

VCS GROUPED PROJECT FOR RENEWABLE POWER GENERATION BY ESSEL MINING AND INDUSTRIES LIMITED



Document Prepared By EKI Energy Services Limited

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Prepared By	Mr. Bhaskar Dutta
Contact	Manager Operations – GHG Services EKI Energy Services Limited Email ID : bhaskar@enkingint.org T +91 731 42 89 086, M +91 9109916710 Address: Office no. 201, Plot 48, Scheme 78 part 2, Vijay Nagar Indore - 452010 (M.P, India) Website www.enkingint.org

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Essel Mining & Industries Limited (EMIL) and their group companies (hereafter referred as “*project proponent*”) have installed Renewable Energy Power Plants based on solar photovoltaic (PV) technology (hereafter referred as “*proposed project activity*”) at various locations across India as a grouped project activity. EMIL and their group companies are looking forward to earn carbon credits under VCS mechanism for these solar PV based power plants.

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.

The proposed grouped project activity supports development of renewable energy generation plants based on Solar PV technology in India and delivering electricity to the grid. Each instance of project activity under this grouped project consist of one or more renewable power generation plant using solar PV technology. The proposed grouped project is a voluntary action being undertaken by PP. All the project activity instances being included in the proposed grouped project are owned by EMIL (or their group companies) who is also acting as Coordinating and Managing entity for the Grouped Project activity.

The renewable energy generation plants under the grouped project activity would generate Solar PV based electricity, which otherwise in absence of project activity would have been generated from fossil fuel fired grid connected power plants. The grouped project activity thus leads to reduction in Greenhouse Gas (GHG) emissions.

All the project instances i.e. renewable energy generation 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 from initial five project activity instances and additional six project activity instances are 247,123 tCO₂e/year.

During the current verification period the project resulted in generation of 576,976.06 MWh of energy resulting in emission reductions of 565,556 tCO₂e.

During the monitoring period no such events or situations occurred which will cause impact on the actual operation of the project activity.

All the Solar PV plants are in operation and No abnormal circumstance occurred during this monitoring period.

Following five project activity instances are being included in the grouped project at the time of registration:

Project activity instances	Project Owner	Title of the project activity	Location	Date of Commissioning	Estimated Annual Average ERs
Instance – 1	Essel	VCS Project for	Bhadla Solar Park,	12th March	29,270

	Mining and Industries Limited	Solar Power Plant at Bhadla, Rajasthan	Village – Bhadla, Tehsil – Bap, District – Jodhpur, Rajasthan India	2014	
Instance – 2		VCS Project for Solar Power plant at Achampet, Telangana	5 MW Solar Power Plant, Achampet Village and Mandal, Dist. Mehaboobnagar, Telangana, India.	07th July 2014	7,171
Instance – 3		VCS Project for Solar Power Plant at Kalwakurthy, Dist. Mehabubnagar, Telangana	Ternikal Village, Kalwakurthy Mandal, Dist. Mehaboobnagar, Telangana, India.	30th June 2014	14,524
Instance – 4		VCS Project for Solar Power Plant at Salakpur, Telangana	Village: Salakpur District: Warangal State: Telangana, India	17th September 2014	14,240
Instance – 5		VCS Project for Solar Power Plant at Alladurg, Telangana	Village: Bharamdhibba District: Medak State: Telangana, India	28th July 2014	14,679

Since the project activity is grouped project activity, more project activity instances can be included in grouped project activity in future. During present verification period, following project instances are being added. These new instances will also be grid connected solar power plants generating renewable power or will displace grid electricity and will contribute to GHG emission reductions. The new project activity instances eligibility criteria have been discussed in section 2.4 of this MR. The relevant sections of MR are updated with mention of all project activity instances.

The details of new project activity instances are as below

Project activity instances	Title of the project activity	Location	Project Owner	Date of Commissioning	Estimated Annual Average ERS
Instance – 6	VCS Project for Solar Power Plant at Karnataka	Village: Bellatti, Shirahatti District: Gadag State: Karnataka, India	Aditya Birla Solar Limited	11th May 2017	36,410
		Village: Chandargi, Kaktol, Ramadurg Taluk District: Belagavi State: Karnataka, India		12th May 2017	36,513
		Village: Mulbangal, District: Kolar State: Karnataka, India		13th Oct 2017	36,599
		Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	Aditya Birla Renewables Limited	26th Mar 2018	26,460

Instance – 7	VCS Project for Solar Power Plant at Vijaypur	Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	Aditya Birla Renewables SPV 1 Limited	26th Mar 2018	10,525
Instance – 8	VCS Project for Solar Power Plant at Hotgi, Maharashtra	Village: Hotgi, Tal South Solapur District: Solapur State: Maharashtra, India		20th June 2018	1,432
Instance – 9	VCS Project for Solar Power Plant at Gotan, Rajasthan, India	Village: Kharia Khangar, Tehsil: Bhopalgarh District: Jodhpur State: Rajasthan, India		1 st Feb 2018	8,956
Instance – 10	VCS Project for Solar Power Plant at Sevagram, Gujarat	Village: Sevagram, Tal-Abdasa District: Kutch State: Gujarat, India		14 th Aug 2018	8,956
Instance – 11	VCS Project for Solar Power Plant at Pune, Maharashtra	Village: Peth, Tal Havelim Dist Pune, Maharashtra, India		1 st Feb 2018	1,388

Technical specifications of above project activity instances are as follows:

Project activity instances	Capacity	PV Modules	Inverters
Instance – 1 Bhadla	20 MW	36,288 nos. (245 Wp each) 52,488 nos. (250 Wp each) Manufactured by CSun	30 nos.(680 KVA each) Manufactured by Schneider
Instance – 2 Achampet	5 MW	18,340 nos. (300 Wp each) Manufactured by CSun	7 nos, (860 kVA each) Manufactured by Schneider Electric
Instance – 3 Kalwakurthy	10 MW	37,940 nos. (290 Wp each) Manufactured by CSun	14 nos, (680 kVA each) Manufactured by Schneider Electric
Instance – 4 Salakpur	10 MW	36,680 nos. (300 Wp each) Manufactured by YINGLI	14 nos, Manufactured by Schneider Electric of capacity 680 kVA each
Instance – 5 Alladurg	10 MW	36,680 nos. (300 Wp each) Manufactured by CSUN	14 nos, (680 KVA) Manufactured by Schneider Electric
Instance – 6 Karnataka	20 MW	69,800 nos. (320/315 Wp each) Make Seraphim	30 nos. Schnidler make (680KW)
	20 MW	69,760 nos. (320/315 Wp each) Make Seraphim	30 nos. Schnidler make (680KVA)
	20 MW	70,040 nos. (320/315 Wp each) Make Seraphim	30 nos. Schnidler make (680KVA)
	17 MW	87,120 nos. (78,360- 320 Wp)	20 nos. Schnidler make (680KVA)
Instance – 7 Vijaypur	6.8 MW	8,760-315 Wp each, Make Znshine Solar	10 nos. Schnidler make (680KVA)
Instance – 8 Hotgi	0.8 MW	3,000 nos. (320 Wp each)	10 invertors, Deltaww

		Make Canadian solar	
Instance – 9 Gotan	5 MW	Total 18,340, 8090- 325 Wp/ 10250- 330 Wp), Make- Canadian Solar	5 Invertors (Make- ABB Ltd) 1 MW each
Instance – 10 Sevagram	5 MW	15,520 nos. (320 Wp each) Make Emmvee	4 Invertors, TMEIC make
Instance – 11 Pune	0.8 MW	3,000 nos. (320 Wp each) Make Canadian solar	10 invertors, Deltaww

Pre project scenario

There was no power generation activity at the project site prior to implementation of the project activity instances. Therefore, in the absence of the proposed project activity instances, the equivalent amount of electricity would have been generated from the connected / new power plants in the grid, while project activity instances in the proposed grouped project are green field projects. Therein, the main emission source in the pre-project scenario is the power plants connected to the grid and the primary GHG involved is CO₂.

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 Applicable to project: 01 – Energy Industries (renewable/non-renewable Sources)

Project Type: I – Renewable Energy Projects

Project Category:

For Large Scale Project activity instances as per CDM terminology i.e. project activity instances with capacity more than 15 MW: (ACM0002) Grid-connected electricity generation from renewable sources (Version 16.0) (EB 81, Annex 9)

Web link: <http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83>

For small scale project activity instances as per CDM terminology i.e. project activity instances with capacity less than 15 MW: (AMS-I.D) Grid connected renewable electricity generation (Version 18.0) (EB 81, Annex 24)

Web link: <http://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

For small scale project activity instances as per CDM terminology i.e. project activity instances with capacity less than 15 MW: AMS-I.F.: Renewable electricity generation for captive use and mini-grid --- Version 3.0

Web link: <http://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

1.3 Project Proponent

Organization name	Essel Mining and Industries Limited
Contact person	Surajit Chanda
Title	Authorized Signatory

Address	4C, Aditya Birla Centre, SK Ahire Marg, Mumbai – 400 030 (Maharashtra) INDIA
Telephone	+91-9873722454
Email	Surajit.chanda@adityabirla.com

Organization name	Aditya Birla Solar Limited
Contact person	Surajit Chanda
Title	Authorized Signatory
Address	4C, Aditya Birla Centre, SK Ahire Marg, Mumbai – 400 030 (Maharashtra) INDIA
Telephone	+91-9873722454
Email	Surajit.chanda@adityabirla.com

Organization name	Aditya Birla Renewables Limited
Contact person	Surajit Chanda
Title	Authorized Signatory
Address	4C, Aditya Birla Centre, SK Ahire Marg, Mumbai – 400 030 (Maharashtra) INDIA
Telephone	+91-9873722454
Email	Surajit.chanda@adityabirla.com

Organization name	Aditya Birla Renewables SPV1 Limited
Contact person	Surajit Chanda
Title	Authorized Signatory
Address	4C, Aditya Birla Centre, SK Ahire Marg, Mumbai – 400 030 (Maharashtra) INDIA
Telephone	+91-9873722454
Email	Surajit.chanda@adityabirla.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Bhaskar Dutta
Title	Manager- Operations
Address	Office No 201, Plot No 48, Scheme 78, Vijay Nagar Part- II, Indore- 452010, India
Telephone	+91-8750286710
Email	bhaskar@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 March 12, 2014 at Bhadla in District Jodhpur (project instance 1) in the state of Rajasthan in India. Hence the project start date is defined as follows:

Project start date: **12th day of March 2014**

The details of the commissioning dates of the individual project activity instances are mentioned in the section 1.1 of this report.

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 crediting period is 12th March 2014 and end date will be 11th March 2024.

