring report* | |
| **Documentation provided by project participant** | |
| *Revised MR, Version-2.* | |
| **DOE assessment** | **Date:** 01/05/2020 |
| As per the grievance register there is no grievance relevant to the project has been received. However, the grievances related to the CSR activities undertaken by PP have been received. All the grievances received during the monitoring period are addressed by PP. The same is confirmed from the verification of grievances register and from site personnel. The details have been included in the MR.<br>CAR is closed | |

| CAR ID | 03 | Section no. | | Date: 27/03/2020 |
|---|---|---|---|---|
| **Description of CAR** | | | | |
| In the technical specification of power plants, it is mentioned that in future there is possibility of change in module configuration. Since the project is already commissioned and under operation, PP is requested to provide the actual module configuration. | | | | |
| **Project participant response** | | | | **Date:** 31/03/2020 |
| *The project activity has been commissioned and thus the actual module configurations have been provided.* | | | | |
| **Documentation provided by project participant** | | | | |
| *Revised MR, version-2.* | | | | |
| **DOE assessment** | | | | **Date:** 01/05/2020 |
| The actual technical specifications of power plants are now mentioned in the monitoring report.<br>CAR is closed. | | | | |

| CAR ID | 04 | Section no. | | Date: 27/03/2020 |
|---|---|---|---|---|
| **Description of CAR** | | | | |
| In Appendix 1 of the MR, PP has provided the calibration details of the energy meter. However, the calibration certificate is not submitted to DOE for verification. | | | | |
| **Project participant response** | | | | **Date:** 31/03/2020 |
| *The calibration certificates of the Energy Meters are now provided to the DOE assessment team.* | | | | |
| **Documentation provided by project participant** | | | | |
| *Calibration Certificates of the Energy Meters.* | | | | |
| **DOE assessment** | | | | **Date:** 01/05/2020 |

| |
|---|
| The calibration certificates of energy meters are now provided. The calibration certificate are verified and found to be correct.<br>CAR is closed. |

| CAR ID | 05 | Section no. | | Date: 27/03/2020 |
|---|---|---|---|---|
| Description of CAR | | | | |
| The electricity export reading considered in the ER sheet for the ASPL-25 MW January 2019 is not consistent with the JMR and Invoice.<br><br>As per the JMR energy exported during the January 2019 is 4549.838 MWh; But the value considered in the ER sheet is 4945,838 MWh.<br><br>Corrective action is sought. | | | | |
| Project participant response | | | | Date: 31/03/2020 |
| *There was a typo error in the ER sheet. The generation value of Jan-2019 has now been corrected as per the values of JMR & Invoice in the revised ER sheet.* | | | | |
| Documentation provided by project participant | | | | |
| *Revised ER sheet, Version-2.* | | | | |
| DOE assessment | | | | Date: 01/05/2020 |
| PP has made the corrections and now the values are in consistent with respective month JMR reading.<br>CAR is closed. | | | | |

Forward Action Requests

| ~~FAR ID~~ | | ~~Section no.~~ | | ~~Date:~~ |
|---|---|---|---|---|
| ~~Description of CAR~~ | | | | |
| ~~NA~~ | | | | |
| ~~Project participant response~~ | | | | ~~Date: 20/04/2020~~ |
| | | | | |
| ~~Documentation provided by project participant~~ | | | | |
| | | | | |
| ~~DOE assessment~~ | | | | ~~Date: 23/04/2020~~ |
| | | | | |

