

SOLAR GROUPED PROJECT BY ACME GROUP (EKIESL-VCS-AUG-16-01)



Document Prepared By EKI Energy Services Limited

Project Title	Solar Grouped project by ACME Group (EKIESL-VCS-Aug-16-01)
Version	4
Date of Issue	17-07-2017
Monitoring Period	22-06-2015 to 31-01-2017
Prepared By	Manish Dabkara, EKI Energy Services Ltd.
Contact	Office No 201, Plot No 48, Scheme 78, Part 2, Vijay Nagar, Indore, Madhya Pradesh 452010 , Telephone +91-0731-4289086, e mail manish@enkingint.org

Table of Contents

1	Project Details	3
1.1	Summary Description of the Project and its Implementation Status	3
1.2	Sectoral Scope and Project Type.....	10
1.3	Project Proponent	10
1.4	Other Entities Involved in the Project.....	13
1.5	Project Start Date	13
1.6	Project Crediting Period	13
1.7	Project Scale and Estimated GHG Emission Reductions or Removals.....	14
1.8	Description of the Project Activity.....	16
1.9	Project Location.....	18
1.10	Conditions Prior to Project Initiation	19
1.11	Compliance with Laws, Statutes and Other Regulatory Frameworks.....	20
1.12	Ownership and Other Programs	20
1.12.1	Project Ownership	20
1.12.2	Emissions Trading Programs and Other Binding Limits	20
1.12.3	Other Forms of Environmental Credit	21
1.12.4	Participation under Other GHG Programs	21
1.12.5	Projects Rejected by Other GHG Programs	21
1.13	Additional Information Relevant to the Project.....	21
2	Application of Methodology	25
2.1	Title and Reference of Methodology	25
2.2	Applicability of Methodology.....	26
2.3	Project Boundary.....	30
2.4	Baseline Scenario	32
2.5	Additionality	33
2.6	Methodology Deviations.....	42
3	ESTIMATed GHG Emission Reductions and Removals.....	42
3.1	Baseline Emissions	42
3.2	Project Emissions.....	47
3.3	Leakage.....	47
3.4	Estimated Net GHG Emission Reductions and Removals	47
4	Monitoring.....	48
4.1	Data and Parameters Available at Validation	48
4.2	Data and Parameters Monitored	49
4.3	Monitoring Plan	50
5	Safeguards	52
5.1	No Net Harm	52
5.2	Environmental Impact	52
5.3	Local Stakeholder Consultation	52
5.4	Public Comments	52
6	ACHieVED GHG Emission Reductions and Removals.....	53
6.1	Data and Parameters Monitored	53
6.2	Baseline Emissions	53
6.3	Project Emissions.....	53
6.4	Leakage.....	53
6.5	Net GHG Emission Reductions and Removals.....	54
	APPENDIX 1: Meter calibration details.....	55
	APPENDIX 2: IRR Results.....	56

1 PROJECT DETAILS

1.1 Summary Description of the Project and its Implementation Status

The proposed grouped project activity is a step towards supporting the implementation and installation of grid connected renewable energy power plants in India. The implementation of grouped project activity ensures energy security, diversification of the grid generation mix and sustainable growth of the electricity generation sector in India.

The main goal of grouped project activity is to implement renewable energy projects in the country and the significant importance of revenues from sale of Verified Carbon Units (VCUs) to achieve this goal forms the basis of the implementation of this grouped project activity. The grouped project activity is a voluntary action and each SPV will be the Project Proponent for their project activity Instance. ACME Group as a parent company formed different SPV (Special Purpose Vehicles) for solar projects and projects are developed by name of SPVs. There are no mandatory laws or regulations existing in India requiring PP or any other party to develop a programme for renewable generation plants.

The grouped project activity will support the development of new grid-connected renewable energy power plants in India and will cover the solar energy technologies. It seeks to enable investment in large scale and small scale grid connected plants that export their generated output to the regional / national electricity grid in India.

All project activity instances within this grouped project activity will consist of single solar renewable technology. Also an individual project activity instance will either be small-scale project activity instance (having methodology AMS I.D version 18) or large-scale project activity instance (having methodology ACM0002 version 17).

The electricity generated by renewable technology (solar) installed as part of the grouped project activity will be supplied either to the regional grid and/or will be supplied to the identified facility via regional grid through a contractual wheeling agreement for captive consumption there by displacing the consumption of electricity from the regional grid electricity distribution system. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Thus for this Project activity instances Indian Grid is applicable.

The objective of the grouped project activity is to develop a platform for reducing VCS Registration timelines and process costs for registration of individual projects under VCS.

All the project instances i.e. renewable energy generation solar PV plants to be included in this grouped project will be from within India only. Hence the location and geographical boundary of the grouped project can be defined as India. The estimated annual emission reductions over a 10 year period of first crediting period from initial 11 project activity instances are 730,457 tCO₂e/year. The total emission reductions for 10 years crediting period will be 7,304,570 tCO₂e.

It is to be noted that SPV - Mihit Solar Power Private Ltd have three projects (25 MW+25 MW+24MW=74 MW) in Punjab state and all these three projects are considered under single project activity instance.

All 11 project activity instances are commissioned and the commission dates are mentioned in section 1.8 of this document.

The total GHG Emission reductions generated in current monitoring period of 22/06/2015 to 31/01/2017 are 475,380 tCO₂e

More project activity instances will be included in the grouped project activity in future. These new instances will also be grid connected solar renewable energy power plants will contribute to GHG emission reductions. These new project activity instances will be of small scale or large scale project activity.

Scenario existing prior to the implementation of project activity:

The scenario existing prior to the implementation of the project activity instances, 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".

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as "a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity".

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology is the following:

The baseline scenario is that the 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 into the grid.

Hence, pre-project scenario and baseline scenario are the same.

TECHNICAL SPECIFICATIONS OF PROJECT ACTIVITY

1. Mihit Solar Power Private Ltd.

a) Mihit Solar Power Private Ltd kherakhurd 25 MW

Technical detail of the equipment	Remark
Technology	Photovoltaic cell Seasonal tilt 5&25
Solar photovoltaic module	250,255,260Wp Modules of make - BYD/TELESON
No. of modules	102792
Total Number of Invertors	29 Units
Transformer numbers and KVA ratings	11 T/F & 5 T/F-5KVA&5 T/F -4008KVA&1T/F-22500 KVA
Central inverters of nominal AC power, output KVA rating , make etc	SCHNIDER-680 KVA
Technical & Operational Lifetime	25 years

b) Mihit Solar Power Private Ltd. Mankhera 25 MW

Technical detail of the equipment	Remark
Technology	Polycrystalline modules, seasonal tilt (Oct to March- 25°, April to Sep- 5°)
Solar photovoltaic module	Talesun-255Wp Talesun-260 Wp BYD-250 Wp BYD-255Wp BYD-260 Wp
No. of modules	102912
Total Number of Invertors	29
Transformer numbers and KVA ratings	Power transformer: 22.5/25 MVA (1 Nos), Aux. Trafo: 100 KVA(1 Nos), Inv. Trafo.: 4080 KVA (5 Nos) Aux Trafo. ICR: 5 KVA (5 Nos)
Central inverters of nominal AC power, output KVA rating , make etc	680 KVA Conext Core XC series Make:- Schneider
Technical & Operational Lifetime	25 years

c) Mihit Solar Power Private Ltd. Jhandekalan 24 MW

Technical detail of the equipment	Remark
Technology	Polycrystalline modules on Seasonal Tilt 25 degree & 5 degree.
Solar photovoltaic module	Waree China - 250wp (37915 Nos.) Waree China - 255wp (1826 Nos.) Waree China - 260wp (4563 Nos.) Waree China - 265wp (182 Nos.) Waree India - 250wp (12750 Nos.) Waree India - 255wp (24492 Nos.) Waree India - 260wp (14400 Nos.) TELSUN - 260wp (3136 Nos.)
No. of modules	99264
Total Number of Invertors	19 Units
Transformer numbers and KVA ratings	Power transformer: 25000 KVA(1 Nos)-Make: Schneinder Aux. Trafo: 100 KVA(1 Nos)-Make: GTB(Ludhiana) Inv. Trafo: 4000 KVA(5 Nos)-Make: Sudhir Aux. Trafo ICR: 5KVA(5 Nos)-Make: Shivalic

Central inverters of nominal AC power, output KVA rating , make etc	1000 KW, ABB - Total 12 Nos. 1000 KW, TBEA - Total 7 Nos.
Technical & Operational Lifetime	25 years

2. ACME Jaisalmer Solar Power Pvt. Ltd., Rayachoti (20 MW)

Technical detail of the equipment	Remark
Technology	Polycrystal modules on Seasonal Tilt at 3 degrees and 15 degrees
Solar photovoltaic module	250Wp Modules of make - BYD, 255Wp Modules of make -BYD, 260Wp Modules of make -BYD, 260Wp Modules of make - Talesun
No. of modules	99096
Total Number of Invertors	20 Units
Transformer numbers and KVA ratings	4 Nos - 4MVA, 2 Nos - 2MVA, 1Nos-100KVA
Central inverters of nominal AC power, output KVA rating , make etc	1MVA-ABB - 16Nos, 1MVA - TBEA - 4 Nos.
Technical & Operational Lifetime	25 years

3. Aarohi Solar Pvt. Ltd., Hindupur (50 MW)

Technical detail of the equipment	Remark
Technology	1)Thin film - CIS technology, 2)Crystalline.
Solar photovoltaic module	Thin film-165 Wp,170 Wp Modules of make - Solar Frontier. Crystalline - 265 Wp,270 Wp TALESUN.
No. of modules	334752 No's
Total Number of Invertors	50 Units
Transformer numbers and KVA ratings	12-4MVA,1-2MVA,2-25MVA Power Trafo.
Central inverters of nominal AC power, output KVA rating , make etc	each 1 MVA ABB make inverters.
Technical & Operational Lifetime	25 years

4. Dayanidhi Solar Power Pvt. Ltd., Shanthipuram (40 MW)

Technical detail of the equipment	Remark
Technology	Poly Crystalline 3 Deg & 15 Deg (Seasonal Tilt)

Solar photovoltaic module	BYD,TALESUN(250W,255W,260W)
No. of modules	188232
Total Number of Invertors	38 No's (In operation), 3 No's (Not in Operation) using As spare
Transformer numbers and KVA ratings	20MVA(2Power Trafo's),4 MVA (9 Trafo's) & 2 MVA (1 Trafo),100KVA (2 Trafo's) Spare:- 2MVA(1 Trafo),100KVA(1Trafo)
Central inverters of nominal AC power, output KVA rating , make etc	ABB:-14 No's PVS 800-57-1000KW-C TBEAA:-24NO's TBEA1000KH-M
Technical & Operational Lifetime	25 years