1.7 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:

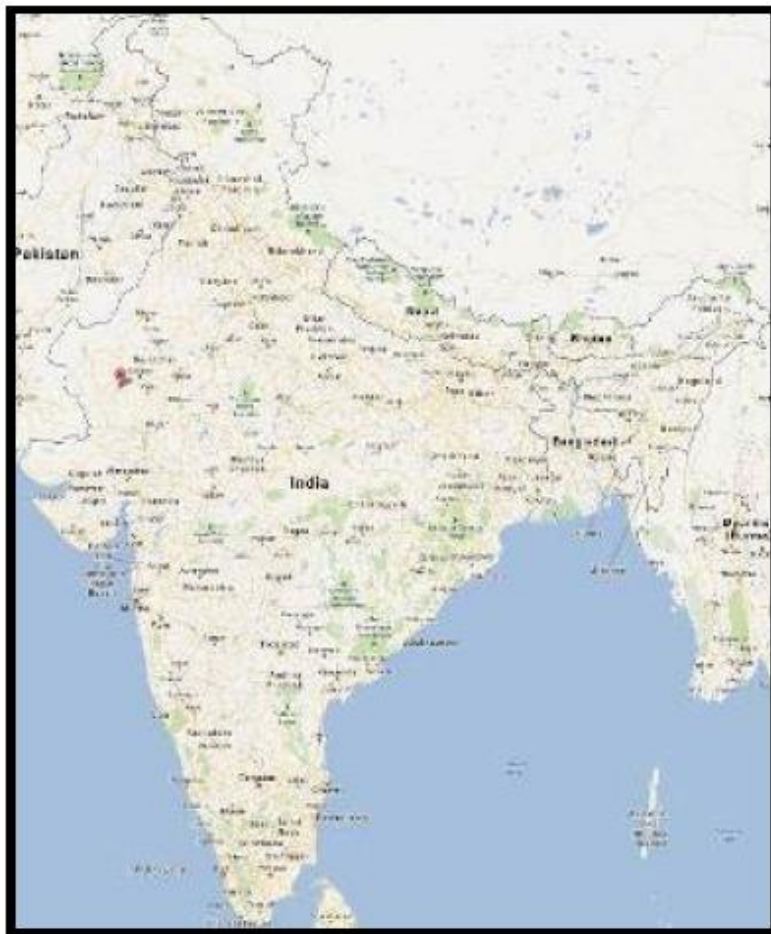
North: 33.24902°N 76.82704°E

South: 6.74678°N 93.84260°E

East: 27.12622°N 97.16712°E

West: 23.71307°N 68.03215°E

The map is as indicated in the following figure:



The geographic boundaries, geo-coordinates for project activity instance included in the grouped project activity are as follows:

Project activity instances	Title of the project activity	Location	Project Owner	Geo Coordinates
Instance – 1 Bhadla	VCS Project for Solar Power Plant at Bhadla, Rajasthan	Bhadla Solar Park, Village – Bhadla, Tehsil – Bap, District – Jodhpur, Rajasthan India	Essel Mining and Industries Ltd.	Latitude: 27.561° N Longitude: 71.929° E
Instance – 2 Achampet	VCS Project for Solar Power plant at Achampet, Telangana	5 MW Solar Power Plant, Achampet Village and Mandal, Dist. Mehaboobnagar, Telangana, India.		Latitude: 16.4° N Longitude: 78.6° E
Instance – 3 Kalwakurthy	VCS Project for Solar Power Plant at Kalwakurthy, Dist. Mehabubnagar, Telangana	Ternikal Village, Kalwakurthy Mandal, Dist. Mehaboobnagar, Telangana, India.		Latitude: 16.7° N Longitude: 78.5° E

Instance – 4 Salakpur	VCS Project for Solar Power Plant at Salakpur, Telangana	Village: Salakpur District: Warangal State: Telangana, India		Latitude: 17.89° N Longitude: 79.05° E
Instance – 5 Alladurg	VCS Project for Solar Power Plant at Alladurg, Telangana	Village: Bhiaramdhibba District: Medak State: Telangana, India		Latitude: 17.94° N Longitude: 77.92° E
Instance – 6 Karnataka	VCS Project for Solar Power Plant at Karnataka	Village: Bellatti, Shirahatti District: Gadag State: Karnataka, India	Aditya Birla Solar Limited	Latitude 15.09° N , Longitude: 75.623° E
		Village: Chandargi, Kaktol, Ramadurg Taluk District: Belagavi State: Karnataka, India		Latitude: 16.021° N, Longitude: 75.127° E
		Village: Mulbangal, District: Kolar State: Karnataka, India		Latitude: 13° 05' 04.4" N, Longitude: 78° 17' 28 .8" E
		Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	Aditya Birla Renewab les Limited	Latitude: 17.250426 ° N , Longitude: 75.6607 46° E
Instance – 7 Bijapur	VCS Project for Solar Power Plant at Vijaypur	Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	Aditya Birla Renewab les SPV 1 Limited	Latitude: 17.250426 ° N Longitude: 75.660746° E
Instance – 8 Hotgi	VCS Project for Solar Power Plant at Hotgi, Maharashtra	Village: Hotgi, Tal South Solapur District: Solapur State: Maharashtra, India		Latitude: 17.559537 12° N Longitude: 76.0021 4484° E
Instance – 9 Gotan	VCS Project for Solar Power Plant at Gotan, Rajasthan, India	Village: Kharia Khangar, Tehsil: Bhopalgarh District: Jodhpur State: Rajasthan, India		Latitude: 26° 36' 25" N, Longitude: 73° 41' 33" E
Instance – 10 Sevagram	VCS Project for Solar Power Plant at Sevagram, Gujrat	Village: Sevagram, Tal- Abdasa District: Kutch State: Gujarat, India		Latitude: 23° 25' 44.55" N, Longitude: 68° 42' 13.17" E
Instance – 11 Pune	VCS Project for Solar Power Plant at Pune, Maharashtra	Village: Peth, Tal Haveli, Dist Pune, Maharashtra, India		Latitude: 18.494475° N , Longitude: 74.0970 218° E

These project activity instances can be represented on the map as follows:



1.8 Title and Reference of Methodology

The project activity instances as part of the grouped project activity will be either small scale project activity instances with power generation capacity less than 15 MW or large scale project activity instances with power generation capacity more than 15 MW as per CDM terminology. Accordingly one of the following methodologies will be used for each of the project activity instance based on its capacity:

For Small Scale Project Activity Instances (including instance – 2 to 5 and instance 7):

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; EB 81

Reference: CDM Methodologies:

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

OR

For Small Scale Project Activity Instances (including instance – 8 to 11):

For small scale project activity instances as per CDM terminology i.e. project activity instances with capacity less than 15 MW: AMS-I.F.: Renewable electricity generation for captive use and mini-grid --- Version 3.0

Web link: <http://cdm.unfccc.int/methodologies/DB/9KJWQ1G0WEG6LKHX21MLPS8BQR7242>

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>)
- ☐ Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (Version 02)
(<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>)
- ☐ Tool to determine the remaining lifetime of equipment (Version 01)
(<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf>)
- ☐ Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)
(<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>)

OR

For Large Scale Project Activity Instances (including instance – 1 and 6):

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: ACM002

Project Type: Type-I: Renewable Energy Projects

Title: Grid-connected electricity generation from renewable sources

Version No.: Version 16; EB 81

Reference: CDM Methodology:

<http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLLAR6MJ6VEU83>

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>)

- Combined tool to identify the baseline scenario and demonstrate additionality (Version 06.0) (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v6.0.pdf>)
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (Version 02) (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.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>)
- Tool to determine the remaining lifetime of equipment (Version 01) (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf>)
- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1) (<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf>)

1.9 Other Programs

- Emission Trading Programs and Other Binding Limits: The PP has not applied this project in any Emission Trading Programs and other Binding Limits.
- Other Forms of Environmental Credit: The PP has not applied this project in any other form of environmental credits.
- Participation under Other GHG Programs: The PP would not consider the credit from any other mechanism for the current monitoring plan. The project has not been registered with any other mechanisms and seeking environmental attributes under VCS mechanism only. The undertaking is provided to confirm that there is no any double accounting for current monitoring period. Also it can be crosschecked that PP is not claiming REC benefits, the same can be verified with the REC accreditation body of India¹.

1.10 Sustainable Development

The grouped project activity as a whole would contribute towards sustainable development of the host country India. The key sustainable development benefits because of the grouped project are outlined as follows:

Social Well-being: Installation of the project would generate direct and indirect employment opportunities in the nearby areas of the project sites. Generation of employment opportunities will help in poverty alleviation, improvement in standard of living etc. of nearby communities hence contributing towards social well-being of local communities.

Environmental Well-being: Each of the individual plants under the project activity will generate renewable electricity through solar PV based power generation system. Use of solar PV technology for electricity generation does not emit any GHG emissions. In the absence of project activity the equivalent amount of electricity would be generated through grid connected fossil fuel fired power plants, thereby leading to increase in GHG and other SO_x, NO_x emissions. As such it is implied that the proposed grouped project would not generate any negative environmental footprint hence leading to environmental well-being.

Economic well-being: Installation and operation of project activity instances as part of the grouped project would generate employment and business opportunities hence contributing towards economic well-being of the local communities.

¹ https://recregistryindia.nic.in/index.php/general/publics/accredited_regens_pdf

Technological well-being: Power generation through solar PV technology is environmentally safe and sound technology. Also there are no harmful emissions while operation of the plant. Hence this technology is amongst the cleanest sources of power generation among the other power generation technologies available in the country. The project activity would help in diffusion of the cleaner technology in the country for power generation. This will lead to technological well-being in power generation sector in India.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Start date is 12/03/2014 (commissioning date of first project instance)

Details of the project activity instances are as follows;

Project activity instances	Title of the project activity	Location	Project Capacity	Commissioning Date
Instance – 1 Bhadla	VCS Project for Solar Power Plant at Bhadla, Rajasthan	Bhadla Solar Park, Village – Bhadla, Tehsil – Bap, District – Jodhpur, Rajasthan India	20 MW	12/03/2014
Instance – 2 Achampet	VCS Project for Solar Power plant at Achampet, Telangana	5 MW Solar Power Plant, Achampet Village and Mandal, Dist. Mehaboobnagar, Telangana, India.	5 MW	07/07/2014
Instance – 3 Kalwakurthy	VCS Project for Solar Power Plant at Kalwakurthy, Dist. Mehabubnagar, Telangana	Ternikal Village, Kalwakurthy Mandal, Dist. Mehaboobnagar, Telangana, India.	10 MW	30/06/2014
Instance – 4 Salakpur	VCS Project for Solar Power Plant at Salakpur, Telangana	Village: Salakpur District: Warangal State: Telangana, India	10 MW	17/09/2014
Instance – 5 Alladurg	VCS Project for Solar Power Plant at Alladurg, Telangana	Village: Bhiramamdhamba District: Medak State: Telangana, India	10 MW	28/07/2014
Instance – 6 Karnataka	VCS Project for Solar Power Plant at Karnataka	Village: Bellatti, Shirahatti District: Gadag State: Karnataka, India	20 MW	11/05/2017
		Village: Chandargi, Kaktol, Ramadurg Taluk District: Belagavi State: Karnataka, India	20 MW	12/05/2017
		Village: Mulbanganal, District: Kolar State: Karnataka, India	20 MW	13/10/2017
		Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	17 MW	26/03/2018

Instance – 7 Bijapur	VCS Project for Solar Power Plant at Vijaypur	Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	6.8 MW	26/03/2018
Instance – 8 Hotgi	VCS Project for Solar Power Plant at Hotgi, Maharashtra	Village: Hotgi, Tal South Solapur District: Solapur State: Maharashtra, India	0.8 MW	20/06/2018
Instance – 9 Gotan	VCS Project for Solar Power Plant at Gotan, Rajasthan, India	Village: Kharia Khangar, Tehsil: Bhopalgarh District: Jodhpur State: Rajasthan, India	5 MW	01/02/2018
Instance – 10 Gujarat	VCS Project for Solar Power Plant at Sevagram, Gujrat	Village: Sevagram, Tal- Abdasa District: Kutch State: Gujarat, India	5 MW	14/08/2018
Instance – 11 Pune	VCS Project for Solar Power Plant at Pune, Maharashtra	Village: Peth District: Pune State: Maharashtra, India	0.8 MW	01/02/2018

The respective project promoter signed operation and maintenance agreements with the O & M contractor of the solar power projects. The performance of the PV plant, safety in operation and scheduled / breakdown maintenances is the responsibility of O & M contractor and are organized and monitored by them, hence the authority and responsibility of project management on site lies with the O & M contractor will maintains all the data / records for the project monitoring.

