



Verified Carbon Standard

140 MW SOLAR PHOTOVOLTAIC PROJECT IN RAJASTHAN



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Document Prepared by EKI Energy Services Limited

Project Title	140 MW Solar Photovoltaic Project in Rajasthan
Version	02
Report ID	VVER170901
Date of Issue	30-March-2020
Project ID	1709
Monitoring Period	01-January-2019 to 31-January-2020 (Inclusive of both days)
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source. Rising Bhadla 1 Private Ltd. and Rising Bhadla 2 Private Ltd. are the promoter of the proposed project activity. The project activity involves installation of 2 x 70 MW solar power project at Bhadla, Jodhpur, Rajasthan. Over the 10 years crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 241,573 tCO₂e per year, thereon displacing 250,258 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

The details of the project and the state of installation are mentioned in the table:-

Project Proponents Name	Capacity in MW (AC)	COD	Connection with Grid	State	Usage
Rising Bhadla 1 Private Ltd.	40 MW	18-July-2017	INDIAN Grid	Rajasthan	Sale to Grid
	30 MW	29-September-2017			
Rising Bhadla 2 Private Ltd.	40 MW	29-August-2017			
	30 MW	01-November-2017			

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity, is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

During the current monitoring period the project resulted in 303,044 tCO₂e which included the period from 01-January-2019 to 31-January-2020 (inclusive of both dates).

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)
 Project Type : I - Renewable Energy Projects

Project Category : Grid-connected electricity generation from renewable sources
ACM0002- Version 17.0¹

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Rising Bhadla 1 Private Ltd
Contact person	Mr. Ayush Bhargava
Title	Assistant Manager- Project Management
Address	S-18 Second Floor Green Park Extension Delhi-110016 India
Telephone	--
Email	ayush.bhargava@risingsunenergy.in

Organization name	Rising Bhadla 2 Private Ltd
Contact person	Mr. Ayush Bhargava
Title	Assistant Manager- Project Management
Address	S-18 Second Floor Green Park Extension Delhi-110016 India
Telephone	--
Email	ayush.bhargava@risingsunenergy.in

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the Project	Project Consultant
Contact person	Mr. Prakash Sahu
Title	Project Manager
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore 452010, India
Telephone	+91-9589899649
Email	prakash@enkingint.org

¹ <https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

1.5 Project Start Date

For this project activity, the project start date is the earliest date of commissioning i.e. 18-July-2017.

1.6 Project Crediting Period

Crediting Period Start date : 18-July-2017

Crediting Period End date : 17-July-2017

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Location

The details of the project locations are mentioned in the table below

Location of the Plant	Village - Bhadla, Tehsil - Phalodi, District- Jodhpur, State-Rajasthan
Location details	Latitude :27°29' N Longitude :71°54'E Elevation :180 m above MSL
Distance from District Headquarter	159 km from Jodhpur
Access by Road	Connected by Road- NH65
Access by Rail	Nearest Railway station- Phalodi: 83 km
Access by Air	Nearest Airport – Jodhpur
Telecommunication	Fairly available
Land	Approximately 140ha land available for 70 MW Solar PV plant.
Climate	Annual Rainfall – 3 mm Max Temp: 50°C Min Temp: -3°C Max Relative Humidity: 100 % Min Relative Humidity: 5% Wind Speed: 1.4 M/s (Min) to 5.7 M/s (Max)

The project locations have been shown in the map below:



Figure 1. State and district Map of Rajasthan and Jodhpur

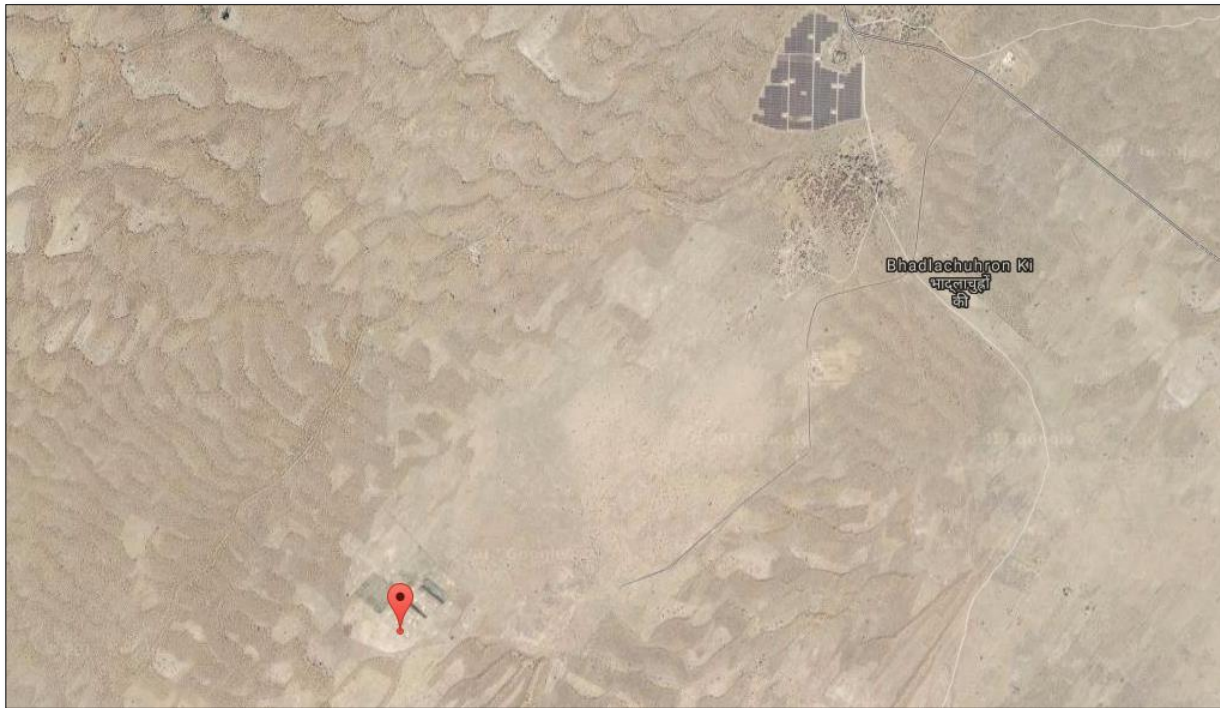


Figure 2 Pin point drop on Google maps

1.8 Title and Reference of Methodology

Title : Grid-connected electricity generation from renewable sources
 Reference : The project activity meets the eligibility criteria of large scale project as it is more than 15 MW

Methodology : Grid-connected electricity generation from renewable sources ACM0002-Version 17.0²

Type I : Energy industries (renewable / non-renewable sources)

Category : Approved Consolidated Methodology (ACM0002)

Tools referred with above methodology and applicable for project activity are:

- Tool to calculate the emission factor for an electricity system³ - Version 05.0 (EB 87, Annex 09)

1.9 Participation under other GHG Programs

Not Applicable, as the project activity is not registered with any other program.

The undertaking from PP has been submitted for no any double accounting for current monitoring period and project activity is not participated any other GHG program other than VCS.

1.10 Other Forms of Credit

The project activity is not availing any REC benefits and the same can be confirmed from publically available link of REC generators.

Web-link: https://www.recregistryindia.nic.in/index.php/general/publics/registered_regens PP has also submitted undertaking for not availing other forms of environmental credit for the same crediting period under consideration. A letter of undertaking from the project participant is being submitted regarding no double counting from the project.

1.11 Sustainable Development

Contribution to sustainable development:

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India . Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

- **Social well-being**
 - Contribution to the development of an otherwise underdeveloped area.

² <https://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

³ <http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

- Generation of employment opportunities for local people during various phases of the project activity.
- **Economic well-being**
 - Since, the project uses renewable solar power resources for power generation it does not lead to any emissions in the environment.
 - Avoiding further depletion of the already over-exploited, limited non-renewable sources like coal, oil, etc.
- **Technological well-being**
 - The technology selected for the power project would use well established Horizontal Pelton type turbines and the project activity would promote the use of such technology.
- **Environmental well-being**
 - Solar being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in avoiding significant amount of GHG emissions.

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the solar PV panels, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that solar PV project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same⁴.

Thus 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 <http://mnre.gov.in/file-manager/UserFiles/report-on-developmental-impacts-of-RE.pdf>

2.2 Local Stakeholder Consultation

The project has already been registered under VCS mechanism, hence it is not applicable. feedback from stakeholders, a dedicated Visitor register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments.

However no any grievances received during the current monitoring period. Since no any grievances received during the current monitoring period, there are no any issues (negative feedback) received from stakeholders, hence no any mitigation measures are required.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Project activity is a new facility (Greenfield) and the electricity generated by the project will be 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. The Project Proponent plans to avail the VCS benefits for the project.