5. Niranjana Solar Energy Pvt. Ltd., Pathikonda (20 MW)

Technical detail of the equipment	Remark
Technology	Poly Crystalline modules on Seasonal Tilt at 3 & 15 degrees
Solar photovoltaic module	250,255&260 Wp Modules of make - BYD&Talesun
No. of modules	97872
Total Number of Invertors	20
Transformer numbers and KVA ratings	BO-15-455-1 ->2000KVA, BO-15-455-2 ->2000KVA, BO-15-454-1->4000KVA, BO-15-454-2 ->4000KVA, BO-15-454-3->4000KVA, BO-15-454-4 ->4000KVA,
Central inverters of nominal AC power, output KVA rating , make etc	Inverters -1000KW ,Make -ABB
Technical & Operational Lifetime	25 years

6. Vishwatma Solar Energy Pvt Ltd., Yemmiganur (30 MW)

Technical detail of the equipment	Remark
Technology	Polycrystalline modules silicon technology with seasonal Tilt at 3 and 15 degrees
Solar photovoltaic module	250,255 and 260 Wp Modules of make - BYD and TELESUN
No. of modules	143376
Total Number of Invertors	30 Units
Transformer numbers and KVA ratings	1 in no 30MVA,7 in no 4MVA,1 in no 2MVA and 1 in no 100KVA

Central inverters of nominal AC power, output KVA rating , make etc	1100KVA, 26 in no TBEA make and 4 in no ABB make
Technical & Operational Lifetime	25 years

7. Acme Raipur Solar Power Pvt. Ltd., Bagbera (30 MW)

Technical detail of the equipment	Remark
Technology	Thin Film-CdTe modules on variable Tilt at 5 Sep _ Apr and 21 Apr to Sep
Solar photovoltaic module	Talesun & BYD - 250,255 &260
No. of modules	118776
Total Number of Invertors	28
Transformer numbers and KVA ratings	Main Power transformer 1 Make ABB 25/30 MVA
Central inverters of nominal AC power, output KVA rating , make etc	24 ABB 1000KW & 6 SUNGRO 630KW Inverter Transformer Raychem RPG 6 nos. – 4MVA & 1 no. -2.5MVA
Technical & Operational Lifetime	25 years

8. Dayakara Solar Power Pvt Ltd., Maddur (30 MW)

Technical detail of the equipment	Remark
Technology	Poly Crystalline modules - Silicon technology on seasanol Tilt at 3 & 23 degrees
Solar photovoltaic module	250W, 255W`` Wp Modules of make - BYD 255W, 260W, 265`` Wp Modules of make - RISEN 260W, 265W`` Wp Modules of make - SUNTECH 255W, 260W, 265W`` Wp Modules of make TALESUN
No. of modules	1,49,256
Total Number of Invertors	30 Units
Transformer numbers and KVA ratings	30MVA - 1 No's , 4MVA- 7 No's, 2MVA- 1 No's, 100KVA - 1 No's
Central inverters of nominal AC power, output KVA rating , make etc	TMeiC - 1MW - 22 No's ABB Make - 1MW - 8 No's
Technical & Operational Lifetime	25 years

9. Grahati Solar Energy Pvt Ltd., Balanagar (50 MW)

Technical detail of the equipment	Remark
Technology	Solar Photo voltaic module modules on seasonal tilting
Solar photovoltaic module	250,255,260,265 Wp Modules of make - BYD,RISEN SUNTECH TALESON
No. of modules	249648
Total Number of Invertors	50
Transformer numbers and KVA ratings	25MVA-2,4MVA-8,2MVA-8,1MVA-2,50KVA-2
Central inverters of nominal AC power, output KVA rating , make etc	380V 1000KW
Technical & Operational Lifetime	25 years

10. Acme Odisha Solar Power Pvt Ltd, Balongir, Odisha (25 MW)

Technical detail of the equipment	Remark
Technology	POLY CRYSTALLINE MODULE WITH SEASONAL TILTING (5,21 DEGREES)
Solar photovoltaic module	250,255 & 260 Wp module of trina solar
No. of modules	118992
Total Number of Invertors	37
Transformer numbers and KVA ratings	Inverter transformer: 9 nos (2720 KVA,380V/11kv) + 1 nos (700 KVA, 340V/11kv) Power transformer: 1 nos (25/30 MVA, 11kv/132kv)
Central inverters of nominal AC power, output KVA rating , make etc	33 nos of schneider (680kw, output: 380V)+ 4 nos of TBEA (630 kw,output:340V)
Technical & Operational Lifetime	25 years

11. Eminent Solar Power Pvt Ltd., Udham Singh Nagar District, Uttrakhand (12.5 MW)

Technical detail of the equipment	Remark
Technology	photovoltaic modules on Fixed Tilt at 15 degrees and 3 degrees
Solar photovoltaic module	260 Wp & 265 Wp Modules of make - Telsun
No. of modules	59256

Total Number of Invertors	12 Units
Transformer numbers and KVA ratings	2 x 4 MVA & 1 x 4.5 MVA
Central inverters of nominal AC power, output KVA rating , make etc	(380V AC,1.1 MWp,Inverter make:-TBEA)
Technical & Operational Lifetime	25 years

1.2 Sectoral Scope and Project Type

The project activity under consideration is a grouped project activity. The project activity instances as part of the grouped project will have following parameters

Sectoral Scope : 01 - Energy industries (renewable / non renewable sources)

Project Type : I - Renewable Energy Projects

Project Category:

For each project activity instances will apply only solar technology. However each project activity instances will be either small scale or large scale and not combination of two.

For large scale project activities, below large scale methodology will be applied

Title: ACM0002 Grid-connected electricity generation from renewable sources --- Version 17.0

Reference: ACM0002 Version 17

For small scale project activities, below small scale methodology will be applied

AMS-I.D.: Grid connected renewable electricity generation --- Version 18.0

1.3 Project Proponent

Organization name	Mihit Solar Power Private Ltd.
Contact person	Gursharan Jassal
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	ACME Jaisalmer Solar Power Pvt. Ltd.
Contact person	Gursharan Jassal

Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Aarohi Solar Pvt. Ltd
Contact person	Jyoti Arora
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Dayanidhi Solar Power Pvt. Ltd.
Contact person	Manish Karna
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Niranjana Solar Energy Pvt. Ltd.
Contact person	Yudhvir Singh Gulia
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Vishwatma Solar Energy Pvt Ltd.
Contact person	Ashish K. Saxena
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-

Email	-
-------	---

Organization name	Acme Raipur Solar Power Pvt. Ltd.
Contact person	Rajesh Sodhi
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Dayakara Solar Power Pvt Ltd
Contact person	Rajesh Sodhi
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Grahati Solar Energy Pvt Ltd
Contact person	Jyoti Arora
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Acme Odisha Solar Power Pvt Ltd
Contact person	Gursharan Jassal
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

Organization name	Eminent Solar Power Pvt. Ltd
Contact person	Gursharan Jassal
Title	Director
Address	Plot No.152, Sector – 44, Gurgaon -122 002, Haryana, India
Telephone	-
Email	-

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Ltd.
Role in the project	Project Consultancy
Contact person	Mr. Manish Dabkara
Title	CEO
Address	Office No 201, Plot No 48, Scheme 78, Part 2, Vijay Nagar, Indore, Madhya Pradesh 452010
Telephone	+919907534900
Email	manish@enkingint.org

1.5 Project Start Date

The first project activity instance of the grouped project under consideration was commissioned and power generation started on 22/06/2015. This project activity instance is SPV- Acme Odisha Solar Power Pvt Ltd under ACME group having installed capacity of 25 MW. Hence the project start date is defined as follows:

Project start date: 22/06/2015

1.6 Project Crediting Period

Project crediting period for grouped project activity is taken as 10 years renewable twice. Accordingly the start date of the first crediting period is 22/06/2015 and end date will be 21/06/2025.

First crediting period is from 22/06/2015 to 21/06/2025.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

As per section 3.9.1 of VCS standard Version 3.6, the projects are classified as follows:

- 1) Projects: Less than or equal to 300,000 tonnes of CO₂e per year
- 2) Large projects: Greater than 300,000 tonnes of CO₂e per year

Each project activity instances being included under grouped project activity currently have less than 300,000 tCO₂e per year emission reductions, hence these project activity instances are classified as “Projects”. However in case of any project activity instance, if GHG emission reductions or removals are greater than 300,000 tonnes of CO₂e per year, then project activity instances are considered as Large projects.

Similarly, the estimated GHG Emission Reductions will depend upon the power generation capacity of individual project activity instances. The emission reductions achieved as part of grouped project activity will increase as per addition of new project activity instances in the future.

However, estimated Emission Reduction for the initial project activity instances being included in the grouped project activity are as follows:

Project Activity Instance	Project Proponent Name	Estimated Annual Emission Reductions (tCO ₂ e)
1	Mihit Solar Power Private Ltd.(25 MW)	40,682
	Mihit Solar Power Private Ltd. (25 MW)	40,682
	Mihit Solar Power Private Ltd. (24 MW)	39,054
2	ACME Jaisalmer Solar Power Pvt. Ltd.	43,405
3	Aarohi Solar Pvt. Ltd.	1,05,002
4	Dayanidhi Solar Power Pvt. Ltd.	78,794
5	Niranjana Solar Energy Pvt. Ltd.	41,932
6	Vishwatma Solar Energy Pvt Ltd.	57,091
7	Acme Raipur Solar Power Pvt. Ltd.	51,567

8	Dayakara Solar Power Pvt Ltd	59,918
9	Grahati Solar Energy Pvt Ltd	98,493
10	Acme Odisha Solar Power Pvt Ltd	49,310
11	Eminent Solar Power Pvt Ltd.	24,527
	Total	730,457

The categorization of project activity instances is as follows: All initial project activity instances fall in the category of 'Projects'

Project Scale	
Project	√
Large project	

Total emission reductions for all initial project activity instances being included in the grouped project are as below

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	730,457
Year 2	730,457
Year 3	730,457
Year 4	730,457
Year 5	730,457
Year 6	730,457
Year 7	730,457
Year 8	730,457
Year 9	730,457
Year 10	730,457
Total estimated ERs	7,304,570
Total number of crediting years	10
Average annual ERs	730,457

The above annual estimation for all initial project activity instances is based on estimated PLF and total capacity of all project activity instances, irrespective of commissioning date of project activity instances, thus in actual emission reductions vary based on actual PLF and commissioning date of project activity instance.

1.8 Description of the Project Activity

The proposed project activities fall under Sectoral Scope I: “Energy industries (renewable-/non-renewable sources)”.

The renewable energy generation technologies proposed to be employed under the project activity instances will be of single technology i.e Solar projects:

(a) Solar Power Plant/Unit;

In case of photovoltaic (PV) plant/unit, the project activity instances would use solar energy to generate direct current from photo voltaic modules that will be converted into alternating current by inverters.

The project activity instances under grouped project activity will be grid connected and will install a new power plant (i.e solar PV) at a site where no renewable power plant was operating prior to the implementation of the project activity (green-field plant). The generated electricity will be supplied to grid or uses grid network for captive or third party sale.

