# BUNDLED SOLAR POWER PROJECT BY VECTOR GREEN ENERGY PRIVATE LIMITED

Document Prepared By EKI Energy Services Limited

| | |
|---|---|
| Project Title | Bundled Solar Power Project by Vector Green Energy Private Limited |
| Version | 02 |
| Report ID | 1770 |
| Date of Issue | 05-March-2020 |
| Project ID | 1770 |
| Monitoring Period | 23 May 2018 to 22 December 2019 (First and last date included) |
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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. The project is a bundled project activity which involves installation of 105 MW solar project in different states of India through SPVs.

Over the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 163,888 tCO2e per year, thereon displacing 169,781 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 SPVs for the project and their location of installation are mentioned in the table
below:-

| Name of SPVs | Capacity in MW | COD | Connection with Grid | State | Usage |
|---|---|---|---|---|---|
| Winsol Solar Fields (Polepally) Pvt Ltd | 15 MW | 01 July 2016 | Indian Grid | Telangana | Sale to State Discom |
| | 50 MW | 31 December 2016 | Indian Grid | Telangana | Sale to State Discom |
| Hindupur Solar Park Pvt Ltd | 40 MW | 28 June 2016 | Indian Grid | Andhra Pradesh | Sale to State Discom |

**Total emission reductions achieved in this monitoring period:**

During the Current Monitoring Period from 23 May 2018 to 22 December 2019 (First and last date included), the project activity has supplied 301,162 MWh of electricity, and thus contributing to the GHG reductions 290,710 $tCO_2e$.

## 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 18.1[1]

[1] http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP

The project is not a grouped project activity.

## 1.3 Project Proponent

| | |
|---|---|
| Organization name | **Winsol Solar Fields (Polepally) Pvt Ltd** |
| Contact person | Mr Lokesh Jeengar |
| Title | GM (Power Sales & Business) |
| Address | Office No. 504/2, 5th Floor, White House Block I, 6-3-1192/1/1, Kundanbagh, Begumpet, Hyderabad Telangana- 500016 India |
| Telephone | - |
| Email | - |

| | |
|---|---|
| Organization name | **Hindupur Solar Park Pvt Ltd** |
| Contact person | Mr Lokesh Jeengar |
| Title | GM (Power Sales & Business) |
| Address | Office No. 504/2, 5th Floor, White House Block I, 6-3-1192/1/1, Kundanbagh, Begumpet, Hyderabad Telangana- 500016 India |
| Telephone | - |
| Email | - |

## 1.4 Other Entities Involved in the Project

| | |
|---|---|
| Organization name | EKI Energy Services Limited |
| Role in the Project | Project Consultant |
| Contact person | Anjali Rao |
| Title | Project Manager |
| Address | Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar INDORE – 452010, India. |
| Telephone | +91 9109120940 |
| Email | anjali@enkingint.org |

## 1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e. 28 June 2016. This is the date of commissioning of 40 MW solar PV project activity by Hindupur Solar Park Pvt Ltd.

## 1.6 Project Crediting Period

**Crediting Period Start date:** 28-June-2016

**Crediting Period End date:** 27-June-2026

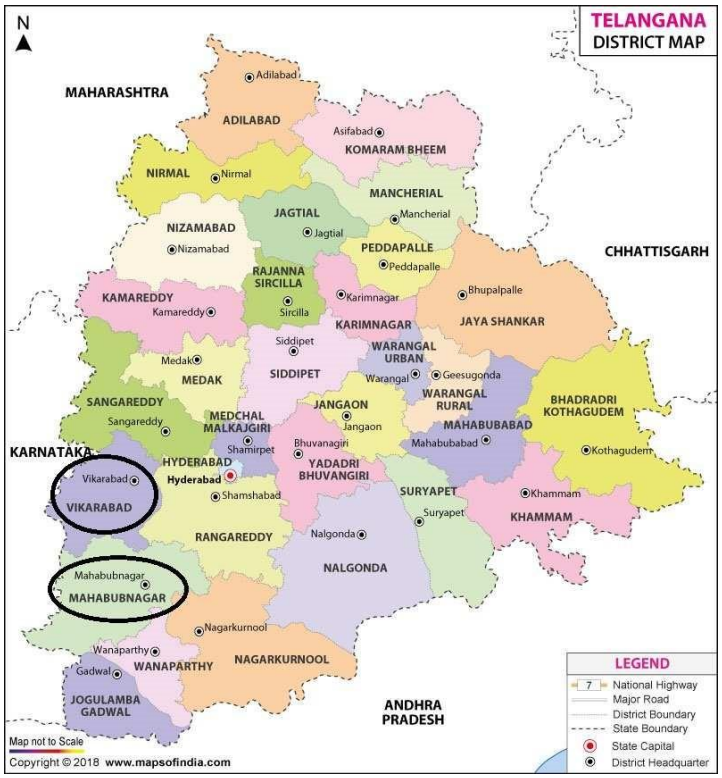
The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