During the monitoring period no such events or situations occurred which will cause impact on the actual operation of the project activity.

All the Solar PV plants are in operation and No abnormal circumstance occurred during this monitoring period.

2.2 Deviations

2.2.1 Methodology Deviations

Not Applicable

2.2.2 Project Description Deviations

The project activity has requested below project description deviation

There are few project activity instances (Instances 8 to 11) which follows AMS I.F methodology, thus deviation has been requested to add AMS I.F methodology in the grouped project activity and VCS PD is revised accordingly. The eligibility criteria, applicability, base line scenario, additionality, monitoring plan is justified in line with AMS I.F for new 4 project activity instances.

As this deviation would impact the determination of the baseline, additionally, applicability conditions and new eligibility criteria for new project activity instances of this new project activity type, the VCS PD is updated and submitted to VVB for validation during current verification.

2.3 Grouped Project

The project activity instances 1-5 were already added during VCS registration of this grouped project activity. Thus the eligibility criteria for other project activity instances i.e instances 6 to 11 are justified below.

The project being a grouped project activity, following new project activity instances are added during present verification.

Project activity instances	Title of the project activity	Location	Capacity	Date of Commissioning
Instance – 6	VCS Project for Solar Power Plant at Karnataka	Village: Bellatti, Shirahatti District: Gadag State: Karnataka, India	20 MW	11th May 2017
		Village: Chandargi, Kaktol, Ramadurg Taluk District: Belagavi State: Karnataka, India	20 MW	12th May 2017
		Village: Mulbangal, District: Kolar State: Karnataka, India	20 MW	13th Oct 2017
		Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	17 MW	26th Mar 2018
Instance – 7	VCS Project for Solar Power Plant at Vijaypur	Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	6.8 MW	26th Mar 2018
Instance – 8	VCS Project for Solar Power Plant at Hotgi, Maharashtra	Village: Hotgi, Tal South Solapur District: Solapur State: Maharashtra, India	0.8 MW	20th June 2018
Instance – 9	VCS Project for Solar Power Plant at Gotan, Rajasthan, India	Village: Kharia Khangar, Tehsil: Bhopalgarh District: Jodhpur State: Rajasthan, India	5 MW	1 st Feb 2018
Instance – 10	VCS Project for Solar Power Plant at Sevagram, Gujrat	Village: Sevagram, Tal-Abdasa District: Kutch State: Gujarat, India	5 MW	14 th Aug 2018
Instance – 11	VCS Project for Solar Power Plant at Pune, Maharashtra	Village: Peth Tal Haveli, District: Pune State: Maharashtra, India	0.8 MW	1 st Feb 2018

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

Sr No.	Eligibility Criteria	Project Activity instances eligibility
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1	Applicability Conditions: The project activity instances shall meet applicability conditions for applicable methodology	Details of applicability conditions for new project activity instances 6 to 11 as per respective methodologies are provided in subsequent sections of this document. All initial project activity instances meet respective applicability conditions of methodology, hence this eligibility criteria is fulfilled. Please refer section below this table for applicability criteria and it's justification for all new project activity instances.
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	The new project activity instances Instance 6 to 11 are located within geographic boundaries of India. Hence this condition is fulfilled. Please refer section 1.7 of MR for location of each project activity instances.
3	Baseline scenario: All Project Activity Instances shall meet the baseline definition as defined in respective methodology	The new project activity instances Instance 6 to 11 have same baseline scenario as per methodology as detailed in subsequent sections, hence this eligibility criteria is fulfilled. Please refer section below this table for applicability criteria and it's justification for all new project activity instances.
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 new project activity instances Instance 6 to 11 are solar PV power plants supplying electricity to grid. All are Green field projects. Hence this condition is fulfilled.
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-ID and for Large Scale Project instances methodology applicable will be ACM0002. For small scale projects as per CDM terminology, Tool for demonstration of additionality for small scale project activities will be used Further for inclusion of Large Scale project activity instances with solar photovoltaic technology in to the grouped project, following condition will be fulfilled at the time of inclusion of project activity instance into the grouped project for the project to be considered automatically additional as per positive list of technologies as per para 30 of ACM 0002 ver 16: The percentage share of total	The additionality for the new project activity instances included in the grouped project has been demonstrated in subsequent sections of report. As per CDM Tool for demonstration of additionality for small scale project activities, solar PV projects with capacity up to 15 MW fall in positive list of technologies termed as automatically additional. Hence project activity instances 7 to 11 are small scale projects and are automatically additional. Currently project activity Instance 6 is the large scale project activity instance being included in the grouped project activity. The percentage share of total installed capacity of the specific technology (solar PV) in the total installed grid connected power generation capacity in the host country is greater than 2%, hence para 30 of ACM0002 ver 16 is not applicable and para 33 of ACM0002 ver 16 has been followed by new project activity instance. The additionality of the new large scale project activity instance is demonstrated using the latest version of the "Tool for the

	installed capacity of the specific technology (solar PV) in the total installed grid connected power generation capacity in the host country is equal to or less than two per cent. Currently the percentage share of total installed capacity of the specific technology (solar PV) in the total installed grid connected power generation capacity in the host country is greater than 2%, hence para 30 of ACM0002 ver 16 is not applicable and para 33 of ACM0002 ver 16 has been followed by new project activity instance. The additionality of the new large scale project activity instance is demonstrated using the latest version of the “Tool for the demonstration and assessment of additionality	demonstration and assessment of additionality” The additionality demonstration of large scale project activity instance 6 is done at Appendix 1 of MR. Accordingly, this condition is fulfilled.
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 12 March 2014 which is commissioning date of project activity instance at Bhadla and start date of all other project activity instances including new project activity instances is after this date. Hence this condition is fulfilled. Please refer commissioning details for start date of each project activity instance.
7	Conditions that avoid double counting of emission reductions like unique identifications of project and claiming emission reduction only under one GHG program	The existing and new project activity instances are identified by latitude and longitude and location of the plant. Declaration has been provided and these project activity instances are not participating in any other GHG program. Hence this condition is fulfilled.
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.	Local stakeholder consultation has been conducted at the project site for initial project activity instances 1 to 5 and also new project activity instances 6 to 11. Details are mentioned in subsequent section of this document. There is no requirement for carrying out EIA for these projects in India, hence this condition is fulfilled.
9	The project activity using solar PV project will supply electricity to grid or user	The existing and new project activity instances are solar PV power plants supplying electricity to grid or user. Hence this condition is fulfilled.

Applicability of Methodology

The proposed grouped project consists of small scale as well as large scale project activity instances. The applicability of methodology is chosen as per conditions described in previous sections of this document. The demonstration and justification of how the project activity(s) meets each of the applicability conditions of the chosen methodology, and tools will be described as follows:

For project activity instance -6 which is included in the grouped project are as follows – Applicability Conditions of ACM0002 (Version 16; EB 81) are explained as follows:

Methodology Criteria	Applicability
This methodology is applicable to grid-connected renewable energy power generation project activities that a) install a Greenfield power plant; b) involve a capacity addition to (an) existing plant(s); c) involve a retrofit of (an) existing plant(s)/unit(s); d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) Involve a replacement of (an) existing plant(s)/unit(s).	The proposed grouped project activity including instance -6 – Karnataka involves installation of greenfield grid connected solar power plant. Hence the applicability condition is fulfilled.
The methodology is applicable under the following conditions: a) 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; b) 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.	a) The grouped project activity including instance-6 is a renewable energy power plants based on solar PV technology. Hence this condition is fulfilled. b) The grouped project activity including instance -6 does not involve capacity additions, retrofits, rehabilitations or replacements, hence this condition is not applicable.
In case of hydro power plants, one of the following conditions shall apply: a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or b) 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 c) The project activity results in new single or multiple reservoirs and the power density,	Not applicable The proposed grouped project activity including instance -6 does not include any hydro power project. Hence, this clause is not applicable.

calculated using equation (3), is greater than 4 W/m²; or (d) 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: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m²; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
In the case of integrated hydro power projects, project proponent shall: 1. 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 2. 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.	Not applicable The proposed grouped project activity including instance -6 does not include any hydro power project. Hence, this clause is not applicable.
The methodology is not applicable to the following: a) 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; b) Biomass fired power plants/units.	Not applicable .The grouped project activity including instance -6 involves green field solar PV power plants and do not involve switching from fossil fuels to renewable energy sources at the sites of the projects. Biomass fired power plants/units are also not involved in the project.
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	Not applicable. No capacity additions, retrofits, rehabilitations and replacements are involved in the grouped project activity including instance -6 as part of the proposed grouped project.

maintenance”.	
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The applicability conditions of tools included in the tools as referred in the methodology ACM0002 (Version 16) are explained as follows:

• **Tool to calculate the emission factor of an electricity system (Version 05.0):** The project activity instances to be included in the proposed grouped project activity replace fossil fuel dominated grid electricity by renewable electricity. Accordingly, this tool has been used to determine the grid emission factor which is used to estimate the amount of baseline emissions. The Central Electricity Authority compiled CO₂ baseline database for the Indian Power Sector. CO₂ baseline database Version 10.0 has been used as reference for the emission factor. This CO₂ database has been compiled in conjunction with the “Tool to calculate the emission factor for an electricity system”.

□ **Tool for the demonstration and assessment of additionality (version 07.0.0):** For new project activity instance 6, The additionality of the large scale project activity instances is being demonstrated in accordance with paragraph 33 of the methodology ACM0002 (Version 16) – Hence application of “Tool for the demonstration and assessment of additionality” (version 07.0.0) is used.