In the Pre- project scenario the entire electricity, delivered to the grid by the project activity, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. The project shall result in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 241,573 tCO₂e per year, thereon displacing 250,258 MWh/year amount of electricity from the grid over the 10 years crediting period.

Starting date of the operation of the project activity is 18-July-2017 which is the date of commissioning/commercial operation of the 1st solar project and since then it is in continuous operation.

There has been no major downtime of equipment's, overhaul times or exchange of equipment's in the project activity during the current monitoring period. The project underwent scheduled breakdown and maintenance during the monitoring period.

3.2 Deviations

2.3.1 Methodology Deviations

No methodology deviation is applied during the monitoring period.

2.3.2 Project Description Deviations

No deviation has taken place in project description during the monitoring period.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid, OM, y}$
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ⁵
Value applied	0.9843
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05" as 3-year generation weighted average using data for the years 2013-14, 2014-15 & 2015-16. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 12, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid, BM, y}$
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⁵ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ⁶
Value applied	0.9083
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05" as per the latest data available for the most recent year 2015-16. The data is obtained from "CO ₂ Baseline Database for Indian Power Sector" version 12, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

Data / Parameter	EF _{grid, CM, y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 12, May 2017 ⁷
Value applied	0.9653
Justification of choice of data or description of measurement methods and procedures applied	<p>The combined margin emissions factor is calculated as follows:</p> $EF_{grid, CM, y} = EF_{grid, OM, y} * W_{OM} + EF_{grid, BM, y} * W_{BM}$ <p>Where:</p> <p>EF_{grid, BM, y}= Build margin CO₂ emission factor in year y (tCO₂/MWh)</p> <p>EF_{grid, OM, y}= Operating margin CO₂ emission factor in year y (tCO₂/MWh)</p> <p>W_{OM} = Weighting of operating margin emissions factor (%) = 75%</p> <p>W_{BM}= Weighting of build margin emissions factor (%) = 25%</p>
Purpose of Data	Calculation of baseline emissions

⁶ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

⁷ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

Comments	The above value is fixed and it is same for the entire crediting period
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4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh/y
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)
Source of data	Monthly joint meter reading reports
Description of measurement methods and procedures to be applied	<p>Common metering at the substation: All the plants (including the project activity solar plant and other investors solar plant) are connected to a Pooling substation 132/220 KV GSS II and further electricity is transferred to 220/400 KV RRVPNL substation. The common metering point at RRVPNL substation consists of both main & check meters (ABT Meters) having accuracy class of 0.2s. The export/import losses between these two substations are apportioned based on pooling substation readings.</p> <p>For detailed schedule of Calibration of energy meters involved in project activity please refer Appendix 1</p>
Frequency of monitoring/recording	Continuous measurement & monthly recording
Value monitored	313,939.68
Monitoring equipment	The electricity exported / supplied by the plant to pooling substation and further to RRVPNL substation. This meter also measures electricity imported by the plant from the grid.
QA/QC procedures to be applied	<p>The meters is approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years. The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines will be applied appropriately to confirm the conservativeness of metering.</p> <p>The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP do not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered the monitoring parameter. The billing is raised based on substation meters.</p>
Purpose of the data	Calculation of baseline emissions
Calculation method	Thus, Net electricity supplied to the grid by the project plant in a given month = Export, kWh – Import, kWh