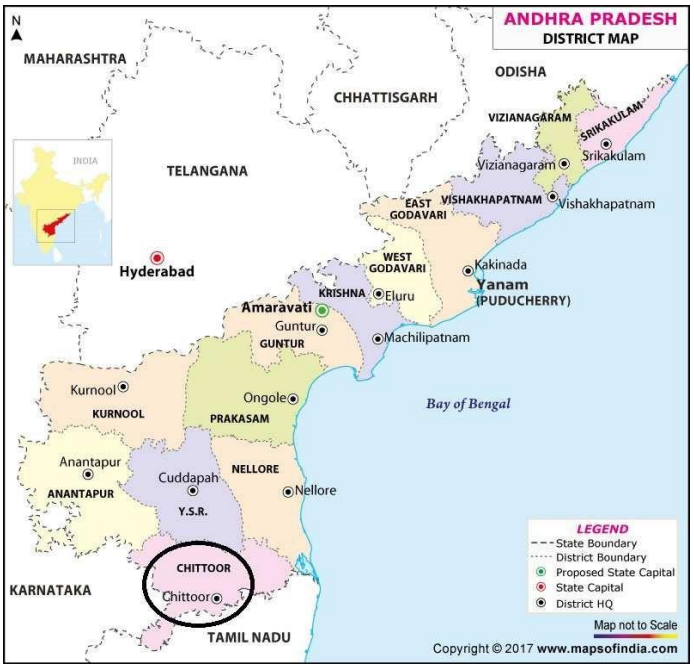
## 1.7 Project Location

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

| Name of SPVs | Capacity (MW) | State | Village | Mandal | District | Latitude (N) | Longitude (E) |
|---|---|---|---|---|---|---|---|
| **Winsol Solar Fields (Polepally) Pvt Ltd** | 15 MW | Telangana | Karoor | Nawabpet | Mahabubnagar | 16°51'49.9" | 78°05'33.6" |
| | 50 MW | Telangana | Indur | Peddumal | Vikarabad | 17°20'41.4" | 77°36'56.6" |
| **Hindupur Solar Park Pvt Ltd** | 40 MW | Andhra Pradesh | Nelapalle | Peddapanjani | Chittoor | 13°20'24" | 78°30'00.0" |

The project locations have been shown in the map below:






## 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:** ACM0002, Grid-connected electricity generation from renewable sources- Version 18.1[2]

**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 system[3] - Version 06.0 (EB 97, Annex 07)
- Methodological Tool- Tool for the demonstration and assessment of additionality[4] - Version 07.0.0 (EB 70, Annex 08)

## 1.9 Participation under other GHG Programs

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

[2] http://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP
[3] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf
[4] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

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.

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

## 1.10 Other Forms of Credit

Include the following information, as applicable:

- Emission Trading Programs and Other Binding Limits: The PP has not applied this project in any Emission Trading Programs and other Binding Limits.
- Other Forms of Environmental Credit: The PP has not applied this project in any other form of environmental credits.

## 1.11 Sustainable Development

**Contribution to sustainable development:**

Ministry of Environment, Forest and Climate Change, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. The project contributes to sustainable development using the following ways.

**Social well-being:** The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

**Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity will also help to reduce the demand supply gap in the state.

The project activity will generate power using zero emissions Solar PV based power generation which helps to reduce GHG emissions and specific pollutants like Sox, Nox, and SPM associated with the conventional thermal power generation facilities.

**Technological well-being**: The successful operation of project activity would lead to promotion of Solar based power generation and would encourage other entrepreneurs to participate in similar projects

**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 same[5].

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.

## 2.2 Local Stakeholder Consultation

The project has already been registered under VCS mechanism, hence it is not applicable.

## 2.3 AFOLU-Specific Safeguards

This section is not applicable because the project activity is not AFOLU project activity.

# 3 IMPLEMENTATION STATUS

## 3.1 Implementation Status of the Project Activity

The project activity involves the installation of Solar PV project. The total installed capacity of the project is 105 MW of Solar PV plant located at different states in India. The project is promoted by **Vector Green Energy Private Limited.**

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.