□ **Combined tool to identify the baseline scenario and demonstrate additionality (version 05.0.0):** The large scale project activity instances to be included in the proposed grouped project will be greenfield power plants. The baseline scenario of the project activity is as defined in paragraph 23 of the methodology ACM0002 (version 16). **Hence application of “Combined tool to identify the baseline scenario and demonstrate additionality” is not required for the proposed project activity.**

□ **Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02):** In accordance with applicable approved methodology ACM0002 (version 16), the project activity instances to be included in the proposed grouped project activity does not involve the project emissions. Further the net metering approach will be used to calculate amount of electricity generated from the power plant, thus **the said tool has not been used for the project activity under consideration.**

□ **Tool to determine the remaining lifetime of equipment (Version 01):** The tool provides guidance to determine the remaining lifetime of baseline or project equipment. Since this is first crediting period hence the said tool will not be applicable and will be taken care of during the renewal of crediting period. However, the project activity instances to be included in the proposed grouped project activity will be greenfield projects and there will be no baseline or project equipment. **Hence application of the said tool is not required for present crediting period the grouped project activity under consideration.**

□ **Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1):** This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at **the renewal of a crediting period.** However, this grouped project activity involves first crediting period, hence **the said tool is not applicable.**

For project activity instance- 7 (and small scale project activity instances to be included in the grouped project in future) – the applicability conditions of AMS.I.D (Version 18) are explained as follows:

Methodology Criteria	Applicability
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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; or b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling	The grouped project activity including project activity instance 7 to be included in the proposed grouped project activity are renewable electricity generation units based on solar photovoltaic technology and each of the said project activity instances will supply electricity to the national grid or supply electricity to an identified consumer facility via national/regional grid or being utilized for captive consumption. Option a is applicable for instance 7. Hence this condition is fulfilled.
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	Table 1 of appendix of AMS-I.D, (Version 18.0) further substantiates that the project which generates and supplies electricity to a national grid falls under AMS-I.D. The grouped project activity including project activity instance 7 supply electricity to grid, hence this condition is applicable
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 grouped project activity including instance 7 to be included in the proposed grouped project activity are the installation of a new solar photovoltaic (PV) power plant at the project site where there was no renewable energy power plant operating prior to the implementation of respective project activity instance. Thus the project activity instances to be included into the grouped project activity under consideration will be Greenfield plants. Hence the applicability condition is fulfilled.
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; b) 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; c) 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.	Not applicable. The grouped project activity including instance 7 to be included in the grouped project activity under consideration are not be hydro power projects. Hence, this clause is not applicable.
If the new unit has both renewable and non-renewable 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.	There will be no non-renewable components in the grouped project activity including instance 7 under consideration. Also each project activity instances will not exceed eligibility limit of 15 MW for small scale project activity as per CDM terminology. There is no co-firing of fossil fuel.
Combined heat and power (co-generation)	The grouped project activity including instance

systems are not eligible under this category.	7 to be included in the grouped project activity under consideration does not involve combined heat and power (co-generation) systems. Hence this condition is fulfilled.
In the case of project activities that involve the capacity 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 from the existing units.	Not applicable The grouped project activity including instance 7 to be included in the grouped project activity under consideration are greenfield power plants. Hence this condition is not applicable.
In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	Not applicable The grouped project activity including Instance 7 to be included in the grouped project activity under consideration will be greenfield power plants that does not involve any retrofit, replacement or capacity addition. Hence this clause is not applicable.
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.	Not applicable The grouped project activity including instances 7 to 11 to be included in the grouped project activity under consideration are greenfield power plants based on solar PV technology and will not involve landfill gas, waste gas, wastewater treatment and agro-industries projects. Hence this clause is not applicable.
In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	Not applicable The grouped project activity including instances 7 to 11 to be included in the grouped project activity under consideration are greenfield power plants based on solar PV technology and will not involve use of biomass. Hence this clause is not applicable.

For project activity instance- 8, 9, 10 and 11 (and small scale project activity instances to be included in the grouped project in future) the power generated from the project activity 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) and thus Methodology AMS I.F is being applied and applicability conditions of AMS.I.F (Version 3) are explained as follows:

Applicability Criterion	Project Case
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to user(s). The project activity will displace electricity from an electricity distribution system that is or would have	The Instance under grouped project (instance 8 to 11) will be a Renewable Energy Project (i.e. solar PV) which supplies electricity to user. The instance will displace electricity from an electricity distribution system that is or would have

been supplied by at least one fossil fuel fired generating unit i.e. in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below: (a) A national or a regional grid (grid hereafter); (b) Fossil fuel fired captive power plant; (c) A carbon intensive mini-grid	been supplied by at least one fossil fuel fired generating unit i.e. in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below: (a) A national or a regional grid (grid hereafter); (b) Fossil fuel fired captive power plant; (c) A carbon intensive mini-grid. Hence the instance under grouped project meets the given applicability criterion. Option a is applicable for instances 8 to 11.
2. Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table	The 2nd option of Table 3 of AMS I.F. Version 3, is applicable when instance under grouped 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) and/or 4th option is applicable when instance under grouped project supplies electricity to a mini grid system where in the baseline all generators use exclusively fuel oil and/or diesel fuel. Option 2nd is applicable for instances 8 to 11.
3. 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 reservoir², 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.	This criteria is applicable for instances which involves hydro power plant and this project involves solar PV, hence this condition is not applicable.
4. This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	Instance under grouped project will be an installation of new renewable energy (solar PV) based electricity generation plants (not addition to existing system). Option a) is applicable for instance.

² A reservoir is to be considered as an “existing reservoir” if it has been in operation for at least three years before the implementation of the project activity.

5. In the case of project activities that involve the capacity 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 from the existing units.	The instance under grouped project will be Greenfield project and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project.
6. 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 renewable energy project (solar PV) is a Green field project activity and this instance is not the enhancement or up gradation project. Hence the criteria is not applicable to the project.
7. If the unit added has both renewable and non-renewable 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.	Instance will have capacity within eligibility limit of 15 MW and will involve only renewable component (solar PV). Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project.
8. Combined heat and power (co-generation) systems are not eligible under this category.	The instances is a renewable energy project (solar PV) and is not a combined heat and power system. Hence the criteria is not applicable to the project.
9. If electricity and/or steam/heat produced by the project activity is delivered to a third party, i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered that ensures that there is no double counting of emission reductions.	If instance delivering the generated electricity to third party, then contract between supplier and consumer will be entered. This is applicable for instances 8 to 11 and they have mutual contract.
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The instance is a renewable energy power project which involves solar PV and is not a biomass project. Hence the criteria is not applicable to the project.

Applicability conditions of tools referred in the methodology AMS.I.D (version 18) and AMS I.F version 03 are explained as follows:

□ **Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (version 02):** In accordance with applicable approved methodology, the individual small scale project activity instances to be included in the grouped project activity under consideration does not involve the project emissions. Also, net metering approach will be used for calculating amount of electricity generated from the plant. Hence application of the said tool is not relevant to the grouped project activity under consideration.

□ **Tool to calculate the emission factor of an electricity system (Version 05.0):** The individual small scale project activity instances to be included in the grouped project activity under consideration replace fossil fuel dominated grid electricity by renewable electricity. Accordingly, this tool has been used to determine the grid emission factor which is used to estimate the amount of baseline emissions. The Central Electricity Authority compiled CO₂ baseline database for the Indian Power Sector. CO₂ baseline database Version 10.0 has been

used as reference for the emission factor. This CO₂ database has been compiled in conjunction with the “Tool to calculate the emission factor for an electricity system”.

□ **Tool to determine the remaining lifetime of equipment (Version 01):** The tool provides guidance to determine the remaining lifetime of baseline or project equipment. Since this is first crediting period hence the said tool will not be applicable and will be taken care of during the renewal of crediting period. However, individual small scale project activity instances to be included in the grouped project activity under consideration are greenfield projects and there will be no baseline or project equipment. Hence application of the said tool is not required for present crediting period of the grouped project activity under consideration.

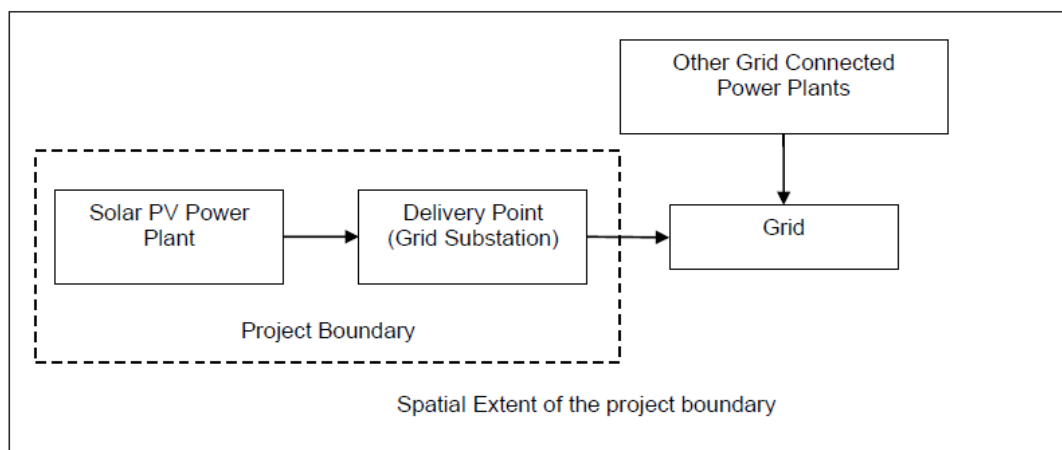
□ **Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1):** This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at **the renewal of a crediting period**. However, this grouped project activity involves first crediting period, hence the said tool is not applicable.

Project Boundary

Referring to the paragraph 18 of the methodology AMS.I.D (Version 18) and paragraph 21 of the methodology ACM0002 (Version 16), the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project activity power plant is connected to. Thus, the project boundary for each of the project activity instance as part of the proposed grouped project activity will consist of PV installation, connected substations, metering equipment and the grid.

Accordingly, the project boundary for project activity instances being included in the grouped project activity will respective PV installation, connected substation, metering equipment and grid including all power plants connected physically to the electricity system.

The project boundary and the spatial extent of the project boundary for each of the project instances as part of the proposed grouped project activity is diagrammatically represented as follows:



Project boundary has been ascertained using para 17 of AMS I.F (Version 3.0) – “The spatial extent of the project boundary includes industrial, commercial facilities consuming energy generated by the system. In the case of electricity generated and supplied to distributed users (e.g. residential users) via mini/isolated grid(s) the project boundary may be confined to physical, geographical site of renewable generating units.

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”.

According to the methodology AMS ID (version 18.0), AMS I.F (Version 3.0) and ACM0002 (version 16.0) the following gases are to be considered for the boundary:

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation.	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
		Other	No	Project activity does not emit other forms of GHG emissions
Project	Greenfield Solar PV Power Project Activity.	CO ₂	No	No CO ₂ emissions are emitted from the project
		CH ₄	No	Project activity does not emit CH ₄
		N ₂ O	No	Project activity does not emit N ₂ O
		Other	No	Project activity does not emit other forms of GHG emissions

Baseline Scenario

The grouped project activity will include small scale (**i.e. project activity instances with capacity less than 15 MW**) as well as large scale (**i.e. project activity instances with capacity more than 15 MW**) project activity instances as per CDM terminology. Accordingly the baseline scenario is defined as follows:

☐ **For small scale project activity instances** as per CDM terminology (**i.e. project activity instances with capacity less than 15 MW**):

The baseline for small scale project activity instances to be included in the grouped project under consideration is determined in accordance with the methodology AMS I.D (version 18) or AMS I.F (version 3) of Appendix B to the Simplified modalities and procedures for small scale CDM project activities. The paragraph 19 of AMS.I.D (version 18) defines baseline scenario for greenfield power plants as – “*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*”.

The paragraph 19 of AMS.I.F (version 3) defines baseline emissions as – “*Baseline emissions for other systems are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor*”.

For large scale project activity instances as per CDM terminology (**i.e. project activity instances with capacity more than 15 MW**):

The baseline for large scale project activity instances to be included in the grouped project under consideration is determined in accordance with approved CDM methodology ACM0002 (version 16). The paragraph 23 of ACM0002 (version 16) defines baseline scenario as – “*If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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”.*

Accordingly, the baseline scenario for new project activity instances being included in the grouped project activity are as follows:

For project activity instance – 6 Karnataka:

The baseline for project activity instance – 6 is determined in accordance with approved CDM methodology ACM0002 (version 16). The paragraph 23 of ACM0002 (version 16) defines baseline scenario as – *“If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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”.*

□ **For project activity instances 7:**

The baseline for small scale project activity Instance – 7: Vijayapura is determined in accordance with the methodology AMS I.D (version 18) of Appendix B to the Simplified modalities and procedures for small scale CDM project activities. The paragraph 19 of AMS.I.D (version 18) defines baseline scenario for greenfield power plants as – *“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 mentioned above, for Greenfield projects, same baseline is prescribed by CDM methodologies AMS-I.D ver 18 and ACM 0002 ver 16. As all the new project activity instances in grouped project are Greenfield projects, same baseline is defined for entire geographical area i.e. India. This meets requirements of grouped projects for baseline as per VCS standard ver 3.5.