The project activity instances will be either small scale project activities (with power generation capacity less than 15 MW) or large scale project activities (with power generation capacity more than 15 MW). However project activity follows AMS I.D Version 18 or ACM0002 Version 17 based on scale of project activity instances.

Baseline Scenario:

As per the applicable methodology, a Greenfield power plant is defined as “a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity”.

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology is the following:

The baseline scenario is that the 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 into the grid.

Hence, pre-project scenario and baseline scenario are the same.

The estimated lifetime of the project activity is considered as 25 years for solar technology. This may increase depending on the operation & maintenance of the plant.

The installed capacity of each SPV is mentioned as below

PP Name	MW	COD	State	Project Location	Latitude (N)	Longitude (E)
Mihit Solar Power	25	21/03/2016	Punjab	Kherakhurd	29.66	75.26

Private Ltd.						
Mihit Solar Power Private Ltd.	25	21/03/2016	Punjab	Mankhera	29.59	75.24
Mihit Solar Power Private Ltd.	24	28/02/2016 (for 11.5 MW) 30/03/2016 (for 12.5 MW)	Punjab	Jandekalan	29.62	75.20
ACME Jaisalmer Solar Power Pvt. Ltd.	20	12/05/2016	Andhra Pradesh	Raichotti	14.11	78.78
AaroHi Solar Pvt. Ltd.	50	29/03/2016	Andhra Pradesh	Hindupur	13.98	77.48
Dayanidhi Solar Power Pvt. Ltd.	40	01/04/2016	Andhra Pradesh	Shantipuram	12.88	78.38
Niranjana Solar Energy Pvt. Ltd.	20	31/03/2016	Andhra Pradesh	Patthikonda	15.36	77.49
Vishwatma Solar Energy Pvt Ltd.	30	02/04/2016 (for 10 MW) 30/04/2016 (for 20 MW)	Andhra Pradesh	Yemmiganur	15.67	77.47
Acme Raipur Solar Power Pvt. Ltd.	30	09/01/2016 (for 23 MW) 15/03/2016 (for 7 MW)	Chattishgarh	Bagbera	21.12	82.48
Dayakara Solar Power Pvt Ltd	30	21/06/2016	Telangana	Maddur	16.88	77.58
Grahati Solar Energy Pvt Ltd	50	20/07/2016 (for 20 MW) 03/08/2016 (for 30 MW)	Telangana	Balanagar	16.93	78.13
Acme Odisha Solar Power Pvt Ltd	25	22/06/2015	Odisha	Balongir,	20.54	83.38
Eminent Solar Power Pvt Ltd.	12.5	09/02/2017	Uttarakhand	Uddham Singh Nagar	29.2	79.1

COD – Date of Commissioning

SPV Name	MW	State	Project Location /Sub Station	Village	Tehsil	District
Mihit Solar Power	25	Punjab	Kherakhurd	Khaira	Sardulgarh	Mansa

Private Ltd.				Khurd		
Mihit Solar Power Private Ltd.	25	Punjab	Mankhera	Mankhera	Sardulgarh	Mansa
Mihit Solar Power Private Ltd.	24	Punjab	Jandekalan	Jhande Kalan	Sardulgarh	Mansa
ACME Jaisalmer Solar Power Pvt. Ltd.	20	Andhra Pradesh	Rayachoti	Pothukur upalli	Ramapuram Mandal	Kadapa
Aarohi Solar Pvt. Ltd.	50	Andhra Pradesh	Hindupur	Kalipi	Roddam Mandal	Anathapur
Dayanidhi Solar Power Pvt. Ltd.	40	Andhra Pradesh	Shanthipuram	Gunjarlapalle & Morasana palle	Shanthipuram Mandal	Chittoor
Niranjana Solar Energy Pvt. Ltd.	20	Andhra Pradesh	Pathikonda	Puchakayalamanda	Pathikonda Mandal	Kurnool
Vishwatma Solar Energy Pvt Ltd.	30	Andhra Pradesh	Yemmiganur	Kadivella	Yemmiganur	Kurnool
Acme Raipur Solar Power Pvt. Ltd.	30	Chattishgarh	Bagbera	Bhikapali	Bagbahara	Mahasamund
Dayakara Solar Power Pvt Ltd	30	Telangana	Maddur	Damkanpur	Maddur	Mehbubnagar
Grahati Solar Energy Pvt Ltd	50	Telangana	Balanagar	Narellapalli	Balanagar	Mehbubnagar
Acme Odisha Solar Power Pvt Ltd	25	Odisha	Balongir	Mursing & Sikuan	Deogaon	Bolangir
Eminent Solar Power Pvt Ltd.	12.5	Uttarakhand	Udham Singh Nagar	Ratanpur Bazpur	Bajpur	Udham Singh Nagar
Total	381.5					

1.9 Project Location

All the project activity instances in the proposed grouped project activity would be located within geographical boundaries of Republic of India. Thus geographical area of grouped project is India.

The geographical boundary is delineated in the form of extreme geographic coordinates as follows:¹

The geographical boundary is delineated in the form of extreme geographic coordinates of India country as follows

Latitude - 8°4' to 37°6' N

Longitude - 68°7' to 97°25' E

Please refer below web link for the range of co-ordinates

https://en.wikipedia.org/wiki/Geography_of_India

The kml file for India is submitted to DOE.

The map of India is as indicated in the following figure:

¹ Precise latitude and longitude details are provided in section 1.8 of this monitoring report.



1.10 Conditions Prior to Project Initiation

The project activity instances as part of the proposed grouped project activity are Greenfield renewable power generation projects. These will be installed at locations where there was no power generation activity at the site. In the absence of the project activity instances as part of the proposed grouped project activity, the equivalent amount of electricity would have been generated from the existing/new power plants connected to the grid.

Therein, the main emission source in the pre-project scenario are the grid connected power plants and the primary GHG involved is CO₂.

The project has not been implemented to generate GHG emissions for the purpose of their subsequent reduction, removal or destruction.

For this project activity, the baseline scenario is the same as conditions existing prior to project initiation. Please refer section 2.4 of joint VCS PD and MR for baseline scenario for the project activity.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Compliance related to following aspects will be provided for each of the project activity instance to be included in the grouped project activity:

- Commissioning certificates
- Power Purchase agreement with state electricity board

Apart from above, as per Central pollution Control Board directions No. B-29012/ESS (CPA) /2015-16 dated 07/03/2016, the wind/solar projects, the category of industries has been changes from Green to White. As per this re-categorisation exercise, "There shall be no necessity of obtaining the Consent to Operate" for White category of industries. An intimation to concerned SPCB / PCC shall suffice". As per this rule, No necessity of consent for non-polluting industries.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The renewable energy technology installed at site of each of the project activity instances as part of the proposed grouped project activity are under ownership of respective SPV/Project Proponent. These SPVs are a part of ACME group. The Power Purchase Agreement (PPA) for the project activity and commissioning certificate for project activity are the supporting documents to demonstrate the project ownership.

This demonstrates the right of use according to clause 3.11.1 (3) of VCS Standard (v3.6) – "a project ownership arising by virtue of a statutory, property or contractual right in the plant, equipment or process that generates GHG emission reductions and/or removals".

1.12.2 Emissions Trading Programs and Other Binding Limits

The grouped project activity under consideration is not participating in any other Emission trading programme and other binding limits.

The all project activity instances are not participating at moment in any other emission trading programme and other binding limits. The GHG emission reductions generated during the current monitoring period have not been used for compliance of other mechanism.

1.12.3 Other Forms of Environmental Credit

The proposed grouped project activity neither has nor intends to generate any other form of GHG related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

The initial project activity instances are neither has nor intends to generate any other form of GHG related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

1.12.4 Participation under Other GHG Programs

The proposed grouped project activity has not been registered and is not seeking registration at moment under any other GHG programs.

The initial project activity instances are not participating in any other GHG program.

1.12.5 Projects Rejected by Other GHG Programs

The proposed grouped project activity is not participating in other Environmental credits, other GHG programs and has not been rejected by other GHG programs.

The initial project activity instances are not participating in other Environmental credits, other GHG programs and have not been rejected by other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is a grouped project and following are the eligibility criteria for inclusion of new project activity instances into the grouped project activity:

- 1) Applicability Conditions: The project activity instances shall meet applicability conditions for applicable methodology (either AMS I.D version 18 or ACM0002 Version 17) as defined in section 2.2
- 2) Geographical Area: The project activity instances to be included in the grouped project activity will be activities involving renewable electricity generation power plants with grid connection using solar technology located within India
- 3) Baseline scenario: All Project Activity Instances shall meet the baseline definition as defined in respective methodology and as explained in section 2.4
- 4) Technology type: The project activity instances to be included in the grouped project activity will be Greenfield activities involving renewable electricity generation power plants with grid connection using solar technology.
- 5) Additionality: The project activity instances to be added as part of the grouped project will meet additionality criteria as set out in the methodology.

For small scale project activity instances - As per Guidelines on the Methodological Tool for the demonstration of additionality of small- scale project activities - Version 10.0.0 (EB 83, Annex 14), a positive list of grid-connected renewable electricity generation technologies are listed that are automatically defined as additional, without further documentation of barriers.

The positive list comprises of the following grid-connected renewable electricity generation technologies of installed capacity up to 15 MW:

- 1) Solar technologies (photovoltaic and solar thermal electricity generation);
- 2) Off-shore wind technologies;
- 3) Marine technologies (wave, tidal).
- 4) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW;

Since the small scale project activity instances involves solar photovoltaic electricity generation projects, it can be concluded from the above list that this project activity is automatically additional and does not require demonstration of barriers.

For large scale project activity instances: For large scale project activity instances, investment analysis will be followed and additionality tool “Tool for the demonstration and assessment of additionality” and methodological tool “Investment Analysis” will be used.

Thus each project activity instance will follow consistent characteristics in terms of additionality based on scale of project activity instances.

6) Start Date: The start date of each project activity instance under the grouped project should not be prior to the start date of the grouped project. The start date of each project activity instance will be determined through documentary evidence.

7) Conditions that avoid double counting of emission reductions like unique identifications of project and claiming emission reduction only under one GHG program.

8) The Grouped Project specific requirements stipulated by the Entity responsible for coordinating and managing grouped project for conducting local stakeholder consultations and environmental impact assessment (EIA), as applicable.

9) The project activity using solar project will supply electricity to grid or to users through grid network.