[5] http://mnre.gov.in/file-manager/UserFiles/report-on-developmental-impacts-of-RE.pdf

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 163,888 tCO2e per year, thereon displacing 169,781 MWh/year amount of electricity from the gird over the 10 years crediting period.

**Solar PV Project Technology Details –**

The project activity aims to harness solar energy through installation of Solar PV project with total installed capacity of 105 MW. The technical specification of each SPV will be mentioned during validation of project activity.

The technical specification of 40 MW plant interconnection with grid on 28 June 2016 by Hindupur Solar Park Pvt Ltd are as follows:

| Sl. No. | Technical details of the equipment[6] | Description |
|---|---|---|
| 1 | Make of modules installed | First solar series4V2 |
| 2 | No. of the modules installed | 432300 |
| 3 | Make & Model of Invertor | ABB |
| 4 | Number of Inverters | 40 |
| 5 | Make & Number of Transformers | Power transformer- 2, makeCROMPTON GREAVES LTD ; Inverter transformers- 20, make-VOLTAMP TRANSFORMER LTD |

The technical specification of 15 MW plant interconnection with grid on 01 July 2016 by Winsol Solar Fields (Polepally) Pvt Ltd are as follows:

| Sl. No. | Technical details of the equipment[7] | Description |
|---|---|---|
| 1 | Make of modules installed | First solar series4V2 |
| 2 | No. of the modules installed | 172788 |
| 3 | Make & Model of Invertor | ABB |
| 4 | Number of Inverters | 15 |
| 5 | Make & Number of Transformers | Power transformer- 1, make-Schneider Electric ; Inverter transformers-8, makeVOLTAMP |

[6] It is to be noted that in future there is possibility of change in module configuration, however project capacity in total will remain same as 40 MW.

[7] It is to be noted that in future there is possibility of change in module configuration, however project capacity in total will remain same as 15 MW.

The technical specification of 50 MW plant interconnection with grid on 31 December 2016 by Winsol Solar Fields (Polepally) Pvt Ltd are as follows:

| Sl. No. | Technical details of the equipment[8] | Description |
|---|---|---|
| 1 | Make of modules installed | First solar series4V2 |
| 2 | No. of the modules installed | 551840 |
| 3 | Make & Model of Invertor | SMA, ABB |
| 4 | Number of Inverters | 22 |
| 5 | Make & Number of Transformers | Power transformer- 2, make-Bharat Beejali ; Inverter transformers-22, makeVoltamp, Shilchar |

## 3.2 Deviations

### 2.3.1 Methodology Deviations

No deviation is taken during the current monitoring period.

### 2.3.2 Project Description Deviations

No deviation is taken during the current monitoring period

## 3.3 Grouped Projects

The specified project is not a part of a grouped project.

# 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 in year y |
| Source of data | Calculated from CEA database, Version 12, May 2017[9] |
| Value applied | 0.9843 |
| Justification of choice of | Calculated as per "Tool to calculate the emission factor for an |

[8] It is to be noted that in future there is possibility of change in module configuration, however project capacity in total will remain same as 50 MW

[9] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

| | |
|---|---|
| data or description of measurement methods and procedures applied | 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 | $EF_{grid,BM,y}$ |
| Data unit | $tCO_2/MWh$ |
| Description | Build Margin $CO_2$ emission factor in year y |
| Source of data | Calculated from CEA database, Version 12, May 2017[10] |
| 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 | For the calculation of the Baseline Emission |
| Comments | This parameter is fixed ex-ante for the entire crediting period. |

| | |
|---|---|
| Data / Parameter | $EF_{grid,CM,y}$ |
| Data unit | $tCO_2/MWh$ |
| Description | Combined Margin $CO_2$ emission factor in year y |
| Source of data | Calculated from CEA database, Version 12, May 2017[11] |
| Value applied | 0.9653 |
| Justification of choice of data or description of measurement methods and procedures applied | The combined margin emissions factor is calculated as follows:<br>$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$<br>Where:<br>$EF_{grid,BM,y}$= Build margin $CO_2$ emission factor in year y ($tCO_2/MWh$)<br>$EF_{grid,OM,y}$= Operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$)<br>$W_{OM}$ = Weighting of operating margin emissions factor (%) = 75%<br>$W_{BM}$= Weighting of build margin emissions factor (%) = 25% |

[10] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf
[11] http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver12.pdf

| | |
|---|---|
| Purpose of Data | For the calculation of the Baseline Emission |
| Comments | This parameter is fixed ex-ante for the entire crediting period. |