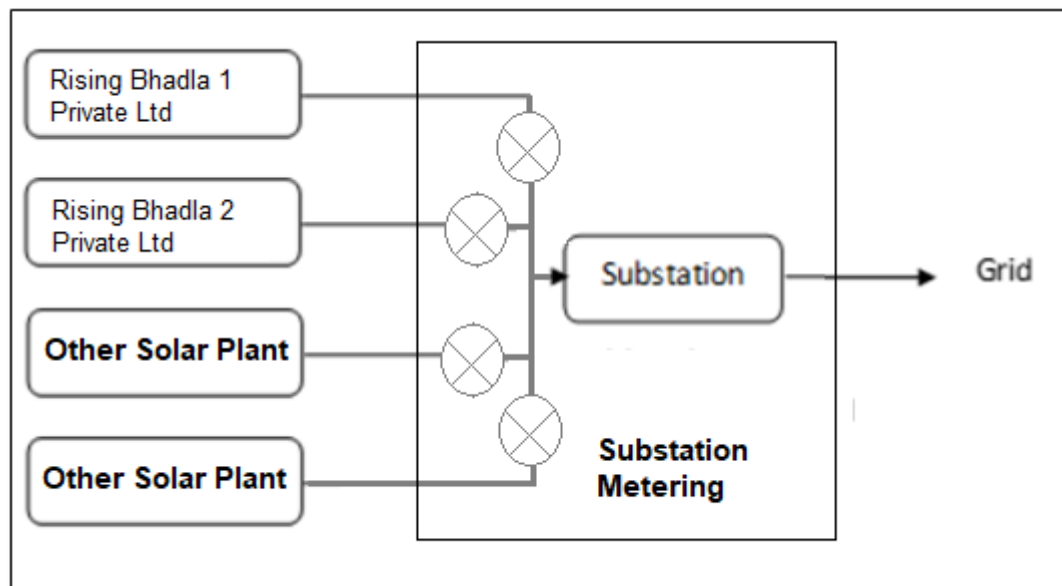
Comments

Data will be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of VERs for this project activity, whichever occurs later.

4.3 Monitoring Plan

The monitoring plan is developed in accordance with the modalities and procedures for CDM project activities and is proposed for grid-connected solar power project being implemented in Rajasthan, India. The monitoring plan, which will be implemented by the project participant describes about the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

Schematic line diagram for the project activity are as follows:



Data Measurement

The export and import energy will be measured continuously using above mentioned Main and Check meters located at the substations. Readings of meters shall be taken on monthly basis by authorized officer of SEB in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices will be raised. These invoices can be used for cross checking the meter readings taken for the respective project activity.

Data collection and archiving

Readings from meters will be collected in the presence of the plant in-charge. Export and Import data would be recorded and stored in logs as well as in electronic form on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of VERs for the project activity whichever occurs later.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff will be trained. The plant helpers will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 17.0):

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO₂/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 CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO₂ 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" (t CO₂/MWh)

Grid Emission Factor

The GEF is fixed ex-ante in the PD as given below:

Parameter	Value
OM	0.9843
BM	0.9083
CM	0.9653

Therefore,

$$\begin{aligned}
 BE_y &= 313,939.68 \times 0.9653 \\
 &= 303,044 \text{ tCO}_2\text{e (Rundown values)}
 \end{aligned}$$

5.2 Project Emissions

Not Applicable, since emissions from the project activity is zero as per ACM0002 methodology. Hence, $PE_y = 0$.

5.3 Leakage

Not Applicable, since leakage emissions from the project activity is zero as per ACM0002 methodology. Hence, $LE_y = 0$.

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity is

$$ER_y = BE_y - PE_y - LE_y$$

Where,

ER_y = Emission Reduction in tCO₂e/year

BE_y = Baseline emission in tCO₂e/year

PE_y = Project emissions in tCO₂e/year

LE_y = Leakage Emissions in tCO₂e/year

For the project activity during the current monitoring period, as per section 5.1

$$BE_y = 303,044 \text{ tCO}_2\text{e}$$

$$PE_y = 0 \text{ tCO}_2\text{e}$$

$$LE_y = 0 \text{ tCO}_2\text{e}$$

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01-January-2019 to 31-December-2019	281,092	0	0	281,092
01-January-2020 to 31-January-2020	21,952	0	0	21,952

Total	303,044	0	0	303,044
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The achieved GHG emission is 15.63 % is higher than the estimated value. This is due to the higher number of sunshine hours. The generation of electricity depends upon many other climatic conditions, and not within the control of the project participant. The increased (15.10%) observed PLF is compared to the sensitivity values of the registered PD (25.55%). The percentage increase is found within the crossing benchmark limit. The higher generation during the current verification period is due to certain natural conditions and hence acceptable.

APPENDIX 1: CALIBRATION RECORDS

Particular	Meter Serial No.	Accuracy Class	Calibration Date	Subsequent Calibration Date	Validity
Rising Bhadla 1 Pvt Ltd (70 MW)					
Main Meter	13194081	0.2 S	05-July-2017	13-August-2018	12-August-2023
Check Meter	13194941	0.2 S	05-July-2017	13-August-2018	12-August-2023
Rising Bhadla 2 Pvt Ltd (70 MW)					
Main Meter	13194961	0.2 S	22-August-2017	13-August-2018	12-August-2023
Check Meter	13195690	0.2 S	22-August-2017	13-August-2018	12-August-2023