The following table demonstrates how the initial project activity instances being included in the grouped project activity fulfil above mentioned eligibility conditions:

Sr. No	Eligibility Criteria	Project Activity instances eligibility
1	Applicability Conditions: The project activity instances shall meet	All initial project activity instances meet respective applicability conditions of

	applicability conditions for applicable methodology (either AMS I.D version 18 or ACM0002 Version 17) as defined in section 2.2	methodology ACM0002 Version 17 (for initial 10 project activity instances) and AMS I.D Version 18 (for initial 1 project activity instance), hence this eligibility criteria is fulfilled. Please refer section 2.2 of this document for applicability criteria.
2	Geographical Area: The project activity instances to be included in the grouped project activity will be activities involving grid connected renewable electricity generation using solar technology located within India.	All initial project activity instances being included in the grouped project are located within geographic boundaries of India. Hence this condition is fulfilled. Please refer commissioning certificate, PPA for Geographical area of project activity.
3	Baseline scenario: All Project Activity Instances shall meet the baseline definition as defined in respective methodology and as explained in section 2.4	All initial project activity instances have same baseline as per methodology as detailed in subsequent sections. Hence this eligibility criteria is fulfilled. Please refer section 2.4 of this document for baseline scenario.
4	Technology type: The project activity instances to be included in the grouped project activity will be Greenfield activities involving grid connected renewable electricity generation using solar PV technology. The electricity should be supplied to grid, or to third party or to be used for captive purpose etc.	All initial project activity instances being included in the grouped project activity are solar PV power plants connected to grid and are green field activities. The generated electricity is supplied to grid. Hence this condition is fulfilled. Please refer PO / Commissioning certificate/PPA for the technology of project activity.
5	Additionality: The project activity instances to be added as part of the grouped project will meet additionality criteria as set out in respective methodologies - for Small Scale Project instances the methodology applicable will be AMS-I.D and for Large Scale Project instances methodology applicable will be ACM0002. For small scale project, project activity instance will be auto additional. For large scale projects - investment analysis will be followed and additionality tool and methodological tool "Investment Analysis" will be used.	The initial 10 project activity instances being included in grouped project activity are large scale projects and their additionality is demonstrated as discussed in section 2.5 of this document. The initial 1 project activity instance is small scale project and is auto additional as discussed in section 2.5 of this document. Hence this condition is fulfilled. Please refer section 2.5 of this document for additionality.
6	Start Date: The start date of each project activity instance under the grouped project should not be prior to the start date of the grouped project. The start date of each project activity instance will be determined through documentary evidence.	The start date of grouped project is considered as 22/06/2015 which is commissioning date of project activity instance Acme Odisha Solar Power Pvt Ltd and start date of all other project activity instances is after this date. Hence this condition is fulfilled. Please refer section 1.5 of this document or commissioning certificate for start date of

		grouped project activity.
7	Conditions that avoid double counting of emission reductions like unique identifications of project and claiming emission reduction only under one GHG program	For initial project activity instances being included in grouped project activity, PP declaration has been provided and these project activity instances are not participating in any other GHG program. Hence this condition is fulfilled. Please refer PP declaration for no double accounting of GHG emission reductions.
8	The Grouped Project specific requirements stipulated by the Entity responsible for coordinating and managing grouped project for conducting local stakeholder consultations and environmental impact assessment (EIA), as applicable	For initial project activity instances being included in grouped project activity, EIA and local stakeholder consultation is not mandatory, hence this is not mentioned in VCS PD. The DOE validation contract is already signed prior to 19/04/2017. For new future project activity instances, local stakeholder consultation is required.
9	The project activity using solar PV project will supply electricity to grid or to users through grid network.	For initial project activity instances being included in grouped project activity, are supplying electricity to grid. Please refer PPA of the project activity for same.

Leakage Management

Since the project activity instances to be included into the grouped project activity are renewable energy projects based on solar technology, no leakage emissions are considered.

Thus leakage management plan and implementation of leakage and risk mitigation measures are not applicable for this grouped project activity.

Commercially Sensitive Information

Not applicable. No any commercially sensitive information has been excluded from the public version of the project description. There is no commercially sensitive information.

Sustainable Development

Apart from generation of renewable electricity, the grouped project activity and project activity instances proposed to be included under it would contribute to the sustainable development of the region - socially, environmentally and economically. Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development.

1. Social well-being;
2. Economic well-being;
3. Environmental well-being; and
4. Technological well-being

Social well-being

- The project activity instances under grouped project activity will result in creating job opportunities for the local population on temporary and permanent basis. Manpower is required both during

erection and operation of the renewable energy projects. This would result in the improvement in living standards of the local community.

- The installation of the renewable energy projects also led to development of basic infrastructure like roads, communication with the nearby cities etc. which also improved in living standards of the local population.

Economic well-being

- The project activity instances under grouped project activity will create direct and indirect job opportunities to the local community during installation and operation of the renewable energy projects.
- The investment for the project activity instances under grouped project activity would lead to the improvement in the economic activity in the local area.

Environmental well-being

- The project activity instances under grouped project activity utilizes renewable energy for generating electricity which otherwise would have been generated through alternate fuel (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. As renewable energy projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable resource, to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment.

Technological well-being:

Clean technology transfer in renewable energy generation and optimal use of renewable energy in the industry.

There is no any provision is required to monitor and report these sustainable development indicators as per national rules and regulations.

Further Information

Not Applicable.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The methodology for large scale project activity instances will be the approved methodology for large-scale CDM project activities. The details of the methodology are as follows:

Methodology: ACM0002

Project Type: Type-I: Renewable Energy Projects

Title: Grid-connected electricity generation from renewable sources

Version No.: Version 17;

Reference: CDM Methodology:

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

The methodology refers to following CDM Tools:

- Tool for the demonstration and assessment of additionality (Version 07.0.0)
(<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>)
- Tool to calculate emission factor for an electricity system (Version 05.0)
(<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf>)

The methodology for small scale project activity instances will be the approved methodology for small-scale CDM project activities. The details of the methodology are as follows:

Methodology: AMS I.D

Project Type: Type-I: Renewable Energy Projects

Title: Grid connected renewable electricity generation

Version No.: Version 18;

Reference: CDM Methodology:

<https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

The methodology refers to following CDM Tools:

- Tool to calculate emission factor for an electricity system (Version 05.0)
(<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf>)

2.2 Applicability of Methodology

The Large Scale project activity instances under grouped project activity will meets the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 17.0, Sectoral Scope 1, as described below:

Applicability	Project activity vis-à-vis applicability Conditions
This methodology is applicable to grid-connected renewable power generation project activities that: • install a Greenfield power plant; • involve a capacity addition to (an) existing plant(s); • involve a retrofit of (an) existing operating plants/units; • involve a rehabilitation of (an) existing plant(s)/unit(s) or • involve a replacement of (an) existing plant(s)/unit(s).	The project activity instances under grouped project activity is installation of a new grid connected renewable energy power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.
The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;	The proposed project activity instances under grouped project activity will be an installation of a new grid connected solar renewable energy power plant and hence this condition is met.
In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	The proposed project activity instances under grouped project activity does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable.
In case of hydro power plants, one of the following	The proposed project activity instances under

conditions shall apply: • The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or • The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m²; or • The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m².	grouped project activity is a grid connected solar renewable energy power project. This condition is applicable only for hydro power plants and not applicable for solar projects. Hence this criteria is not applicable.
The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m², all of the following conditions shall apply: • The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m²; • Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; • Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be; ✓ Lower than or equal to 15 MW; and ✓ Less than 10 per cent of the total installed capacity of integrated hydro power project.	The proposed project activity instances under grouped project activity is a grid connected solar renewable energy power project. This condition is applicable only for hydro power plants and not applicable for solar projects.
In the case of integrated hydro power projects, project proponent shall: • Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or • Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The proposed project activity instances under grouped project activity is a grid connected solar renewable energy power project. This condition is applicable only for hydro power plants and not applicable for solar projects.
Methodology is not applicable to the following • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants/units	The project activity instances under grouped project activity will be installation of a new grid connected solar renewable energy power project and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the grouped project activity.

	This grouped project activity does not involve any biomass based power plants and hence this criterion is not applicable to the project activity.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity instances under grouped project activity will be a new grid connected solar renewable energy power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions of "Tool to calculate the emission factor for an electricity system"	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Since project activity instances under grouped project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity instances under grouped project activity will be located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO2 emission factor of biofuels is zero.	Each project activity instances under grouped project activity will be grid connected renewable energy project and CO2 emission factor is not considered for biofuels.

The small Scale project activity instances under grouped project activity will meets the applicability conditions of the approved consolidated baseline and monitoring methodology AMS I.D, Version 18.0, Sectoral Scope 1, as described below

Applicability	Project activity vis-à-vis applicability Conditions
---------------	---

1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid. (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is a Renewable Energy Project i.e. Solar Photo Voltaic Power Project which falls under applicability criteria option 1(a) or option 1 (b). Hence the project activity meets the given applicability criterion.
2. Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", "AMS-I.F.: Renewable electricity generation for captive use and mini-grid" and "AMS-I.A.: Electricity generation by the user) applies is included in the appendix ² .	The 1 st option or 3 rd option (of Table 2 of AMS I.D. Version 18, EB 61 is applicable (please refer footnote) as project supplies electricity to national grid.
3. This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	The project activity instance is installation of new solar based electricity generation green field plants (not addition to existing system). Option a is applicable.
4. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: - The project activity is implemented in an existing reservoir with no change in the volume of reservoir; - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²; - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m².	The project is solar power project and thus the criterion is not applicable to this project activity.
5. If the new unit has both renewable and non-renewable	The small scale project activity instances

2

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid ² system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	involves only renewable component with capacity less than 15 MW. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable solar energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct ³ from the existing units.	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable, the solar project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS-I.C.: Thermal energy production with or without electricity” shall be explored.	The Project activity is a renewable solar Photovoltaic power project and is not a landfill gas, waste gas, waste water treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.	The Project activity is a renewable solar Photovoltaic power project and is not a biomass project. Hence the criteria is not applicable to the project activity.

2.3 Project Boundary

Project boundary has been ascertained using para 21 of ACM0002 (Version 17.0) and para 18 of AMS I.D Version 18 – “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to”.

Hence the project boundary includes the renewable energy power turbine generator, sub-stations, grid and all power plants connected to grid. The proposed project activity instances will evacuate power to the grid.

³ Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered “physically distinct”.

The boundary also extends to the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to”.

For project activity instances that have independent electricity meters installed for measurement of net electricity supplied to grid (i.e. the meters installed at the grid inter-connection point measure the electricity generation from the project activity instances only,) the project boundary would consists of dedicated meters.