## 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 in MWh (This value will be the sum of the net electricity generated from all 3 sites) |
| Source of data | Monthly joint meter reading reports |
| Description of measurement methods and procedures to be applied | The difference of final value of export and import is used for monthly values of net electricity supplied to the grid by the project<br>activity and same value will be considered for ER calculations. |
| Frequency of monitoring/recording | Continuous measurement & monthly recording |
| Value monitored | 301,162 MWh |
| Monitoring equipment | The electricity exported / supplied by the plant to pooling substation and further to substation. This meter also measures electricity imported by the plant from the grid.<br>The billing meter used for project activity having following specification<br>Monitoring: ABT cum Tri vector meter are used<br>Data type: Measured<br>Type of meter: Static type meter (Main, Check & Standby meter).<br>Accuracy Class of meters: 0.2s<br>The meter details are being mentioned over APPENDIX1: Meter Calibration Details |
| QA/QC procedures to be applied | 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[12] 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. |

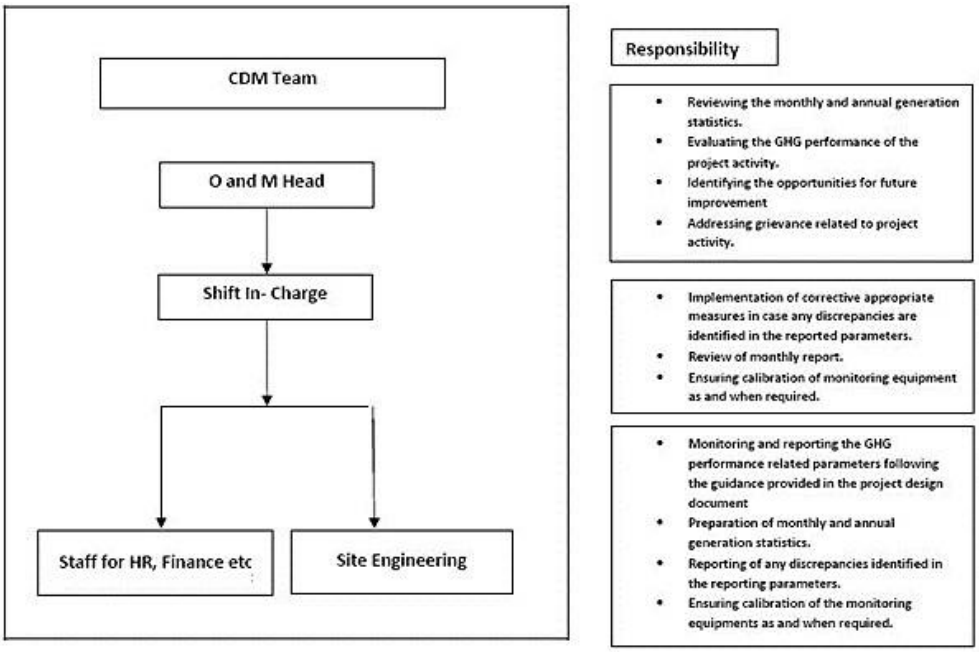
[12] http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

| | |
|---|---|
| | 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.<br><br>The billing is raised based on substation meters. |
| 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. 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.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity. The team comprises of the following members:




### 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.

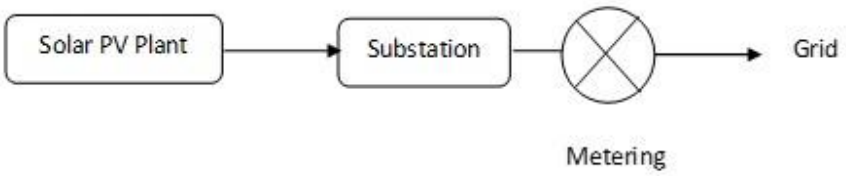
### Personnel training

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.

**Metering Arrangement**

Line diagram with metering arrangement for the project activity is shown below.




The metering arrangement for all the three sites are the same. Each solar plant has their own dedicated metering arrangement at the substation end. The metering arrangement is under control of state electricity board and may change in future.