• **For project activity instances 8 to 11:**

The baseline for small scale project activity Instance - Instance – 8: Hotgi, Instance – 9: Gotan, Instance 10: Sevagram and Instance – 11: Pune is determined in accordance with the methodology AMS I.F (version 3) of Appendix B to the Simplified modalities and procedures for small scale CDM project activities. The paragraph 19 of AMS.I.F (version 3) defines baseline scenario for greenfield power plants as – *“Baseline emissions for other systems are the product of amount electricity displaced with the electricity produced by the renewable generating unit and an emission factor”.*

Additionality

As described in earlier sections of this document, the grouped project activity under consideration will consist of small scale project activity instances as well as large scale project activity instances. Accordingly the additionality for respective types of project activity instances is demonstrated as follows:

For small scale project activity instances (i.e. project activity instances with capacity less than 15 MW as per CDM terminology): Additionality for the small scale project activity instances to be included in the proposed grouped project activity is defined as follows:

Methodological tool – Demonstration of additionality for small scale project activities⁷ (paragraph 10) refers to demonstrate that the project activity would not have occurred anyway due to at least one of the following barriers:

a) **Investment barrier:** a financially more viable alternative to the project activity would have led to higher emissions;

b) **Technological barrier:** a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions

c) **Barrier due to prevailing practice:** prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;

d) **Other barriers:** Without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Further, paragraph 11 of the said methodological tool refers that, documentation of barriers is not required for the positive list of technologies and project activity types that are defined as automatically additional for project sizes up to and including the small-scale CDM thresholds (e.g. installed capacity up to 15 MW). The positive list comprises of:

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

The small scale project activity instances to be included in the proposed grouped project activity are grid connected solar photovoltaic electricity generation projects having capacity less than 15 MW and hence, will fall under the positive list of technologies as mentioned above. This demonstrates the additionality for small scale project activity instances to be included in the proposed grouped project activity is demonstrated.

Presently, there are new Solar PV project activity instances 7 to 11 with capacity less than 15MW are included under the grouped project. The new project activity instances 7 to 11 with capacity less than 15MW are 6.8 MW Solar Project at Vijaypur in Telangana, 0.8 MW Solar Project at Hotgi in Maharashtra, 5 MW Solar Project at Gotan in Rajasthan, 5 MW Solar Project at Sevagram in Gujarat and 0.8 MW Solar PV Project at Pune in Maharashtra. Thus, these will fall under the positive list of technologies that are automatically additional as mentioned above.

For large scale project activity instances (i.e. project activity instances with capacity more than 15 MW as per CDM terminology): Additionality for the large scale project activity instances (capacity more than 15 MW) to be included in the grouped project activity under consideration is defined as follows:

For demonstration of additionality of large scale project activity instances, Simplified procedure to demonstrate additionality is used in line with paragraph 29 of methodology ACM0002 (version 16.0). Section “**5.3.1. Simplified procedure to demonstrate additionality**” of ACM0002 (version 16.) states following:

The simplified procedure to demonstrate additionality is applicable to the following grid connected electricity generation technologies (positive list):

- (a) Solar photovoltaic technologies;
- (b) Solar thermal electricity generation including concentrating Solar Power (CSP);
- (c) Off-shore wind technologies;
- (d) Marine wave technologies;
- (e) Marine tidal technologies.

The large scale project activity instances to be included into the grouped project activity will use Solar Photovoltaic Technology for power generation. Hence in line with requirements specified above, the Simplified procedure to demonstrate additionality can be used for demonstrating additionality of the project activity instances.

Further, paragraph 30 of the methodology ACM0002 (version 16.0) states as follows:

A specific technology in the positive list is defined as automatically additional if at the time of PDD submission any of the following conditions is met:

- (a) The percentage share of total installed capacity of the specific technology in the total installed grid connected power generation capacity in the host country is equal to or less than two per cent; or*
- (b) The total installed capacity of the technology in the host country is less than or equal to 50 MW.*

Hence in accordance with paragraph 29 and 30 of methodology ACM0002 (version 16.0) the additionality has been demonstrated for existing large scale project activity instance 1.

However the new project activity instance 6 does not fulfill the para 29 and 30 of ACM0002 Version 16, Hence as per para 33 of ACM0002 Version 16, procedure to demonstrate additionality based on the "Tool for the demonstration and assessment of additionality has been followed. Thus project activity instance 6 fall under large scale projects and their additionality is being depicted in Appendix- 1 of the MR.

2.4 Safeguards

2.4.1 No Net Harm

The project activity does not cause any harm to the local ecology. It primarily requires the installation of the Solar PV project, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

Also as per the Central Pollution Control Board of India notification³ Solar PV project falls under White Category and are practically non-polluting.

However, there are no negative impacts on air, water, soil quality and ambience are envisaged due to the project activity.

2.4.2 Local Stakeholder Consultation

The project proponents organized stakeholders meeting in order to take into account the concerns of the nearby villagers regarding the project implementation.

³ http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

The respective dates of Local Stakeholder Consultation being organized at each site are as follows:

Project Instance	Location	Invitation Date	Meeting Date
Instance – 1 Bhadla	Bhadla Solar Park, Village – Bhadla, Tehsil – Bap, District – Jodhpur, Rajasthan India	28/08/2015	12/09/2015
Instance – 2 Achampet	5 MW Solar Power Plant, Achampet Village and Mandal, Dist. Mehaboobnagar, Telangana, India.	26/08/2015	14/09/2015
Instance – 3 Kalwakurthy	Ternikal Village, Kalwakurthy Mandal, Dist. Mehaboobnagar, Telangana, India.	26/08/2015	14/09/2015
Instance – 4 Salakpur	Village: Salakpur District: Warangal State: Telangana, India	26/08/2015	15/09/2015
Instance – 5 Alladurg	Village: Bharamdhibba District: Medak State: Telangana, India	26/08/2015	16/09/2015
Instance – 6 Karnataka	Village: Bellatti, Shirahatti District: Gadag State: Karnataka, India	15/09/2016	22/09/2016
Instance – 7 Bijapur	Village: Devar Nimbargi, District: Vijayapura State: Karnataka, India	15/09/2016	23/09/2016
Instance – 8 Hotgi	Village: Hotgi, Tal South Solapur District: Solapur State: Maharashtra, India	05/01/2017	13/01/2017
Instance – 9 Gotan	Village: Kharia Khangar, Tehsil: Bhopalgarh District: Jodhpur State: Rajasthan, India	05/11/2016	10/11/2016
Instance – 10 Gujarat	Village: Sevagram, Tal- Abdasa District: Kutch State: Gujarat, India	12/03/2018	20/03/2018
Instance – 11 Pune	Village: Peth District: Pune	25/04/2018	30/04/2018

	State: Maharashtra, India		
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Also as a part of continuous feedback from stakeholders, there were no other major comments or protest raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region. The PP also placed a grievance register onsite in where the stakeholder can put down his/her complain and the same if found genuine will be addressed immediately.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF _{Grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor for National Grid in year y for the proposed grouped project activity
Source of data	The combined margin emission factor is calculated using following formula: $EF_{Grid,CM,y} = EF_{grid,OM,y} * WOM + EF_{grid,BM,y} * WBM$
Value applied	0.9770 for NEWNE grid and 0.9817 for Southern grid
Justification of choice of data or description of measurement methods and procedures applied	This is in accordance with applicable methodologies – AMS.I.D (version 18.0) and ACM0002 (version 16.0) and Tool to calculate the emission factor for an electricity system (version 05.0).
Purpose of the data	Calculation of baseline emissions
Comments	The combined margin emission factor for respective projects are applied depending on which grid they operate in.

The parameter Combined margin emission factor for National Grid in year y for the proposed grouped project activity only used for emission reductions and additionality is demonstrated as per “Tool for the demonstration and assessment of additionality”, hence the below parameters mentioned in registered VCS PD are not mentioned in VCS MR.

The percentage share of total installed capacity of the specific technology, Weight of operating margin emission factor for calculating the emission factor, Weight of Build margin emission factor for calculating the emission factor, Build margin emission factor for respective Grid in year y, Operating margin emission factor for respective Grid in year y

3.2 Data and Parameters Monitored

Data / Parameter	EG _{PJ,facility,y}
Data unit	MWh
Description	Net electricity supplied to the grid by the project activity instance

	during the year y (for AMS I.D and ACM002 component)
Source of data	The quantity of net electricity supplied by the project activity to the grid (i.e. Net export in kWh) is taken from monthly "Joint Meter Reading" report which contains monthly energy meter reading
Description of measurement methods and procedures to be applied	Net electricity supplied to is calculated based on the measured values of "export" and "import" on the meter at the delivery point, where monthly joint meter reading is taken.
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value applied	Actual values of net electricity supplied to grid will be monitored for each of the project activity instance separately. Following are values for all project activity instances: 1. Project Activity Instance- 1 –172,516.543 2. Project Activity Instance- 2 –37,303.78 3. Project Activity Instance- 3 –75,364.5 4. Project Activity Instance- 4 –68,851.54 5. Project Activity Instance- 5 –70,953.36 6. Project Activity Instance- 6 –134,845.71 7. Project Activity Instance- 7 –7,711.96
Monitoring equipment	Monitoring equipment will be energy meter installed at each of the project activity instance site. Readings will be cross checked with Invoices.
QA/QC procedures to be applied	The measurement of the electricity generated will be jointly recorded by respective power distribution company and project participants. This value is treated as the accurate and final measurement of the energy supplied to Grid by the power producer. The meters are installed at the delivery point to grid. All meters shall be calibrated as described in the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006. These regulations describe of calibration of meters to be done at least once in five years.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	The monitored data will be archived electronically by the project proponent for the period that covers crediting period + 2 years.

Data / Parameter	EG _{BL,y}
Data unit	MWh
Description	Net electricity displaced by the project activity instance during the

	year y (for AMS I.F component)
Source of data	The quantity of net electricity displaced by the project activity is taken from monthly “Joint Meter Reading” report or Monthly report which contains monthly energy meter reading
Description of measurement methods and procedures to be applied	Net electricity displaced is calculated based on the measured values of “export” on the meter at the delivery point, where monthly joint meter reading is taken.
Frequency of monitoring/recording	Continuous monitoring and monthly recording
Value applied	Actual values of net electricity displaced by project will be monitored for each of the project activity instance separately. Following are values for all project activity instances: 1. Project Activity Instance- 8 –384.89 2. Project Activity Instance- 9 –6,664.94 3. Project Activity Instance- 10 –1,308.35 4. Project Activity Instance- 11 –1,070.50
Monitoring equipment	Monitoring equipment will be energy meter installed at each of the project activity instance site. Readings will be cross checked with Invoices.
QA/QC procedures to be applied	The measurement of the electricity displaced by meters installed at site. All meters shall be calibrated as described in the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006. These regulations describe of calibration of meters to be done at least once in five years.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	The monitored data will be archived electronically by the project proponent for the period that covers crediting period + 2 years.