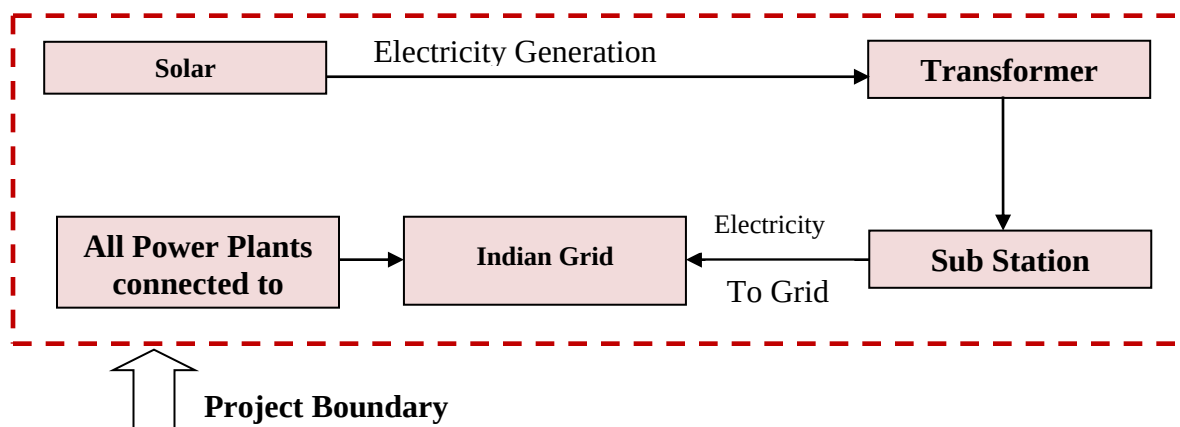
The initial project activity instances have dedicated metering arrangement.

For project activity instances that do not have independent electricity meters installed for measurement of net electricity exported to grid (i.e. the meters installed at the grid inter-connection point measure the combined electricity generation from the project activity instances as well as non-project activity instances project activities,) apportioning procedures would be adopted for the calculating the net electricity generation attributable to the project activity instances. The project boundary in such a project activity instances consists common meters.

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity instances Owner or project activity instances Implementer does not have any control on it. Thus for project activity instances, net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

It is to be noted that metering arrangement is under control of state electricity board and PP do not have any control on it.

The schematic representation of project boundary for grid connected project activity instances is represented as below



The sources and GHG gases involved for proposed Project activity instances are as below

Source		Gas	Included	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO ₂	Yes	Major emission sources.
		CH ₄	No	Excluded for simplification. This is conservative
		N ₂ O	No	Excluded for simplification. This is conservative

Source		Gas	Included	Justification/Explanation
Project activity	For geothermal power plants, fugitive emissions of CH ₄ and CO ₂ from non-condensable gases contained in geothermal steam	CO ₂	No	Project activity instances does not involve any Geothermal Power plant. Hence not applicable
		CH ₄	No	Project activity instances does not involve any Geothermal Power plant. Hence not applicable
		N ₂ O	No	Project activity instances does not involve any Geothermal Power plant. Hence not applicable
	CO ₂ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO ₂	No	Project activity instances does not involve solar thermal or geothermal power plants. Hence not applicable
		CH ₄	No	Project activity instances does not involve solar thermal or geothermal power plants. Hence not applicable
		N ₂ O	No	Project activity instances does not involve solar thermal or geothermal power plants. Hence not applicable
	For hydro power plants, emissions of CH ₄ from the reservoir	CO ₂	No	Project activity instances does not involve hydro power plants. Hence neglected

2.4 Baseline Scenario

As per the applicable methodology, a Greenfield power plant is defined as “a new renewable energy power plant that is constructed and operated at a site where no renewable energy power plant was operated prior to the implementation of the project activity”.

As the project activity falls under the definition of a Greenfield power plant, the baseline scenario as per applied methodology (ACM0002) and AMS I.D is the following:

As per para 19 of AMS I.D version 18.0; If the project activity is the installation of a Greenfield power plant

The baseline scenario is that the 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 into the grid.

As per para 23 of ACM0002 version 17.0; If the project activity is the installation of a Greenfield power plant

“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, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

Hence, the baseline for the project activity is the equivalent amount of power from the INDIAN grid.

The combined margin ($EF_{grid,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) (having weightage 25%) and build margin (BM) (having weightage 75%). Calculations for this combined margin must be based on data from an official source of CEA database (where available) and made publically available.

The combined margin of the INDIAN National Grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,y}$	0.9777 tCO ₂ /MWh	Combined margin CO ₂ emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO ₂ Emission Database, Version 11.0 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,OM,y}$	0.9941 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
$EF_{grid,BM,y}$	0.9285 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Calculated as per "Tool to calculate the emission factor for an electricity system, version 05.0.0" BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period. The data is obtained from "CO ₂ Baseline Database for Indian Power Sector" version 11.0, published by the Central Electricity Authority, Ministry of Power, Government of India.

2.5 Additionality

Additionality Assessment for small scale project activity Instances

As per Guidelines on the Methodological Tool for the demonstration of additionality of small- scale project activities⁴ - Version 10.0.0 (EB 83, Annex 14), a positive list of grid-connected renewable electricity generation technologies are listed that are automatically defined as additional, without further documentation of barriers.

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-21-v1.pdf>

The positive list comprises of the following grid-connected renewable electricity generation technologies of installed capacity up to 15 MW:

- 1) Solar technologies (photovoltaic and solar thermal electricity generation);
- 2) Off-shore wind technologies;
- 3) Marine technologies (wave, tidal).
- 4) Building-integrated wind turbines or household rooftop wind turbines of a size up to 100 kW;

Since the project activity instances is a solar photovoltaic electricity generation project of capacity less than 15 MW, it can be concluded from the above list that the project activity is automatically additional and does not require demonstration of barriers.

Thus, it is well established that the proposed small scale project activity instances are auto additional.

Additionality Assessment for large scale project activity Instances

In line with VCS Standard version 3.5, the additionality of the Project activity is ascertained in line with the applicable guidance from the UNFCCC. The demonstration of additionality for the proposed Project activity is being carried out in accordance with the additionality tool provided by the UNFCCC i.e. "Tool for demonstration and assessment of Additionality" Version 07.0.0,. The tool provides a step-wise approach to demonstrate additionality which is displayed below:

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first-of-its-kind. Hence not applicable.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity:

Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed VCS project activity.

The purpose of the project activity is to generate electrical power using solar energy and feed the electricity generated to the grid. Hence, the following alternatives are considered:

Alternative 1: The proposed project activity not undertaken as a VCS project activity.

The PP could proceed with the implementation of the project without Carbon credit benefits. The electricity produced from the renewable energy project would have been sold to the grid. This is in compliance with all applicable legal and regulatory requirements and can be a part of the baseline. However, the Project activity is not feasible without revenues from sale of Carbon Credits. This argument has been discussed in step 2 of the Additionality section.

Alternative 2: No proposed project activity and equivalent amount of energy would have been produced by the grid electricity system through its currently running power plants and by new capacity addition to the grid i.e. Continuation of the present situation.

The PP would have continued without investment in Project activity with usual business activities. The grid would continue with the fossil fuel based power projects and this would result in GHG

emissions. Hence, the new capacity add-on from a fossil fuel based power plant is appropriate, realistic & credible baseline alternative for the project activity.

Outcome of Sub-step 1a: All the realistic alternatives for the project activity have been enlisted above.

Sub-step 1b: Consistency with mandatory laws and regulations:

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using solar energy is not a legal requirement or a mandatory option.
- There are state and sectoral policies, framed primarily to encourage solar power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

Outcome of Sub-step 1b: Hence, both the alternatives enlisted above are found to comply with the mandatory laws and regulations taking into account the enforcement of the legislations in the region or country and EB decisions on national and/or sectoral policies and regulations. However, Alternative 2 has been selected as the appropriate baseline alternative for this project activity.

Step 2: Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of emission reductions credits. To conduct the investment analysis, use the following sub-steps:

Sub-step 2a: Determine appropriate analysis method

As per Tool for demonstration and assessment of Additionality; Sub-step 2a, Paragraph (1), as the project activity is selling the generated electricity & getting financial benefits other than CDM benefits hence, Option- I (Apply simple cost analysis) is not applicable under this situation. Also as per EB-92, Annex 5, Methodological Tool of "Investment Analysis" version 7, clause no.18 "In the cases of projects which could be developed by an entity other than the project participant the benchmark should be based on parameters that are standard in the market". Hence Option-II (Apply investment comparison analysis) is also not applicable under this situation. So the project promoter has chosen Option- III or benchmark analysis as an appropriate analysis method to demonstrate the investment barrier.

This method determines the attractiveness of the project activity for the investors, as well as provides a measure of the viability of the investment to generate revenues during its operation, as compared with other avenues and investment options. Hence, the Benchmark analysis method is to be employed for analysis of the said project.

Sub-step 2b (Option III): Apply benchmark analysis

The investment analysis using Benchmark analysis approach (Option III) has been chosen. Further, this method illustrates the evaluation of the Project by the PP before the decision to undertake the project was taken and management approval granted.

Choice of Financial Indicator:

According to the “Tool for demonstration and assessment of Additionality”, *the financial indicator can be based either on (1) project IRR or (2) equity IRR. There is no general preference between the approaches (1) or (2). The benchmark chosen for analysis shall be fully consistent with the choice of approach.* Therefore in accordance with the guidance, the relevant financial indicator for project activity has been chosen as Equity IRR.

Choice of Benchmark:

As per para 16 of Guidelines on the methodological Tool of the investment analysis (Annex 5, EB 92),

The applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR.

In the project activity, PP has considered the cost of equity as the benchmark for the project as per Appendix of methodological Tool “Investment Analysis” based on date of decision made for the project activity. Thus earlier guidelines of Investment Analysis default values are used for Benchmark determination. The default value of Return on Equity for Group-1 projects in India is 11.75% as per EB 62 Annex 5 dated 15/07/2011, 11.10% as per EB85 Annex 12 dated 24/07/2015. The same approach will be followed for future project activity instances.

As per paragraph 17 of the above mentioned document, “In situations where an investment analysis is carried out in nominal terms and the available IRR benchmarks are in real terms, project participants shall convert the real term values of benchmarks to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used”.

The investment analysis has been carried out in Nominal terms. Accordingly, Default value has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India). PP has calculated Benchmark based on WPI mean inflation rate. As per Para 17 of Appendix of EB 92, Annex 05, the inflation forecast should be for the duration of the crediting period. However, since RBI provides forecast inflation only for 5 & 10 years, the project investor has

calculated benchmark using 10 years durations and the same is considered as Benchmark for the project activity.

The benchmark has been computed in the following manner:

$$\text{Nominal Benchmark}^5 = \{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$$

Where,

Real Benchmark = Default Value, i.e., 11.75% (as per Appendix of Annex 5, EB 62) and 11.10% (as per Appendix of Annex 12, EB 85)

Inflation rate = Projected Inflation Rate for India in next 10 years (RBI Forecast)

Based on decision made for the large scale project activity, the inflation rate are taken from RBI forecast

Large scale project activity instances investment decision date:

Project Activity instance	PP Name	MW	Investment Decision Date
1	Mihit Solar Power Private Ltd.	25	15-03-2015
	Mihit Solar Power Private Ltd.	25	15-03-2015
	Mihit Solar Power Private Ltd.	24	25-02-2015
2	ACME Jaisalmer Solar Power Pvt. Ltd.	20	05-01-2015
3	Aarohi Solar Pvt. Ltd.	50	30-09-2015
4	Dayanidhi Solar Power Pvt. Ltd.	40	30-09-2015
5	Niranjana Solar Energy Pvt. Ltd.	20	30-09-2015
6	Vishwatma Solar Energy Pvt Ltd.	30	25-08-2015
7	Acme Raipur Solar Power Pvt. Ltd.	30	25-10-2015
8	Dayakara Solar Power Pvt Ltd	30	25-10-2015
9	Grahati Solar Energy Pvt Ltd	50	25-10-2015
10	Acme Odisha Solar Power Pvt Ltd	25	30-03-2014

The calculations of benchmark and IRR calculations are prepared in excel spreadsheet and same is submitted to DOE.