# 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

## 5.1 Baseline Emissions

The baseline is the MWh produced by the renewable generating unit multiplied by an emission coefficient (measured in $tCO_2equ/MWh$) calculated in a transparent and conservative manner as:

$$BE_y = EF_y \times EG_y$$

Where,

**$BE_y$:** Baseline emissions due to displacement of electricity during year y in tons of $tCO_2e$
**$EG_y$:** Electricity supplied to the grid by the project activity during the year y in MWh,
**EFy**: $CO_2$ baseline emission factor for the electricity displaced due to the project activity in during the year y in tons $CO_2/MWh$

**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 |

## 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

**$ER_y = BE_y - PE_y$**

$BE_y$ = Baseline Emissions

$PE_y$ = Project emissions

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$ER_y$ = 290,710– 0

= 290,710 $tCO_2e$

| 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** | 109,083 | 0 | 0 | 109,083 |
| **2019** | 181,628 | 0 | 0 | 181,628 |
| **Total** | 290,710 | 0 | 0 | 290,710 |

It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 259,976 $tCO_2e$, whereas actual emission reductions achieved are 290,710 $tCO_2e$, which is approximately 12% higher than the estimated emission reductions. The generation of electricity depends upon many other climatic conditions, which are not within the control of the project participant. The higher generation during the current verification period is due to certain natural conditions. It is to be noted that due to the higher generation during the current monitoring period, there is no impact on the additionality and the IRR is still below the benchmark value. The identified IRR with the observed PLF (20.64%) is 10.26% which is below the IRR benchmark values i.e. 15.10%. Hence, increased ER is acceptable.

# APPENDIX1: METER CALIBRATION DETAILS

For Winsol Solar-15 MW

| Meter Details | Main Meter | Check Meter | Standby Meter |
|---|---|---|---|
| Meter Serial No | APX00924 | APX00925 | APX00926 |
| Meter Make | Secure | Secure | Secure |
| Accuracy Class | 0.2 s | 0.2 s | 0.2 s |
| Date of Calibration | 31 July 2017 | 31 July 2017 | 31 July 2017 |
| Date of Calibration | 30 October 2018 | 30 October 2018 | 30 October 2018 |
| Due date of Calibration | 29 October 2023 | 29 October 2023 | 29 October 2023 |

For Winsol Solar -50 MW

| Meter Details | Main Meter | Check Meter | Standby Meter |
|---|---|---|---|
| Meter Sl. No | APW00111 | AP925645 | APX00645 |
| Make | SECURE | SECURE | SECURE |
| Accuracy Class | 0.2 s | 0.2 s | 0.2 s |
| Date of Calibration | 02 March 2018 | 02 March 2018 | 02 March 2018 |
| Date of Calibration | 25 October 2018 | 25 October 2018 | 25 October 2018 |
| Due date of Calibration | 24 October 2023 | 24 October 2023 | 24 October 2023 |

For Hindurpur Solar-40 MW

| Hindupur Solar Park Pvt Ltd- I | | | |
|---|---|---|---|
| Meter Details | Main Meter | Check Meter | Standby Meter |
| Meter Sl. No | APX00864 | APX00865 | APX00866 |
| Make | SECURE | SECURE | SECURE |
| Accuracy Class | 0.2 s | 0.2 s | 0.2 s |
| Date of Calibration | 04 December 2017 | 04 December 2017 | 04 December 2017 |
| Due Date of Calibration | 03 December 2022 | 03 December 2022 | 03 December 2022 |

| Hindupur Solar Park Pvt Ltd- II | | | |
|---|---|---|---|
| Meter Details | Main Meter | Check Meter | Standby Meter |
| Meter Sl. No | APX00858 | APX00859 | APX00860 |
| Make | SECURE | SECURE | SECURE |
| Accuracy Class | 0.2 s | 0.2 s | 0.2 s |
| Date of Calibration | 21 September 2017 | 21 September 2017 | 21 September 2017 |

| | | | |
|---|---|---|---|
| **Due Date of Calibration** | 20 September 2022 | 20 September 2022 | 20 September 2022 |

| **Hindupur Solar Park Pvt Ltd- III** | | | |
|---|---|---|---|
| **Meter Details** | **Main Meter** | **Check Meter** | **Standby Meter** |
| **Meter Sl. No** | APX00861 | APX00862 | APX00863 |
| **Make** | SECURE | SECURE | SECURE |
| **Accuracy Class** | 0.2 s | 0.2 s | 0.2 s |
| **Date of Calibration** | 04 December 2017 | 04 December 2017 | 04 December 2017 |
| **Due Date of Calibration** | 03 December 2022 | 03 December 2022 | 03 December 2022 |

| **Hindupur Solar Park Pvt Ltd- IV** | | | |
|---|---|---|---|
| **Meter Details** | **Main Meter** | **Check Meter** | **Standby Meter** |
| **Meter Sl. No** | APX00867 | APX00868 | APX00869 |
| **Make** | SECURE | SECURE | SECURE |
| **Accuracy Class** | 0.2 s | 0.2 s | 0.2 s |
| **Date of Calibration** | 04 December 2017 | 04 December 2017 | 04 December 2017 |
| **Due Date of Calibration** | 03 December 2022 | 03 December 2022 | 03 December 2022 |