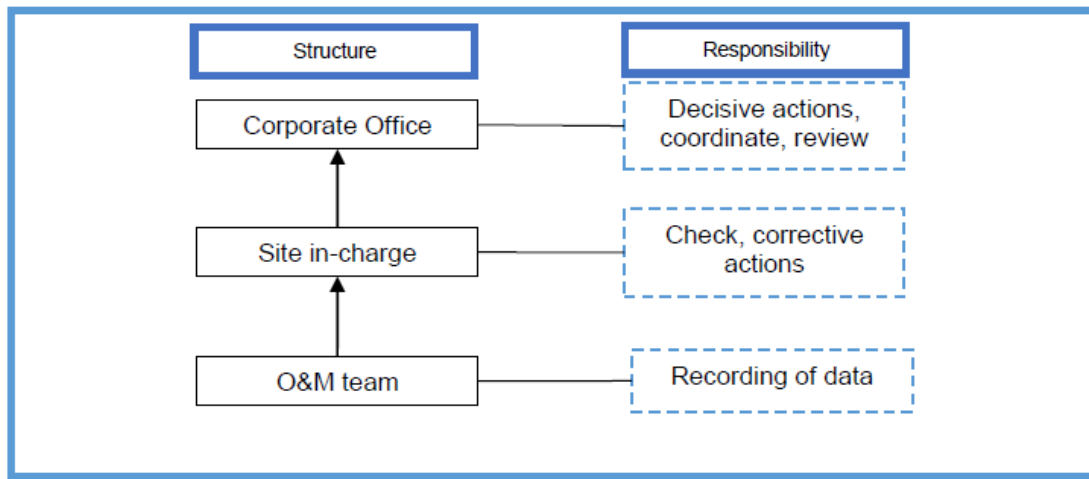
3.3 Monitoring Plan

The monitoring plan for the grouped project activity has been developed in accordance with procedures described in methodologies – AMS.I.D (version 18.0), AMS I.F (version 3.0) and ACM0002 (version 16.0). Two of these methodologies require monitoring of the quantity of net electricity supplied from the project activity power plant to the grid. For AMS I.F methodology, the monitoring of net quantity of electricity displaced by project is required. The monitoring plan is described as follows:

Roles and Responsibility:

Essel Mining and Industries Limited (EMIL) is the coordinating and managing entity for the grouped project activity. EMIL is also the coordinating and managing entity and the

implementation entity for each of the project activity instance to be included in the grouped project activity. The management structure implemented for the purpose of monitoring of proposed project activity is explained as follows:



Corporate Office

Officers in corporate office of project proponent are responsible for overall co-ordination towards the project activity instances development under VCS, including communication with VCS Consultants and Validation/Verification agencies etc. They also ensure that the relevant monitoring and data up-keep is carried out for the project activity properly and regularly.

Thus, corporate office of Project Proponent/ project activity instance owner are solely responsible for timely execution of all the related activities in VCS project development as well as operation of the proposed grouped project activity and take decisive actions in this regard.

Site In-charge

Site In-charge for each of the project activity instance are the project activity instance owner staff who is responsible for trouble free day to day operation of Solar PV project in support with O&M Team at respective sites. The site in-charge ensures that the monitoring plan is adhered and operations are carried out as per standard procedures. He/she collects all the relevant monitored data from O&M Team, and submit them to the corporate office for perusal. For the VCS aspects, he/she co-ordinates for the site visits under validation/verification process of the project activity.

O&M Team

The monitoring data related to the project activity are collected, reported, maintained and archived by O&M team at the respective project sites. The corrective actions (if required) would be taken by O&M Team to maintain the quality of data. The team further submits the monitoring data to site in-charge for perusal.

Monitoring Procedures:

For each of the project activity instance to be included in the grouped project activity, the main and check meters are installed. Details of the metering point and meters installed for all project activity instances in the grouped project activity are provided in the table as follows:

Project activity instances	Project site	Meter Details	Main Meter	Check Meter	Metering Point
Instance – 1: Bhadla	Bhadla, Rajasthan	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	13194946	13194947	Meters are installed within plant premises
Instance – 2: Achampet	Achampet, Telangana	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	02781573	02781574	Meters are installed at 132/33 kV grid substation at Achampet, Dist. Mehaboobnagar, Telangana
Instance – 3: Kalwakurthy	Kalwakurthy, Telangana	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	02781577	02781578	Meters are installed at 132/33 kV grid substation at Kalwakurthy, Dist. Mehaboobnagar, Telangana
Instance – 4: Salakpur	Mutsyal, Telangana	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	13194257	13194258	Meters are installed at 132/33 kV Grid Sub-station (GSS) of located at Mustyal, Telangana
Instance – 5: Alladurg	Aladurg, Telangana	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	02781621	02781631	Meters are installed at 132/33 kV Grid Sub-station (GSS) of located at Peddashankarampet in Telangana
Instance – 6: Karnataka	Shirahatti, Karnataka	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	16102125	16102130	Meters are installed at 132/33 kV substation at project site
	Ramadurg, Karnataka	3 phase 4 wire, bidirectional meters with accuracy	16102135	16102133	Meters are installed at 132/33 kV Grid Sub-station (GSS) of located at Chandargi village in Karnataka

		class of 0.2S			
	Mulbangal, Karnataka	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	14194780	14194782	Meters are installed at 132/33 kV Grid Sub-station (GSS) of located at Chandargi village in Karnataka
	Vijaypur, Karnataka	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	X0488422	X0488423	Meters are installed at 11 KV Plant end at Devar Nimbargi
Instance – 7: Vijaypur	Vijaypur, Karnataka	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	X0488419	X0488421	Meters are installed at 11 KV Plant end at Devar Nimbargi
Instance – 8: Hotgi	Hotgi, Maharastra	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	05288830	05288838	Meters are installed at 11 KV Project site
Instance – 9: Gotan	Gotan, Jodhpur	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	RJB 90318	RJB 90317	Meters are installed at 11 KV Project site
Instance – 10: Sevagram	Sevagram, Gujarat	3 phase 4 wire, bidirectional meters with accuracy class of 0.2S	HT 01180175	HT 01180176	Meters are installed at 11 KV Project site
Instance – 11: Pune	Pune, Maharastra	3 phase 4 wire, bidirectional	Y 0355612	Y 0355568	Meters are installed at 11 KV Project site

		meters with accuracy class of 0.2S			
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4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions are calculated by multiplying the Net electricity exported to the grid with net baseline emission factor, as given in the VCS PD.

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

Where,

$EG_{PJ, facility, y}$ = Quantity of net electricity generation that is generated and fed into the grid or grid electricity displaced as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{Grid, CM, y}$ = Combined margin CO₂ emission factor for grid connected power generation

Also as per the applied methodology AMS I.F. baseline emissions are being calculated as follows:

$$BE_y = EG_{BL, y} * EF_{CO2, CM, y}$$

Where $EG_{BL, y}$ = Quantity of net electricity displaced in year y

$EF_{CO2, CM, y}$ = Combined margin CO₂ emission factor for grid connected power generation

4.2 Project Emissions

Since the project activity instances to be included into the grouped project activity are renewable energy projects based on solar PV technology, there will be no project emissions involved as per paragraph 39 of the small scale methodology AMS.I.D (version 18.0), para 24 of AMS I.F and paragraph 35 of the large scale methodology ACM0002 (version 16.0). Hence,

$$PE_y = 0$$

4.3 Leakage

Since the project activity instances to be included into the grouped project activity are renewable energy projects based on solar PV technology, no leakage emissions are considered - in line with paragraph 42 of the small scale methodology AMS.I.D (version 18.0), para 27 of AMS I.F and paragraph 60 of the large scale methodology ACM0002 (version 16.0).

4.4 Net GHG Emission Reductions and Removals

Based on paragraph 43 of methodology AMS.I.D (version 18.0) and paragraph 61 of methodology ACM0002 (version 16.0) and AMS.I.F (Version 03), net GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

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)

LE_y = Leakage emissions in year y (tCO₂e/yr)

Since PE_y = LE_y = 0, ER_y = BE_y

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)
2014	52,694	0	0	52,694
2015	95,689	0	0	95,689
2016	95,613	0	0	95,613
2017	136,515	0	0	136,515
2018	185,045	0	0	185,045
Total	565,556	0	0	565,556

Vintage wise emission reductions for each project activity instances are as follows:

Year	2014	2015	2016	2017	2018	Total
Instance 1: Bhadla	29,905	35,759	37,429	36977	28478	168548
Instance 2: Achampet	3,870	8,801	8,429	8691	6830	36621
Instance 3: Kalwakurthy	7827	17862	17131	17341	13824	73985
Instance 4: Salakpur	4323	16395	16521	17108	13244	67591
Instance 5: Aladurg	6769	16872	16103	16734	13176	69654
Instance 6: Karnataka Gadag	0	0	0	19385	27026	46411
Instance 6: Karnataka Ramdurg	0	0	0	19844	27234	47078
Instance 6: Karnataka	0	0	0	435	19890	20325

Mulbangal						
Instance 6: Karnataka Vijayapura (17 MW)	0	0	0	0	18563	18563
Instance 7: Vijaypur	-	-	-	0	7570	7570
Instance 8: Hotgi	-	-	-	0	376	376
Instance 9: Gotan	-	-	-	0	6511	6511
Instance 10: Sevagram	-	-	-	0	1278	1278
Instance 11: Pune	-	-	-	0	1045	1045
Total	52694	95689	95613	136515	185,045	565,556

It is to be noted here that as per the registered PD, the emission reductions during the current monitoring period was estimated to be 522,506 tCO₂e, whereas actual emission reductions achieved are 565,556 tCO₂e, which is approximately 8.24% higher than the estimated emission reductions. The generation of electricity depends upon the Solar isolation and PLF, which is influenced by natural phenomena and not within the control of the project participant.