The Appendix 2 mentioned the result of IRR, Benchmark and sensitivity analysis.

Sub-step 2c: Calculation and comparison of financial indicators

⁵As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

The Post tax Equity IRR is evaluated for the entire lifetime of the project activity, i.e. 25 years. It is calculated based on the cash outflows from and cash inflows into the project activity.

The Appendix 2 mentioned the result of IRR, Benchmark and sensitivity analysis.

Key Assumptions supporting financial projections are provided in excel spreadsheet:

Based on result of IRR excel spreadsheets, equity IRR is less than Benchmark.

This substantiates that the investment is not financially attractive (Equity IRR for the project activity is less than the Benchmark). Thus it can be easily concluded that project activity is additional & is not business as usual scenario.

Sub-step 2c: Sensitivity Analysis:

As per Guidance 28 and 29 of EB 92 Annex 15, the sensitivity analysis of the project parameters which may substantially influence the Equity IRR is carried out to assess the robustness of the conclusion. These parameters are Generation, O&M cost, Tariff Rate, Project Cost etc.

The Appendix 2 mentioned the result of IRR, Benchmark and sensitivity analysis.

It can be observed from sensitivity table that in various scenarios wherein there are changes in tariff, O&M cost, electricity generation and project's capital cost, the equity IRR does not cross the benchmark. Thus, it can be concluded that revenue from sale of VERs is important to alleviate this gap and hence the project has been considered to be additional.

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice Analysis

Sub-step 4a: Analyze other activities similar to the proposed Project activity:

The common practice analysis is carried out step by step as per "Methodological tool: Common Practice, version 03.1" para 5. Stepwise approach for common practice are as follows:

This common practise analysis step is applicable only for large scale project activity instances. All large/small scale projects are operated under ACME Group, hence PP has categorised the project into two main categories, one as small scale projects and large scale projects.

All large scale projects of ACME Group are separated as different project activity instances based on Special Purpose vehicle (SPV) name just for transparency purpose, For the proposed VCS Grouped VCS Project activity, all large scale initial project activity instances are part of ACME Group. Thus common practise analysis is conducted considering all project activity instances together and India as a geographical region. The common practise analysis has been conducted considering the total capacity of current grouped project activity instances (though PP has total installed capacity more than capacity of current grouped project activity instances).

The total installed capacity of large scale project activity instances is 369 MW, thus common practise analysis is demonstrated based on 369 MW solar capacity. Considering this capacity of 369 MW, it is observed that there are no any similar projects in India. Thus total large scale project activity instances are not a common practise.

However in response to VCS Board review query, the common practise analysis was done based on individual project activity instance. Each state have different energy policy and tariff regulation is different for each state. Thus respective state of project activity instance is considered as geographical region for that project activity instance. As explained in section 1.1, Mihit Solar Power Private Ltd. SPV have three projects in Punjab state, thus all these 3 projects are considered as single project activity instance. Thus there are total 10 initial large scale project activity instances and their common practise analysis is demonstrated as below

Step (1): calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

Project Activity instance	PP (SPV) Name	MW	Range -50% in MW	Range +50% in MW
1	Mihit Solar Power Private Ltd. 25 MW	74	37	111
	Mihit Solar Power Private Ltd. 25 MW			
	Mihit Solar Power Private Ltd. 24 MW			
2	ACME Jaisalmer Solar Power Pvt. Ltd.	20	10	30
3	Aarohi Solar Pvt. Ltd.	50	25	75
4	Dayanidhi Solar Power Pvt. Ltd.	40	20	60
5	Niranjana Solar Energy Pvt. Ltd.	20	10	30
6	Vishwatma Solar Energy Pvt Ltd.	30	15	45
7	Acme Raipur Solar Power Pvt. Ltd.	30	15	45
8	Dayakara Solar Power Pvt Ltd	30	15	45
9	Grahati Solar Energy Pvt Ltd	50	25	75
10	Acme Odisha Solar Power Pvt Ltd	25	12.5	37.5

Step (2): identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

- (a) The projects are located in the applicable geographical area;
- (b) The projects apply the same measure as the proposed project activity;
- (c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

- (d) *The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;*
- (e) *The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;*
- (f) *The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.*

Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

- a. Project is located host country India. However as mentioned above, each state have different energy policy and tariff regulation is different for each state. Thus respective state of project activity instance is considered as geographical region for that project activity instance. Therefore, respective state of Project activity instance have been chosen for analysis. For initial large scale project activity instances Odisha, Chhattisgarh, Telangana, Andhra Pradesh and Punjab states are considered to identify similar projects.
- b. The project activity is a green-field solar PV power project and uses measure (b) *“Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies”*. Therefore, all projects applying same measure (b) as the proposed project activity are candidates for similar projects.
- c. The energy source used by the project activity is solar. Hence, only solar energy projects have been considered for analysis.
- d. The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.
- e. The capacity range of the projects is within the applicable capacity range from +/-50% of respective project activity instance.
- f. Since CDM guideline is followed for common practise analysis, the start date need to be considered as per CDM guidelines for common practise analysis. The publically available data by Ministry of New & Renewable Energy, Government of India for State wise commissioning status of grid connected Solar Power Projects is as on 30/11/2015 and for all project activity instances, the start date is before 30/11/2015 and this is a conservative approach. The start date of respective project activity instance is mentioned in CPA analysis excel sheet.

Based on publically available data by Ministry of New & Renewable Energy, Government of India for State wise commissioning status of grid connected Solar Power Projects (As on 30.11.2015)⁶, the numbers of Similar projects (CDM and non-CDM) identified, which fulfil above-mentioned conditioned are tabulated in below table.

⁶ <http://mnre.gov.in/file-manager/UserFiles/state-wise-commissioned-grid-connected-solar-power-projects.htm>

Step (3): within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

The list of N_{all} projects for each project activity instances are mentioned in below table

Step (4): within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff} .

From the projects identified above, those projects which employ “different technologies” have been excluded and the number of such projects has been identified as N_{diff} .

The solar thermal power generation involves steam generation through concentric solar collectors and consists of boiler, turbine etc, however solar photovoltaic involves solar modules, which converts DC power to AC power. Thus solar thermal power plant is treated as different technology for Andhra Pradesh state project activity instances. The list of N_{diff} projects for each project activity instances are mentioned in below table

Project Activity instance	PP (SPV) Name	MW	Nsolar	Nall	Ndiff	$F=1-N_{diff}/N_{all}$	$N_{all}-N_{diff}$
1	Mihit Solar Power Private Ltd. 25 MW	74	1	1	0	1	1
	Mihit Solar Power Private Ltd. 25 MW						
	Mihit Solar Power Private Ltd. 24 MW						
2	ACME Jaisalmer Solar Power Pvt. Ltd.	20	2	2	0	1	2
3	Aarohi Solar Pvt. Ltd.	50	2	1	1	0	0
4	Dayanidhi Solar Power Pvt. Ltd.	40	3	2	1	0.5	1
5	Niranjana Solar Energy Pvt. Ltd.	20	3	3	0	1	3
6	Vishwatma Solar Energy Pvt Ltd.	30	2	1	0	1	1
7	Acme Raipur Solar Power Pvt. Ltd.	30	1	1	0	1	1
8	Dayakara Solar Power Pvt Ltd	30	0	0	0	na	0
9	Grahati Solar Energy Pvt Ltd	50	0	0	0	na	0

10	Acme Odisha Solar Power Pvt Ltd	25	0	0	0	na	0
----	---------------------------------	----	---	---	---	----	---

Step (5): calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

The value of F for each project activity instance is mentioned in above table.

As per methodological tool “common practise” version 03.1, the proposed project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3.

Thus if both conditions are fulfilled, then project activity will be a common practise otherwise, the project activity is treated as not a common practise.

Based on result of F and $N_{all}-N_{diff}$ as mentioned in above table, both conditions are not fulfilled. The difference of $N_{all}-N_{diff}$ is less than 3.

Thus, the proposed project activity is not a “common practice” within a sector in the applicable geographical area. Please refer common practise analysis excel sheet for detail analysis.

2.6 Methodology Deviations

Not applicable

3 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

According to the approved baseline methodology ACM0002 Version 17.0.0, EB 81, Annex 9 and also as per Methodology AMS I.D Version 18.

Baseline emissions:

The baseline emission calculation for the project activity instances is attributable to the CO₂ Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the Indian grid will be multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y	=	Baseline Emissions in year y; tCO ₂
EG_{facility,y}	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
EF_{grid,CM,y}	=	CO ₂ emission factor of the grid in year y;

		tCO ₂ /MWh
--	--	-----------------------

The methodology provides following approaches for emission factor calculations:

- (a) *Combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology "Tool to calculate the emission factor for an electricity system".*

OR

- (b) *The weighted average emissions (in t CO₂/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.*

Option (a) has been considered to calculate the grid emission factor as per the 'Tool to calculate the emission factor for an electricity system' version 5 since data is available from an official source.

CO₂ Baseline Database for the Indian Power Sector, Version 11, April 2016⁷, published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 05.0, EB 87, Annex 9, the following steps have been followed.

STEP 1: Identify the relevant electricity systems;

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);

STEP 3: Select a method to determine the operating margin (OM);

STEP 4: Calculate the operating margin emission factor according to the selected method;

STEP 5: Calculate the build margin (BM) emission factor;

STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems

The tool defines that "*for determining the electricity emission factors, identify the relevant electricity system. Similarly, identify any connected electricity systems*". It also states that "*If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used*". Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern.

However since August 2006, however, all regional grids except the Southern Grid had been integrated and were operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids were treated as a single grid named as NEWNE grid from FY 2007-08 onwards for the purpose of this CO₂ Baseline Database. As of 31 December 2013, the Southern grid has also been synchronised with the NEWNE grid, hence forming one unified Indian Grid. Since the project supplies electricity to the Indian grid, emissions

⁷ http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver11.pdf

generated due to the electricity generated by the Indian grid as per CM calculations will serve as the baseline for this project.