From October 2019 onwards the metering location of 40 MW Hindupur changed, the individual 132 KV Lilo at Beechinipalli tagged to 132 KV Hindupur – Dharmavaram line. The recent calibration of the meter occurred in 10/05/2018. The metering details of the 132 KV Hindupur - Dharmavaram line is mentioned below:

| **Meter Details** | **Main Meter** | **Check Meter** | **Standby Meter** |
|---|---|---|---|
| **Meter Sl. No** | APX00618 | APX00617 | APX00701 |
| **Make** | SECURE | SECURE | SECURE |
| **Accuracy Class** | 0.2 s | 0.2 s | 0.2 s |
| **Date of Calibration** | 10 May 2018 | 10 May 2018 | 10 May 2018 |
| **Due date of calibration** | 09 May 2023 | 09 May 2023 | 09 May 2023 |

# APPENDIX2: MAJOR BREAKDOWN DETAILS

**For Winsol Solar -50 MW**

| S.no | Date | Duration | Remarks |
|---|---|---|---|
| 1. | 06-Jun-18 | 1:40 | Plant trip due to under voltage protection operated in Gss side |
| 2. | 12-Jun-18 | 7:59 | Inverter trip due to stack failure |
| 3. | 13-Jun-18 | 12:35 | SMA team investigate the fault, checked the control circuit and replce the contactor and ACC card. |
| 4. | 26-Jun-18 | 11:56 | Inverter trip due to stack failure error code (6625). Two stacks replced an inverter started 17:52 with 66.66%. |
| 5. | 30-Jun-18 | 6:51 | Inverter 13 off due to DC switch error 7704, We inform to SMA team they reached site and work on it. Morning inverter startedand its under observation |
| 6. | 17-Jul-18 | 8:03 | All three Stacks failure, Informed to SMA team for Replacement of stacks. |
| 7. | 18-Aug-18 | 6:12 | Stack failure in Block 4 ,(E6625) , 3 Stacks replaced by SMA team |
| 8. | 21-Aug-18 | 8:18 | SMA team replaced stack , parameter checked and started inverter at 6:36 am.on 22.08.2018 |
| 9. | 01-Sep-18 | 6:17 | checking IR of HT cable and inspection of both side HT panel ends and Transformer.reset relay an stated the Inverter, System OK |
| 10. | 06-Sep-18 | 7:53 | SMA team replaced all 3 Nos. stacks. |
| 11. | 18-Sep-18 | 5:45 | SMA team replaced all 3 Nos. stacks. |
| 12. | 10-Oct-18 | 5:43 | Inv under BD |
| 13. | 11-Oct-18 | 5:53 | SMA replaced 3 nos stacks.Checked the parameters and started the Inverter. |
| 14. | 03-Jan-19 | 3:54 | Inverter started after system reboot, DCC board replaced as per Instructed by SMA |
| 15. | 12-May-19 | 10:55 | Contacted SMA person with the guidance kept INV in off mode |
| 16. | 13-May-19 | 12:31 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 17. | 14-May-19 | 12:39 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 18. | 15-May-19 | 12:32 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 19. | 16-May-19 | 12:37 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 20. | 17-May-19 | 12:40 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 21. | 18-May-19 | 12:39 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 22. | 19-May-19 | 12:40 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 23. | 20-May-19 | 12:33 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 24. | 21-May-19 | 12:16 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 25. | 22-May-19 | 12:39 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 26. | 23-May-19 | 12:42 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 27. | 24-May-19 | 12:39 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |