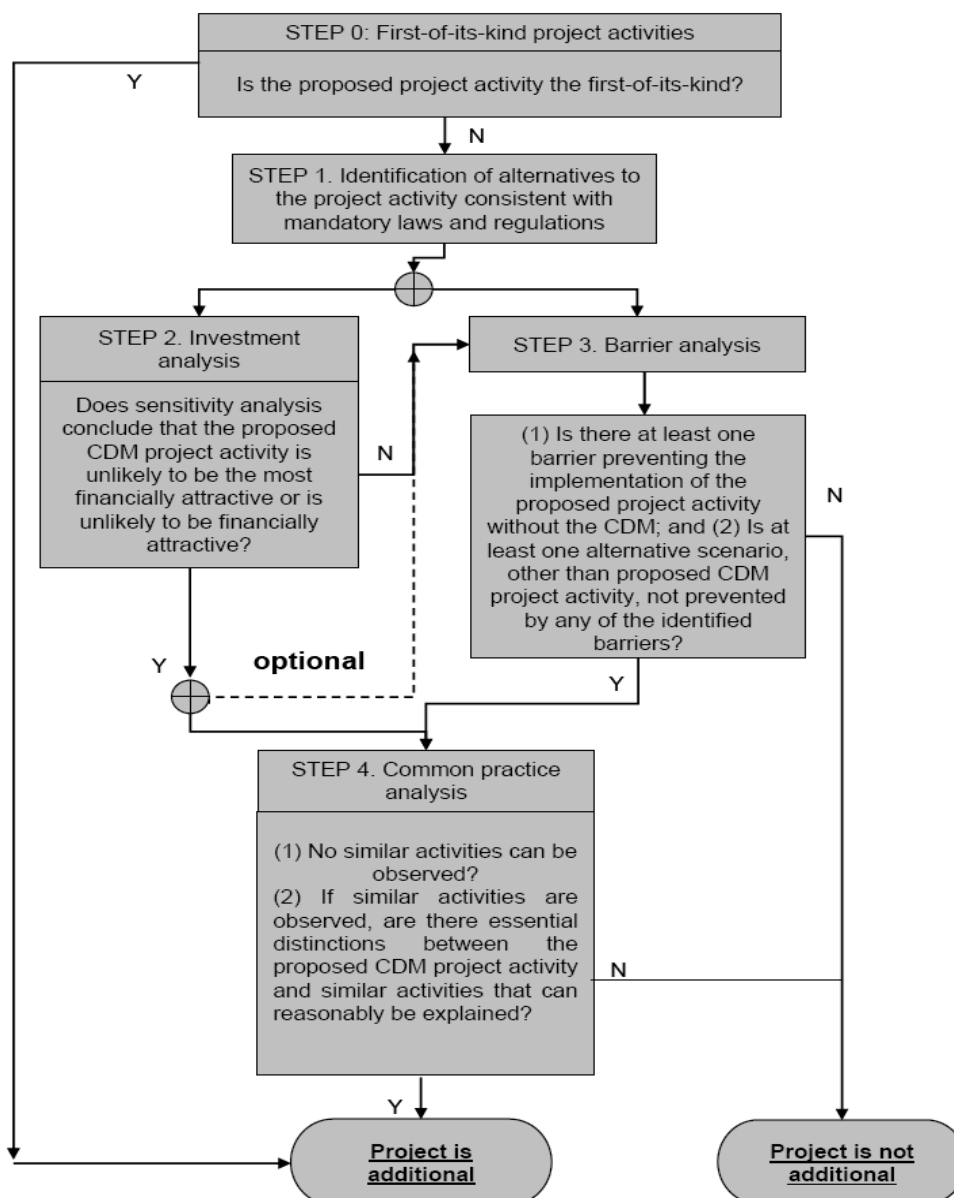
The comparison between estimated and actual ER for each project activity instance is as below. For few project activity PLF is higher than estimated, hence actual ER are higher than estimation. However this solar PLF is nature dependent and PP does not have any control on it. There is no any impact on scale, applicability and additionality of project activity instance due to this high PLF during current monitoring period.

Comparison Estimated Vs Actual from commissioning to end date (20/10/2018) of MP							
Project activity instances	Title of the project activity	COD	Operational days in current MP	Annual Estimation for 365 days	ER estimation for actual days	Actual ER	% Variation between Actual ER and estimated ER
Instance – 1 Bhadla	VCS Project for Solar Power Plant at Bhadla, Rajasthan	12-Mar-14	1684	29270	135043	168548	24.81%
Instance – 2 Achampet	VCS Project for Solar Power plant at Achampet, Telagana	07-Jul-14	1567	7171	30786	36621	18.95%

Instance – 3 Kalwakurthy	VCS Project for Solar Power Plant at Kalwakurthy, Dist. Mehabubnagar, Telangana	30-Jun-14	1574	14524	62632	73985	18.13%
Instance – 4 Salakpur	VCS Project for Solar Power Plant at Salakpur, Telangana	17-Sep-14	1495	14240	58325	67591	15.89%
Instance – 5 Alladurg	VCS Project for Solar Power Plant at Alladurg, Telangana	28-Jul-14	1546	14679	62175	69654	12.03%
Instance 6 Karnataka	VCS Project for Solar Power Plant at Karnataka	11-May-17	528	36410	52670	46411	-11.88%
		12-May-17	527	36513	52719	47078	-10.70%
		13-Oct-17	373	36599	37401	20325	-45.66%
		26-Mar-18	209	26460	15151	18563	22.52%
Instance – 7 Bijapur	VCS Project for Solar Power Plant at Vijaypur	26-Mar-18	209	10525	6027	7570	25.60%
Instance – 8 Hotgi	VCS Project for Solar Power Plant at Hotgi, Maharashtra	20-Jun-18	123	1432	483	376	-22.15%
Instance – 9 Gotan	VCS Project for Solar Power Plant at Gotan, Rajasthan, India	01-Feb-18	262	8956	6429	6511	1.28%
Instance – 10 Gujarat	VCS Project for Solar Power Plant at Sevagram, Gujrat	14-Aug-18	68	8956	1669	1278	-23.43%
Instance – 11 Pune	VCS Project for Solar Power Plant at Pune, Maharashtra	01-Feb-18	262	1388	996	1045	4.92%
					522506	565556	8.24%

APPENDIX 1: ADDITIONALITY DEMONSTRATION OF NEW PROJECT INSTANCE

In the present verification one large scale project activity instance (Instance 6: Karnataka) has been added with a bundled total installed capacity of 77 MW. Baseline considerations for the project are based on approved consolidated baseline methodology ACM0002 (Version 16.0). The methodology requires the project investor to determine the additionality based on “Methodological Tool- Tool for the demonstration and assessment of additionality”, Version 7.0.0. The step-wise approach to establish additionality of the project activity has been followed, details of which are provided in the following paragraphs:



In line with VCS Standard version 3.7, 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.

Thus though two alternatives are mentioned above as per step of additionality tool, the first alternative is not possible as project activity is not viable without carbon credit benefits and second alternative is the baseline scenario for the project activity as per methodology as mentioned in section 2.4 of joint VCS PD & MR.

It is to be noted that being the green field project activity, “the baseline scenario is 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”.

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. The project activity comes under white category as mentioned in section 1.11 of this document, thus there shall be no necessity of obtaining the Consent to Operate” for White category of industries. Since project activity falls under white category and the non-polluting nature of project fulfils the compliance to the local laws and regulations (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 renewable 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.

The both alternatives are in compliance with laws and regulations required. There is no any mandatory requirement to implement the project activity.

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. Since solar projects are categorised as white category, no any consent to operate required from pollution control board.

However, Alternative 2 has been selected as the appropriate baseline alternative for this project activity in line with methodology.

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

The Project activity envisages to export the power to Indian grid and the revenues from the sale would be generated in accordance with the terms and tariffs established in the Power Purchase Agreement (PPA). Thus, simple cost analysis (Option I) cannot be used as the analysis method as the sale of the units of generated electricity shall result in a revenue stream during the operations of the Project activity.

In the absence of the project activity grid electricity would have been the obvious choice for the Project which requires no investment. Hence investment comparison analysis (Option II) is also not appropriate for the project activity.

After eliminating Option I and Option II, the use of Benchmark analysis (Option III) is the method of analysis that has been selected as the most suitable method. 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 post tax equity IRR.

Choice of Benchmark:

As per Investment Analysis tool, Required/expected returns on equity are appropriate benchmarks for an equity IRR. The Equity IRR is considered as the financial indicator and the benchmarks used is cost of equity. Hence the benchmarks used are applicable to the project activity and the type of IRR calculation presented

At the time of decision made of project activity, Version 06 of methodological tool "Investment Analysis" (EB 85 Annex 12) was the latest available tool to PP, hence PP has considered the same tool for default value of return on equity. The default value of Return on Equity for Group-1 projects in India is 11.10%.

As per paragraph 7 of Appendix A of the above mentioned document, "In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below 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".

Default Value Benchmark:

As per para 20 of EB 85, Annex 12 the cost of equity is determined by selecting the values provided in the Appendix, i.e. Default values for cost of equity (expected return on equity) is presented below:

Appendix in EB 85, Annex 12 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.10%**

The Required return on equity (benchmark) was computed in the following manner:

$$\text{Nominal Benchmark}^4 = \{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$$

Where:

- Default value for Real Benchmark = 11.10% (as per Appendix of EB 85, Annex 12)
- Inflation Rate forecast for by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India.

For Instance 6: Karnataka 77 MW Solar project

Instance 6: Karnataka consists of 4 individual projects which are as follows:

- (i) Shirahatti 20 MW
- (ii) Ramadurg 20 MW
- (iii) Mulbungal 20 MW
- (iv) Vijayapura 17 MW

The input assumptions and default benchmark has been calculated separately for each project activities being a part of Project Instance 6.

(i) Input assumptions for 20 MW Shirahatti project

Cost of the Project Activity	
Investor's Name	Aditya Birla Solar Limited
Project Location	Sirahatti
State	Karnataka
AC Project Capacity (MW)	20
Expected Date of Commissioning	31-May-2017
Life of Plant in years	25

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in INR
MN

Items	Cost	Tax	Cost + Tax
Total Project Cost	1,034.60	-	1,034.60

⁴ As per Fisher Equation, https://en.wikipedia.org/wiki/Fisher_equation

Total	1,034.60	-	1,034.60
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O&M Expenses	25.00	-	25.00
5.72% Escalation, starting from 1st Yr.			

Assumptions and equity IRR of the project has been calculated as below:

Investor Name - Aditya Birla Solar Limited	Equity IRR without CDM	Benchmark (Equity IRR)
	8.45%	15.43%

Assumption and financial of the project

Details of the project		Source	Link
State where the project is situated	Karnataka	As per DPR	
Total Capacity (MW)	20.00	As per DPR	
Expected Date of Commissioning	31-May-17	As per DPR	
Life of the plant (Yrs.)	25	As per DPR	-
Generation of electricity			
PLF (%)	21.27%	As per DPR	-
Annual generation (kWh)	37,265,040	Calculated Value	
Annual Degradation per year	0.50%	As per DPR	-
Tariff rate at the decision making (INR/kWh)	4.97	As per DPR	-
Escalation in tariff rate	0.0%		-
Transmission & Wheeling Losses (%)	0.00%		-
Operation and maintenance cost and Insurance			
O & M Expenses (INR Mn.)	25.00	As per DPR	-
O & M free for (Yr.)	-		
Escalation in the operational expenses (%)	5.72%	As per DPR	-
Insurance (INR Mn.)	10.35	CERC order	http://www.cercind.gov.in/2016/orders/SO17.pdf

Administrative expenses	4.00		-
Financial parameters			
TOTAL COST (INR Mn.)	1,034.60	As per DPR	
Loan Amount (INR Mn.)	724.22	As per DPR	
Equity Investment (INR Mn.)	310.38	As per DPR	
Term loan			
Loan Amount (INR Mn.)	724.22	As per DPR	-
Interest rate (%)	11.00%	As per DPR	-
Loan Tenure (Qtr.)	60	Assumption	-
Moratorium Period (Qtr.)	1	Assumption	
Repayment Period (Qtr.)	59	Calculated Value	-
Repayment instalments value (INR Mn.)	12.275	Calculated Value	-
1st instalment from (Qtr. end)	30-Sep-17	Considered from the next Quarter End	-
Book Depreciation (SLM Method)			
Land	68.40		
Gross Depreciable Value (INR Mn.)	966.20	Calculated Value	
Salvage Value (%)	10.00%		-
Salvage value (INR Mn.)	96.62	Calculated Value	
Net Depreciable Value (INR Mn.)	869.58	Calculated Value	
Residual Value (INR Mn.)	165.02	Calculated Value	-
IT Depreciation			
IT Depreciation(%)	7.69%	IT act	https://www.incometaxindia.gov.in/charts%20%20tables/depreciation%20rates.htm
Income Tax			
Financial Year	FY 2017-18		
Income tax rate (%)	30.00%	As Per Income Tax Rule, Pg 29, Para E(I)	http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf
Corporate Tax / MAT (%)	33.00%	As Per IT rule	https://www.bankbazaar.com/tax/corporate-tax.html
Service Tax (%)	15.00%	As Per Income Tax Rule	http://taxguru.in/service-tax/service-tax-rate-chart-effect-01062016.html

Surcharge (%)	10.00%	As Per Income Tax Rule	http://taxguru.in/income-tax/income-tax-rate-chart-assessment-year-201516-financial-year-201415.html
Education cess (%)	3.00%	As Per Income Tax Rule, Pg 5, 11 and 12	http://taxguru.in/income-tax/income-tax-rate-chart-slabs-for-ay-2017-18-fy-2016-17.html
Final Tax rates			
Income tax rate (%)	33.99%	Calculated Value	
MAT (%)	37.39%	Calculated Value	
Service Tax (%)	15.45%	Calculated Value	

(ii) Input assumptions for 20 MW Ramadurg project

Cost of the Project Activity	
Investor's Name	Aditya Birla Solar Limited
Project Location	Ramadurg
State	Karnataka
AC Project Capacity (MW)	20
Expected Date of Commissioning	31-May-2017
Life of Plant in years	25

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in INR
MN

Items	Cost	Tax	Cost + Tax
Total Project Cost	1,064.80	-	1,064.80
Total	1,064.80	-	1,064.80

O&M Expenses	25.00	-	25.00
5.72% Escalation, starting from 1st Yr.			