Table: Geographical Scope of Indian Electricity Grid

Northern	Eastern	Western	North-Eastern	Southern
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Kerala
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Tamil Nadu
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Andhra Pradesh
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Telangana
Punjab	Andaman & Nicobar	Maharashtra	Nagaland	Puducherry
Rajasthan		Goa	Tripura	Lakshadweep
Uttar Pradesh				
Uttarakhand				

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants have the option of choosing between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

The Project Participant has chosen only grid power plants in the calculation.

STEP 3: Select a method to determine the operating margin (OM) method

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or
- (d) Average OM.

The data required to calculate simple adjusted OM or Dispatch data analysis is not possible due to lack of availability of this activity data to the project developers. The choice of other two options for calculating the operating margin emission factor depends on the generation of electricity from low cost/must run sources. In the context of the methodology low cost/must run resources typically include hydro, geothermal, wind, low cost biomass, nuclear and solar generation.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

2010-	2011-	2012-	2013-	2014-
-------	-------	-------	-------	-------

	2011	2012	2013	2014	2015
India	18.4%	19.6%	16.9%	18.6%	16.8%

Data Source: Central Electricity Authority (CEA) database Version 11, April'2016

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the Indian grid is less than 50 % of the total generation. Thus the average emission rate method cannot be applied, as low cost/must run resources constitute less than 50% of total grid generation.

The "Simple operating margin" has been calculated as per the weighted average emissions (in tCO₂/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation;

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- **Ex-ante option:** If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. **Or**
- **Ex-post option:** If the ex-post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

PP has chosen ex ante option for the calculation of OM with 3 years generation weighted average of the most recent years available at the time of submission of VCS PD to the DOE for validation.

OM determined at validation stage will be the same throughout the crediting period. There will be no requirement to monitor & recalculate the emission factor during the first crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage. The CEA database has followed the approach of simple OM in line with tool to calculate emission factor for an electricity system.

Option A of tool has been selected. The operating margin, therefore, can be calculated by dividing the grid's total CO₂ emissions by the net generation of all thermal stations. In other words, it represents the weighted average emissions rate of all thermal stations.

Net Generation in Operating Margin (GWh) (excl. Imports)			
	2012-13	2013-14	2014-15
INDIAN Grid	6,97,187	7,21,632	8,08,417

Simple Operating Margin (tCO ₂ /MWh) (incl. Imports)			
	2012-13	2013-14	2014-15
INDIAN Grid	0.99	1.00	0.99

Weighted Generation Operating Margin	
INDIAN Grid	0.9941

STEP 5: Calculate the build margin emission factor ($EF_{BM,y}$)

Option 1 as described above is chosen to calculate the build margin emission factor for the project activity. BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

Build Margin (tCO ₂ /MWh) (not adjusted for imports)	
	2014-15
INDIAN Grid	0.9285

(With sample group constituting most recent capacity additions to the grid comprising 20% of the system generation)

STEP 6: Calculate the combined margin (CM) emissions factor

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system, Version 05.0.0, EB 87, Annex 9, allows to weigh the operating margin and Build margin at 75% and 25%, respectively for wind and solar projects and 50% and 50%, respectively for hydro and biomass projects.

The baseline emission factor is calculated using the combined margin approach as described in the following steps:

Calculation of Baseline Emission Factor EF_y

The baseline emission factor EF_y is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y}$$

Where,

w_{OM}	75% weight for solar energy projects
w_{BM}	25% weight for solar energy projects
$EF_{OM,y}$	calculated as described in Steps 3&4 above (tCO ₂ /MWh)
$EF_{BM,y}$	calculated as described in Steps 5 above (tCO ₂ /MWh)

$$\begin{aligned} \text{Baseline Emission factor (INDIAN Grid)} &= 0.75 * 0.9941 + 0.25 * 0.9285 \\ &= 0.9777 \text{ tCO}_2/\text{MWh} \end{aligned}$$

The baseline emission factor is ex-ante parameter and will remain constant throughout the crediting period.

3.2 Project Emissions

Project Emissions: For most renewable power generation projects activities $PE_y = 0$. As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity instances is not geo-thermal or solar thermal, project emissions are not applicable for solar power projects.

Hence $PE_y = 0$

3.3 Leakage

Leakage Emissions: As per methodology, No Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.

As per methodology, For renewable energy projects, there is no any leakage emissions occurred.

Hence, $LE_y = 0$

3.4 Estimated Net GHG Emission Reductions and Removals

As per methodology ACM0002 (version 17.0) and AMS I.D version 18, net GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

ER_y = Emission reductions in year y (tCO₂e/yr)

BE_y = Baseline emissions in year y (tCO₂e/yr)

PE_y = Project emissions in year y (tCO₂e/yr)

Ex-ante calculation (estimate) of net GHG emission reductions:

Ex-ante emission reduction calculations are calculated based on current project activity instances to be included in the grouped project activity under consideration. Summary of ex-ante emission reduction calculations is as follows:

Year	Estimated baseline emissions or removals	Estimated project emissions or removals	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals
------	--	---	--	---

	(tCO ₂ e)	(tCO ₂ e)		(tCO ₂ e)
Year 1	730,457	0	0	730,457
Year 2	730,457	0	0	730,457
Year 3	730,457	0	0	730,457
Year 4	730,457	0	0	730,457
Year 5	730,457	0	0	730,457
Year 6	730,457	0	0	730,457
Year 7	730,457	0	0	730,457
Year 8	730,457	0	0	730,457
Year 9	730,457	0	0	730,457
Year 10	730,457	0	0	730,457
Total	7,304,570	0	0	7,304,570

4 MONITORING

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 11, April 2016
Value applied:	0.9941
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 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 11.0, 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 first 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 11, April 2016

Value applied:	0.9285
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 05.0.0" as 3-year generation weighted average using data for the years 2012-2013, 2013-2014 & 2014-2015. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 11.0, 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 first 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 11, April 2016
Value applied:	0.9777
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 05.0.0". The data is obtained from "CO ₂ Baseline Database for Indian Power Sector" Version 11, April 2016, 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 first crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}
Data unit	MWh
Description	Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the project activity instances in year y
Source of data	Credit Report /JMR as per Monthly Generation Report
Description of measurement methods and procedures applied	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: One in five years Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes issued by state electricity board as per

	below equation: $EG_{facility,y} = EG_{Export} - EG_{Import}$ The joint reading at metering point is carried out once in a month in presence of O&M officials and state electricity board personnel. The calculations/measurement of net electricity supplied to grid is under purview of state electricity board and the PP/Project activity Instance owner has no role on it. PP/Project activity Instance owner will get value of net electricity supplied to grid and hence this parameter is mentioned as a part of monitoring plan. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the PP to the State Electricity Board or invoices with third party.
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value applied:	747,125
Monitoring equipment	Monitoring equipment will be energy meter installed at each of the project activity instance site. Readings will be cross checked with back up meter. The accuracy class of meters, calibration frequency of meters is totally under purview of state electricity board and PP do not have any control on it.
QA/QC procedures applied	The calibration of all the meters will be undertaken once in five years ⁸ and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.5s or higher. The meter accuracy class and calibration interval is under purview of state electricity board and PP/Project Activity Instances owner do not have any control on it. It is also noted that apportioning procedure (if applicable for project activity instances) is under control of state electricity board and PP do not have any control on it. The available parameter to PP/project activity instance owner is the net electricity supplied to grid and same parameter is mentioned as monitoring parameter.
Purpose of data	The Data/Parameter is required to calculate the baseline emission.
Calculation method	The parameter is measured and if any calculation is required, the calculation is based on measured parameters.
Comments	Data will be archived electronically for a period of 2 years beyond the end of crediting period

4.3 Monitoring Plan

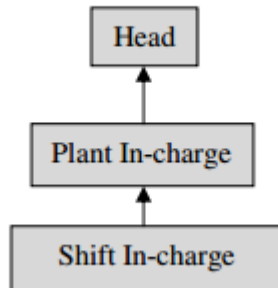
The monitoring plan, which is implemented by the PP describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data results with the PP. PP proposed the following structure for data monitoring,

⁸ http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf

collection, data archiving and calibration of equipments for this project activity instances. The team comprises of the following members:

Organisational Structure for Monitoring



PP has assigned the responsibility of operation and maintenance of project activity instances with relevant and authorised O&M contractors. The Plant In-charge and Shift In-Charge would be deployed by O&M contractors.

Responsibilities of Head: Overall functioning and maintenance of the data.

Responsibilities of Plant In-charge: Responsibility for Maintains the data records, ensures completeness of data, and reliability of data (calibration of equipments).

Responsibilities of Shift In-charge: Responsibility for day to day data collection and maintains day to day log book for monitored data.

In the event when the individual verification period dates and billing cycle dates of the project activity do not coincide, then the electricity export will be apportioned based on number of days. The ratio of number of days under monitoring period and total number of days under billing cycle will multiplied to total electricity export to billing cycle.

For project activity instances which involves solar projects with common metering, apportioning will be followed to determine net electricity export to grid. The apportioning procedure is not under control of PP, thus value of net electricity supplied to grid is available to PP and same is mentioned as monitoring parameter. The value of net electricity supplied to grid is used for ER calculations.

It is to be noted that the metering arrangement, accuracy class of meters, feeder arrangements, calibration frequency of meters are under control of state electricity board and PP do not have any control on it. Thus any deviation at actual site or during verification is accepted.

QA & QC Procedures to be followed

Necessary check meters as required would be installed, to operate in standby mode or when the main meters are not working. All meters will be calibrated at least once in five year as per CEA notification. Records of calibration certificates will be maintained for verification. Hence, high quality is ensured with the above parameters. The calibration of meters is under purview of state electricity board and CME/ project activity instances owner do not have any control on it.

Data Recording and Storage

For measuring the net energy supplied to grid by the project activity instances at the interconnection point, one set of Main meter and Check Meter shall be provided. Representatives of both project activity instances Owner and State Utility will be present to record the monthly meter readings. The state utility will prepare the credit report for the net energy supplied to the grid and same will be used as a basic document for monitoring and verification of the net energy supplied to the grid. Based on the monthly credit report, the project activity instances Owner shall

raise an invoice to the utility. Utility will pay to the project activity instances Owner based on this document.

The above document will be kept at safe storage for verification of emission reductions generated from the project activity. The period of data storage will be 2 years beyond crediting period.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. However, in case monitoring equipment get failed or found faulty, they shall be replaced with calibrated meters as quickly as possible. In case main meter get failed or found faulty, the reading of check meter will be considered.

Personnel training

In order to ensure a proper functioning of the project activity instances and a properly monitoring of emission reductions, the staff will be trained. The Shift In-charge and Plant In-charge will be trained in equipment operation, data recording, operation and maintenance and emergency procedures in compliance with the monitoring plant.

5 SAFEGUARDS

5.1 No Net Harm

As per VCS Guidelines, this section is not mandatory being project is under validation and DOE Contract is prior to 19/04/2017.