# APPENDIX III: TEAM COMPETENCE

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Certificate of Competence*** | | | | | | | |
| ***Name*** | ☒ Mr.<br>☐ Ms. | **Ma Paa Puratchikkanal** | | | | | |
| ***Qualification Procedure*** | | *Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.* | | | | | |
| ***Appointed to work as:*** | | | | | | | |
| | | **CDM Validator/Verifier** | **Team Leader** | **Team Member** | **Technical Expert** | **Technical Reviewer** | **Financial Expert** |
| *Appointed* | | Yes | Yes | Yes | Yes | Yes | No |
| *Appointed Date* | | 29-07-2019 | | | | | |
| | | | | | | | |
| ***Authorized to work as Technical Expert for:*** | | | | | | | |
| *Authorized Technical Area* | | **Sectoral Scope** | | **TA Code** | **Technical Area within the scope** | | |
| | | Energy industries (renewable - / non-renewable sources) | | 1.1 | Thermal energy generation | | |
| | | Energy industries (renewable - / non-renewable sources) | | 1.2 | Renewables | | |
| | | Energy demand | | 3.1 | Energy demand | | |
| | | Construction | | 6.1 | Construction | | |
| | | Waste handling and disposal | | 13.1 | Solid waste and wastewater | | |
| | | Agriculture | | 15.1 | Agriculture | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| ***Authorized to work as Local Expert for:*** | | | | | | | |
| *Country/Countries* | | India | | | | | |
| | | | | | | | |
| ***Compliance check by:*** Anand S. R. | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ***Certificate of Competence*** | | | | | | | |
| ***Name*** | ☒ Mr.<br>☐ Ms. | **Narendra Kumar .R** | | | | | |
| ***Qualification Procedure*** | | *Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.* | | | | | |
| ***Appointed to work as:*** | | | | | | | |
| | | **CDM Validator/Verifier** | **Team Leader** | **Team Member** | **Technical Expert** | **Technical Reviewer** | **Financial Expert** |
| *Appointed* | | Yes | Yes | Yes | Yes | Yes | No |
| *Appointed Date* | | 29-07-2019 | | | | | |
| | | | | | | | |
| ***Authorized to work as Technical Expert for:*** | | | | | | | |
| *Authorized Technical Area* | | **Sectoral Scope** | | **TA Code** | **Technical Area within the scope** | | |
| | | Energy industries (renewable - / non-renewable sources) | | 1.1 | Thermal energy generation | | |
| | | Energy industries (renewable - / non-renewable sources) | | 1.2 | Renewables | | |
| | | Energy demand | | 3.1 | Energy demand | | |
| | | Waste handling and disposal | | 13.1 | Solid waste and wastewater | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| ***Authorized to work as Local Expert for:*** | | | | | | | |
| *Country/Countries* | | India | | | | | |
| | | | | | | | |
| ***Compliance check by:*** Anand S. R. | | | | | | | |

# APPENDIX IV: ABBREVIATIONS

| | |
|---|---|
| ACM | Approved Consolidated Methodology |
| BM | Build Margin |
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CL | Clarification Request |
| CSP | Concentrated Solar power |
| DPR | Detailed Project Report |
| EB | Executive Board |
| EISA | Environmental and Social Impact Assessment |
| EPC | Engineering and Procurement Contractor |
| ER | Emission Reductions |
| FAR | Forward Action Request |
| GHG | Greenhouse Gases |
| IPCC | Intergovernmental Panel for Climate Change |
| ISO | International Organization for Standardization |
| JMR | Joint Meter Readings |
| LCS | Local Controller System |
| MP | Monitoring Period |
| MR | Monitoring Report |
| MW | Mega Watt |
| MWh | MegaWatt hour |
| NCV | Net Calorific Value |
| OM | Operating Margin |
| O&M | Operation & Maintenance |
| PD | Project Description |
| PP | Project proponent |
| PPA | Power Purchase Agreement |
| SPV | Special Purpose Vehicle |
| QA/QC | Quality Assurance/Quality Control |
| $tCO_2$ | Tonnes of Carbon Dioxide |

| | |
|---|---|
| UNFCCC | United Nations Framework Convention on Climate Change |
| VCS | Verified Carbon Standard |
| VCSA | Verified Carbon Standard Association |
| VCU | Verified Carbon Unit |