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| 28. | 25-May-19 | 12:41 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 29. | 26-May-19 | 12:34 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 30. | 27-May-19 | 12:49 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 31. | 28-May-19 | 12:46 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 32. | 29-May-19 | 12:50 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 33. | 30-May-19 | 12:09 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 34. | 31-May-19 | 12:45 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 35. | 01-Jun-19 | 12:46 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 36. | 02-Jun-19 | 12:38 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 37. | 03-Jun-19 | 11:13 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 38. | 04-Jun-19 | 11:13 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 39. | 05-Jun-19 | 12:50 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 40. | 06-Jun-19 | 11:53 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 41. | 07-Jun-19 | 12:47 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 42. | 07-Jun-19 | 4:20 | Contacted SMA person with the guidance we changed the buffer module & restart the inverter |
| 43. | 08-Jun-19 | 12:01 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 44. | 08-Jun-19 | 12:01 | Contacted SMA person with the guidance, he denied to open inverter DC fuses till DC voltage <200 V, then checked the insulation value After sunset, conducted insulation measurment test for all DC cables, found input 19.6 is having issue rest cables got good results. |
| 45. | 09-Jun-19 | 12:42 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 46. | 10-Jun-19 | 12:42 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 47. | 11-Jun-19 | 12:53 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 48. | 12-Jun-19 | 12:49 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 49. | 13-Jun-19 | 12:47 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 50. | 14-Jun-19 | 12:52 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 51. | 15-Jun-19 | 12:58 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 52. | 16-Jun-19 | 12:54 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 53. | 17-Jun-19 | 12:57 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 54. | 18-Jun-19 | 13:01 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 55. | 19-Jun-19 | 12:53 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 56. | 20-Jun-19 | 12:50 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 57. | 21-Jun-19 | 12:12 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 58. | 22-Jun-19 | 12:47 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 59. | 23-Jun-19 | 12:43 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 60. | 24-Jun-19 | 12:41 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 61. | 25-Jun-19 | 13:00 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 62. | 26-Jun-19 | 12:56 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 63. | 27-Jun-19 | 12:32 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 64. | 28-Jun-19 | 12:49 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 65. | 29-Jun-19 | 12:13 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |

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|---|---|---|---|
| 66. | 30-Jun-19 | 12:50 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 67. | 01-Jul-19 | 12:09 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 68. | 02-Jul-19 | 12:30 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 69. | 03-Jul-19 | 12:43 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 70. | 04-Jul-19 | 12:36 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 71. | 05-Jul-19 | 12:49 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 72. | 06-Jul-19 | 12:35 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 73. | 07-Jul-19 | 12:37 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 74. | 08-Jul-19 | 12:21 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 75. | 09-Jul-19 | 12:31 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 76. | 10-Jul-19 | 12:11 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 77. | 11-Jul-19 | 12:27 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 78. | 12-Jul-19 | 12:47 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 79. | 13-Jul-19 | 12:34 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 80. | 14-Jul-19 | 12:44 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 81. | 15-Jul-19 | 12:41 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 82. | 16-Jul-19 | 12:37 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 83. | 17-Jul-19 | 12:10 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 84. | 18-Jul-19 | 12:44 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 85. | 19-Jul-19 | 12:17 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 86. | 20-Jul-19 | 12:44 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 87. | 21-Jul-19 | 12:49 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 88. | 22-Jul-19 | 12:43 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 89. | 23-Jul-19 | 12:42 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 90. | 24-Jul-19 | 12:36 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 91. | 25-Jul-19 | 6:01 | INV 14 in off Mode from 12th May 2019 (07:40 hrs) |
| 92. | 23-Aug-19 | 5:20 | Contacted SMA with the guidance checked the insulation value of DC cables. |
| 93. | 24-Aug-19 | 3:38 | Contacted SMA with the guidance checked the insulation value isolated defective strings, switched on the inverter |
| 94. | 05-Oct-19 | 5:29 | Checked the PV field &Found fault in string no:11 then disconnected from load & restart the inverter. |
| 95. | 12-Nov-19 | 4:24 | ICOG panel tripped on Master trip relay activated found bucholz relay operated, checked TRAFO, ICOG, HT cable healthiness, Release air in all air vent plugs of IDT and charged trafo in normal operation. |
| 96. | 18-Nov-19 | 6:13 | 1. Checked the breaker physically and its function.<br>2. Inspection of relays by providing addition aux supply.<br>3.Cheked the transformer physically.<br>4.Insulation resistance tested.<br>5.Topup the trafo oil & air released from all the valves and charged the transformer and inverter |