5.2 Environmental Impact

According to Indian regulation, the implementation of the renewable energy power project does not require an Environmental Impact Assessment (EIA). As all the project activity instances involved in the grouped project activity involves installation of the renewable energy power project and as the Indian regulation on the Environmental Impact Assessment is the same for all the renewable energy Power Projects, it is decided to analyze the environmental impacts at the groped project activity Level.

As per the Ministry of Environment and Forests (Government of India) notification dated September 14,2006 regarding the requirement of environmental Impact Assessment (EIA) studies as per the Environmental Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of Environment and Forests), any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. The renewable energy power Projects are not included in this list and thus an EIA is not required. Hence, environmental impact analysis is not required for the groped project activity and also for the project activity instances.

5.3 Local Stakeholder Consultation

As per VCS Guidelines, this section is not mandatory being project is under validation and DOE Contract is prior to 19/04/2017.

5.4 Public Comments

As per VCS Guidelines, this section is not mandatory being project is under validation and DOE Contract is prior to 19/04/2017. The project was already listed.

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}
Data unit	MWh
Description	Quantity of net electricity supplied (MWh) to the grid as a result of the implementation of the project activity instances in year y
Value applied:	486,223.599
Comments	Quantity of net electricity supplied (MWh) to the grid is the difference of export and import.

6.2 Baseline Emissions

The baseline emission calculation for the project activity instances is attributable to the CO₂ Emission that could have been produced by the fossil fuel based power plants in absence of the proposed project activity. Therefore the amount electricity supplied to the Indian grid will be multiplied by the grid emission factor of Indian grid to calculate the baseline emissions reduced by the proposed project activity.

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

Where,

BE_y	=	Baseline Emissions in year y; tCO ₂
EG_{facility,y}	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
EF_{grid,CM,y}	=	CO ₂ emission factor of the grid in year y; tCO ₂ /MWh

Thus

$$\begin{aligned}
 BE_y &= 486,223.599 \times 0.9777 \\
 &= 475,380 \text{ tCO}_2\text{e}
 \end{aligned}$$

6.3 Project Emissions

As per methodology, for renewable energy projects, there is no any project emissions occurred.

Hence, PE_y= 0

6.4 Leakage

As per methodology, for renewable energy projects, there is no any leakage emissions occurred.

Hence, LEy= 0

6.5 Net GHG Emission Reductions and Removals

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)
22/06/2015 to 31/12/2015	20,388	0	0	20,388
01/01/2016 to 31/12/2016	401,854	0	0	401,854
01/01/2017 to 31/01/2017	53,138	0	0	53,138
Total	475,380	0	0	475,380

APPENDIX 1: METER CALIBRATION DETAILS

The meter serial number (0.2 s Accuracy class) and their calibration dates used for initial project activity instances are as below.

PP Name	MW	State	Project Location	Main Meter serial number	Check Meter Serial Number	Stand By Meter if available	Calibration Date
Mihit Solar Power Private Ltd.	25	Punjab	Kherakhurd	PBB48607	NA	NA	06-12-2016
Mihit Solar Power Private Ltd.	25	Punjab	Mankhera	PBB48603	NA	NA	06-12-2016
Mihit Solar Power Private Ltd.	24	Punjab	Jandekalan	PBB48610	PBB48609	PBB48611	10-12-2015
ACME Jaisalmer Solar Power Pvt. Ltd.	20	Andhra Pradesh	Raichotti	APX00910 & APX00913	APX00911 & APX00914	APX00912 & APX00915	26-04-2016
Aarohi Solar Pvt. Ltd.	50	Andhra Pradesh	Hindupur	APX00584	APX00585	APX00586	29-12-2015
Dayanidhi Solar Power Pvt. Ltd.	40	Andhra Pradesh	Shantipuram	APX00604	APX00605	APX00600	28-03-2016
Niranjana Solar Energy Pvt. Ltd.	20	Andhra Pradesh	Patthikonda	15196518 & 15196512	15196519 & 15196521	15196516 & 15197462	19-03-2016
Vishwatma Solar Energy Pvt Ltd.	30	Andhra Pradesh	Yemmiganur	15197463	15197470	15196511	19-03-2016
Acme Raipur Solar Power Pvt. Ltd.	30	Chattishgarh	Bagbera	MSP54469	NA	NA	07-12-2015
Dayakara Solar Power Pvt Ltd	30	Telangana	Maddur	APX00907	APX00908	APX00909	31-05-2016
Grahati Solar Energy Pvt Ltd	50	Telangana	Balanagar	APX00971	APX00972	APX00973	09-06-2016
Acme Odisha Solar Power Pvt Ltd	25	Odisha	Balongir	OPTO1170	OPTO1399	NA	24-06-2016

Few sites have only main meter, few sites have main and check meters and few sites have main, check and stand by meters as per state electricity board approval. Thus NA in above table means, meters are not in existence at site.

For Kherakhurd, Mankhera of Punjab state and Balongir of Odisha state have calibration delay, and delayed calibration results are within permissible limit of error, hence accuracy class i.e 0.2% error factor is applied for export and import conservatively.

APPENDIX 2: IRR RESULTS

For large scale project activity instances, the result of IRR analysis, Benchmark and sensitivity analysis are mentioned below

1. Mihit Solar Power Private Ltd.

All three projects of SPV Mihit Solar Power Private Ltd are considered under single project activity instance. For project sites, kherakhurd and Mankhera, the combined DPR are prepared, hence IRR calculations for combined capacity of 50 MW is demonstrated. Also as explained above, being as single project activity instance for all 3 projects of SPV Mihit Solar Power Private Ltd, total 74 MW capacity is considered for common practise analysis.

a) Mihit Solar Power Private Ltd kherakhurd and Mankhera 50 MW

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	10.10%	16.33%

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	10%	Breaching Value
PLF	7.93%	10.10%	12.27%	28.40%
O&M	10.38%	10.10%	9.83%	-269.50%
Project Cost	12.15%	10.10%	8.43%	-24.90%
Tariff Rate	7.93%	10.10%	12.27%	28.40%

b) Mihit Solar Power Private Ltd. Jhandekalan 24 MW

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	10.26%	16.33%

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	10%	Breaching Value
PLF	8.08%	10.26%	12.42%	27.60%
O&M	10.53%	10.26%	9.99%	-265.50%
Project Cost	12.30%	10.26%	8.55%	-24.32%
Tariff Rate	8.08%	10.26%	12.42%	27.60%

2. ACME Jaisalmer Solar Power Pvt. Ltd., Rayachoti (20 MW)

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	12.23%	16.89%

Sensitivity Analysis	Equity IRR			
----------------------	------------	--	--	--

Variation %	-10%	Normal	10%	Breaching Value
PLF	10.17%	12.23%	14.27%	22.98%
O&M	12.41%	12.23%	12.05%	-266.00%
Project Cost	14.23%	12.23%	10.57%	-20.53%
Tariff Rate	10.17%	12.23%	14.27%	22.98%

3. Aarohi Solar Pvt. Ltd., Hindupur (50 MW)

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	11.69%	15.10%

Sensitivity Analysis	Equity IRR			
----------------------	------------	--	--	--

Variation %	-10%	Normal	10%	Breaching Value
PLF	9.58%	11.69%	13.66%	17.20%
O&M	11.87%	11.69%	11.51%	-193.00%
Project Cost	13.62%	11.69%	10.05%	-16.35%
Tariff Rate	9.58%	11.69%	13.66%	17.20%

4. Dayanidhi Solar Power Pvt. Ltd., Shanthipuram (40 MW)

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	11.64%	15.10%

Sensitivity Analysis	Equity IRR			
----------------------	------------	--	--	--

Variation %	-10%	Normal	10%	Breaching Value
-------------	------	--------	-----	-----------------

PLF	9.51%	11.64%	13.60%	17.60%
O&M	11.82%	11.64%	11.43%	-196.00%
Project Cost	13.56%	11.64%	9.98%	-16.60%
Tariff Rate	9.51%	11.64%	13.60%	17.60%

5. Niranjana Solar Energy Pvt. Ltd., Pathikonda (20 MW)

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	11.91%	15.10%

Sensitivity Analysis	Equity IRR			
----------------------	------------	--	--	--

Variation %	-10%	Normal	10%	Breaching Value
PLF	9.82%	11.91%	13.89%	15.90%
O&M	12.09%	11.91%	11.73%	-180.50%
Project Cost	13.85%	11.91%	10.27%	-15.25%
Tariff Rate	9.82%	11.91%	13.89%	15.90%

6. Vishwatma Solar Energy Pvt Ltd., Yemmiganur (30 MW)

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	8.81%	14.99%

Sensitivity Analysis	Equity IRR			
----------------------	------------	--	--	--

Variation %	-10%	Normal	10%	Breaching Value
PLF	6.98%	8.81%	10.55%	36.20%
O&M	8.99%	8.81%	8.60%	-368.00%
Project Cost	10.48%	8.81%	7.35%	-29.25%
Tariff Rate	6.98%	8.81%	10.55%	36.20%

7. Acme Raipur Solar Power Pvt. Ltd., Bagbera (30 MW)

Equity IRR without CDM	Benchmark (Equity IRR)
------------------------	------------------------

Final Results	7.95%	15.10%
---------------	-------	--------

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	10%	Breaching Value
PLF	5.91%	7.95%	9.88%	37.00%
O&M	8.21%	7.95%	7.67%	-325.50%
Project Cost	9.76%	7.95%	6.41%	-30.20%
Tariff Rate	5.91%	7.95%	9.88%	37.00%

8. Dayakara Solar Power Pvt Ltd., Maddur (30 MW)

	Equity IRR without CDM	Benchmark (Equity IRR)
Final Results	12.48%	15.10%

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	10%	Breaching Value
PLF	10.17%	12.48%	14.79%	11.40%
O&M	12.69%	12.48%	12.27%	-123.50%
Project Cost	14.73%	12.48%	10.70%	-11.46%
Tariff Rate	10.17%	12.48%	14.79%	11.40%

9. Grahathi Solar Energy Pvt Ltd., Balanagar (50 MW)

	Equity IRR without CDM	Benchmark (Equity IRR)
Final Results	11.79%	15.10%

Sensitivity Analysis	Equity IRR			
Variation %	-10%	Normal	10%	Breaching Value
PLF	9.59%	11.79%	14.05%	14.80%
O&M	12.04%	11.79%	11.55%	-155.50%
Project Cost	13.98%	11.79%	10.40%	-14.45%
Tariff Rate	9.59%	11.79%	14.05%	14.80%

10. Acme Odisha Solar Power Pvt Ltd, Balongir, Odisha (25 MW)

Final Results	Equity IRR without CDM	Benchmark (Equity IRR)
	12.00%	18.01%

Sensitivity Analysis	Equity IRR
----------------------	------------

Variation %	-10%	Normal	10%	Breaching Value
PLF	9.86%	12.00%	14.14%	27.58%
O&M	12.19%	12.00%	11.81%	-330.50%
Project Cost	14.10%	12.00%	10.33%	-23.65%
Tariff Rate	9.86%	12.00%	14.14%	27.58%