For Winsol Solar -50 MW

| S.no | Date | Duration | Remarks |
|---|---|---|---|
| 1. | 14-Jun-18 | 3:19 | Due to Installation of PT and CT,PT Testing. |
| 2. | 19-Aug-18 | 3:43 | 132KV Bay Maintenanace at 132KV GSS Polepally By AE-TS TRANSCO |
| 3. | 02-Dec-18 | 3:45 | Inverter tripped on DC BRK POS Fault due short in ISU-3 |
| 4. | 03-Apr-19 | 1:30 | Pad Clamp Damaged at 4 Pole structure in Polepally Site,Ippaturu |
| 5. | 24-Apr-19 | 1:25 | Reset The fault and charged the inverter |
| 6. | 24-Apr-19 | 1:25 | Reset The fault and charged the inverter |
| 7. | 24-Apr-19 | 1:25 | Reset The fault and charged the inverter |
| 8. | 24-Apr-19 | 1:25 | Reset The fault and charged the inverter |
| 9. | 29-Apr-19 | 3:10 | Bypass the Line PT and 132KV transmission line charged |
| 10. | 04-Jun-19 | 1:53 | Inverter Tripped under K16 relay unhealthy due to ICU-1 over temperature. |
| 11. | 05-Jun-19 | 1:22 | Inverter Tripped under K16 relay unhealthy due to ICU-1 over temperature. |
| 12. | 07-Jun-19 | 6:57 | we Checked the inverter ISU section found one fan failure in ISU-1, isolate the ISU -1 and charged the inverter 65% load. |
| 13. | 13-Jun-19 | 2:00 | Charged the 33KV OUTGOING feeder after TL maintenance work completed |
| 14. | 14-Jun-19 | 1:51 | Charged the 33KV OUTGOING feeder after TL maintenance work completed |
| 15. | 29-Jun-19 | 1:51 | LC Returned and charged the plant after 132KV TL maintenance |
| 16. | 30-Jul-19 | 6:08 | Discussed with ABB Person Checked all cable tightness found ok, Reset the fault and charged the Inverter on full Load |
| 17. | 30-Aug-19 | 2:15 | Charged the feeder after the completion of ABT Meter calibration |
| 18. | 19-Sep-19 | 0:20 | Grid failure at GSS Due to E/F Operated |
| 19. | 07-Oct-19 | 0:48 | Inverter main auxiliray supply fail due to loose connection at T.B ,we found that one and immedatiely tightened the T.B |

For Hindurpur Solar -40 MW

| S.no | Date | Duration | Remarks |
|---|---|---|---|
| 1. | 29-Aug-18 | 6:38 | Block 7 HT panel tripped in Earth Fault and Over current |
| 2. | 29-Aug-18 | 6:38 | Block 7 HT panel tripped in Earth Fault and Over current |
| 3. | 29-Aug-18 | 6:38 | Block 7 HT panel tripped in Earth Fault and Over current |
| 4. | 29-Aug-18 | 6:38 | Block 7 HT panel tripped in Earth Fault and Over current |
| 5. | 16-Nov-18 | 11:31 | Checked and found phase sensor & fault indicator blown sor so removed its from circuit and megger value checked ,cleaned , and block OG and incomer2 end termination done,tighted & reset & start ok. |
| 6. | 30-Mar-19 | 1:08 | inv 3 tripped due to APP.Error.44 and communication 8 fault,as per instructions communicated with ABB service engineers and restored |

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|---|---|---|---|
| 7. | 08-Jun-19 | 3:32 | Feeder 4 tripped on E/L ,During line patroling we found small branch of tree fall on line due to heavy wind |
| 8. | 08-Jun-19 | 0:19 | Feeder 1&4 are in same pole so Feeder 1 taken LC for rectification of Feeder 4. |
| 9. | 08-Jun-19 | 2:05 | feeder 1 trip on E/L from Plant end due to CT & PT cables damaged due to rat entry |
| 10. | 17-Jun-19 | 5:03 | Block 6 IDT 12 tripped in earth fault, related ckt checked then start |
| 11. | 24-Jul-19 | 0:14 | Feeder 1 tripped on Earth fault, Trail charge taken ,T/M line withstanded and charged the feeder |
| 12. | 31-Jul-19 | 3:41 | Inverter 25 tripped on Earth fault and Over current fault, checked related Ckt. Found 2 no's 690V 1000A fuse failure in ISU |
| 13. | 21-Aug-19 | 2:04 | Feeder 4 tripped on E/L fault , T/M line patroling done, foung Snake crawling on the Pole and touches PH to Earth, LC Taken and removed the snake and Feeder charged. |
| 14. | 20-Sep-19 | 1:13 | Feeder 2 Trippped due to LA blast in HT Panel, LAs and PT fuses replaced and Restarted the Feeder. |
| 15. | 26-Sep-19 | 1:24 | Feeder 2 Failure due to Heavy rains and thunders |
| 16. | 26-Sep-19 | 1:24 | Feeder 3 Failure due to Heavy rains and thunders |
| 17. | 28-Sep-19 | 12:08 | Inverter 39 Operated In Group 2, Due to Isu 2 LC filter fan Failure. |
| 18. | 27-Nov-19 | 0:13 | Feeder 3 tripped on E/L fault due to Bird flash, trail charge taken T/M line withstanded and feeder charged. |