Financial assumptions and equity IRR has been calculated as below:

Investor Name - Aditya Birla Solar Limited	Equity IRR without CDM	Benchmark (Equity IRR)
	8.32%	15.43%

Assumption and financial of the project

Details of the project		Source	Link
State where the project is situated	Karnataka	As per DPR	
Total Capacity (MW)	20.00	As per DPR	
Expected Date of Commissioning	31-May-17	As per DPR	
Life of the plant (Yrs.)	25	As per DPR	-
Generation of electricity			
PLF (%)	21.27%	As per DPR	-
Annual generation (kWh)	37,265,040	Calculated Value	
Annual Degradation per year	0.50%	As per DPR	-
Tariff rate at the decision making (INR/kWh)	4.92	As per DPR	-
Escalation in tariff rate	0.0%		-
Transmission & Wheeling Losses (%)	0.00%		-
Operation and maintenance cost and Insurance			
O & M Expenses (INR Mn.)	25.00	As per DPR	-
O & M free for (Yr.)	-		
Escalation in the operational expenses (%)	5.72%	As per DPR	-
Insurance (INR Mn.)	10.65	CERC order	http://www.cercind.gov.in/2016/orders/SO17.pdf
Administrative expenses	4.00		-
Financial parameters			
TOTAL COST (INR Mn.)	1,064.80	As per DPR	
Loan Amount (INR Mn.)	745.36	As per DPR	
Equity Investment (INR Mn.)	319.44	As per DPR	
Term loan			
Loan Amount (INR Mn.)	745.36	As per DPR	-
Interest rate (%)	11.00%	As per DPR	-
Loan Tenure (Qtr.)	68	Assumption	-
Moratorium Period (Qtr.)	1	Assumption	
Repayment Period (Qtr.)	67	Calculated Value	-
Repayment	11.125	Calculated Value	-

instalments value (INR Mn.)			
1st instalment from (Qtr. end)	30-Sep-17	Considered from the next Quarter End	-
Book Depreciation (SLM Method)			
Land	68.40		
Gross Depreciable Value (INR Mn.)	996.40	Calculated Value	
Salvage Value (%)	10.00%		-
Salvage value (INR Mn.)	99.64	Calculated Value	
Net Depreciable Value (INR Mn.)	896.76	Calculated Value	
Residual Value (INR Mn.)	168.04	Calculated Value	-
IT Depreciation			
IT Depreciation (%)	7.69%	IT act	https://www.incometaxindia.gov.in/charts%20%20tables/depreciation%20rates.htm
Income Tax			
Financial Year	FY 2017-18		
Income tax rate (%)	30.00%	As Per Income Tax Rule, Pg 29, Para E(I)	http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf
Corporate Tax / MAT (%)	33.00%	As Per IT rule	https://www.bankbazaar.com/tax/corporate-tax.html
Service Tax (%)	15.00%	As Per Income Tax Rule	http://taxguru.in/service-tax/service-tax-rate-chart-effect-01062016.html
Surcharge (%)	10.00%	As Per Income Tax Rule	http://taxguru.in/income-tax/income-tax-rate-chart-assessment-year-201516-financial-year-201415.html
Education cess (%)	3.00%	As Per Income Tax Rule, Pg 5, 11 and 12	http://taxguru.in/income-tax/income-tax-rate-chart-slabs-for-ay-2017-18-fy-2016-17.html
Final Tax rates			
Income tax rate (%)	33.99%	Calculated Value	
MAT (%)	37.39%	Calculated Value	
Service Tax (%)	15.45%	Calculated Value	

(iii) Input assumptions for 20 MW Mulbagal project

Cost of the Project Activity	
Investor's Name	Aditya Birla Solar Limited
Project Location	Mulbagal

State	Karnataka
AC Project Capacity (MW)	20
Expected Date of Commissioning	31-May-2017
Life of Plant in years	25

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in INR
MN

Items	Cost	Tax	Cost + Tax
Total Project Cost	1,112.90	-	1,112.90
Total	1,112.90	-	1,112.90

O&M Expenses	25.00	-	25.00
5.72% Escalation, starting from 1st Yr.			

Financial assumptions and equity IRR has been calculated as below:

Investor Name - Aditya Birla Solar Limited	Equity IRR without CDM	Benchmark (Equity IRR)
	8.32%	15.43%

Assumption and financial of the project

Details of the project		Source	Link
State where the project is situated	Karnataka	As per DPR	
Total Capacity (MW)	20.00	As per DPR	
Expected Date of Commissioning	31-May-17	As per DPR	
Life of the plant (Yrs.)	25	As per DPR	-
Generation of electricity			
PLF (%)	21.27%	As per DPR	-
Annual generation (kWh)	37,265,040	Calculated Value	
Annual Degradation per year	0.50%	As per DPR	-
Tariff rate at the decision making (INR/kWh)	4.92	As per DPR	-
Escalation in tariff rate	0.0%		-
Transmission &	0.00%		-

Wheeling Losses (%)			
Operation and maintenance cost and Insurance			
O & M Expenses (INR Mn.)	25.00	As per DPR	-
O & M free for (Yr.)	-		
Escalation in the operational expenses (%)	5.72%	As per DPR	-
Insurance (INR Mn.)	10.65	CERC order	http://www.cercind.gov.in/2016/orders/S017.pdf
Administrative expenses	4.00		-
Financial parameters			
TOTAL COST (INR Mn.)	1,064.80	As per DPR	
Loan Amount (INR Mn.)	745.36	As per DPR	
Equity Investment (INR Mn.)	319.44	As per DPR	
Term loan			
Loan Amount (INR Mn.)	745.36	As per DPR	-
Interest rate (%)	11.00%	As per DPR	-
Loan Tenure (Qtr.)	68	Assumption	-
Moratorium Period (Qtr.)	1	Assumption	
Repayment Period (Qtr.)	67	Calculated Value	-
Repayment instalments value (INR Mn.)	11.125	Calculated Value	-
1st instalment from (Qtr. end)	30-Sep-17	Considered from the next Quarter End	-
Book Depreciation (SLM Method)			
Land	68.40		
Gross Depreciable Value (INR Mn.)	996.40	Calculated Value	
Salvage Value (%)	10.00%		-
Salvage value (INR Mn.)	99.64	Calculated Value	
Net Depreciable Value (INR Mn.)	896.76	Calculated Value	
Residual Value (INR Mn.)	168.04	Calculated Value	-
IT Depreciation			
IT Depreciation(%)	7.69%	IT act	https://www.incometaxindia.gov.in/charts%20%20tables/depreciation%20rates.htm
Income Tax			
Financial Year	FY 2017-18		

Income tax rate (%)	30.00%	As Per Income Tax Rule, Pg 29, Para E(I)	http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf
Corporate Tax / MAT (%)	33.00%	As Per IT rule	https://www.bankbazaar.com/tax/corporate-tax.html
Service Tax (%)	15.00%	As Per Income Tax Rule	http://taxguru.in/service-tax/service-tax-rate-chart-effect-01062016.html
Surcharge (%)	10.00%	As Per Income Tax Rule	http://taxguru.in/income-tax/income-tax-rate-chart-assessment-year-201516-financial-year-201415.html
Education cess (%)	3.00%	As Per Income Tax Rule, Pg 5, 11 and 12	http://taxguru.in/income-tax/income-tax-rate-chart-slabs-for-ay-2017-18-fy-2016-17.html
Final Tax rates			
Income tax rate (%)	33.99%	Calculated Value	
MAT (%)	37.39%	Calculated Value	
Service Tax (%)	15.45%	Calculated Value	

(iv) Input assumptions for 17 MW Vijayapura project

Cost of the Project Activity	
Investor's Name	Aditya Birla Renewables Limited
Project Location	Bijapur
State	Karnataka
AC Project Capacity (MW)	17
Expected Date of Commissioning	31-May-2017
Life of Plant in years	25

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in INR
MN

Items	Cost	Tax	Cost + Tax
Total Project Cost	926.70	-	926.70
Total	926.70	-	926.70

O&M Expenses	21.25	-	21.25
5.72% Escalation, starting from 1st Yr.			

Financial assumptions and equity IRR has been calculated as below:

Investor Name - Aditya Birla Renewables Limited	Equity IRR without CDM	Benchmark (Equity IRR)
	3.76%	15.43%

Assumption and financial of the project

Details of the project		Source	Link
State where the project is situated	Karnataka	As per DPR	
Total Capacity (MW)	17.00	As per DPR	
Expected Date of Commissioning	31-May-17	As per DPR	
Life of the plant (Yrs.)	25	As per DPR	-
Generation of electricity			
PLF (%)	20.00%	As per DPR	-
Annual generation (kWh)	29,784,000	Calculated Value	
Annual Degradation per year	0.50%	As per DPR	-
Tariff rate at the decision making (INR/kWh)	4.42	As per DPR	-
Escalation in tariff rate	0.0%		-
Transmission & Wheeling Losses (%)	0.00%		-
Operation and maintenance cost and Insurance			
O & M Expenses (INR Mn.)	21.25	As per DPR	-
O & M free for (Yr.)	-		
Escalation in the operational expenses (%)	5.72%	As per DPR	-
Insurance (INR Mn.)	9.27	CERC order	http://www.cercind.gov.in/2016/orders/SO17.pdf
Administrative expenses	3.40		-
Financial parameters			
TOTAL COST (INR Mn.)	926.70	As per DPR	
Loan Amount (INR Mn.)	648.69	As per DPR	
Equity Investment (INR Mn.)	278.01	As per DPR	
Term loan			
Loan Amount (INR Mn.)	648.69	As per DPR	-
Interest rate (%)	11.00%	As per DPR	-
Loan Tenure (Qtr.)	68	Assumption	-
Moratorium Period (Qtr.)	1	Assumption	
Repayment Period (Qtr.)	67	Calculated Value	-

Repayment instalments value (INR Mn.)	9.682	Calculated Value	-
1st instalment from (Qtr. end)	30-Sep-17	Considered from the next Quarter End	-
Book Depreciation (SLM Method)			
Land	68.40		
Gross Depreciable Value (INR Mn.)	858.30	Calculated Value	
Salvage Value (%)	10.00%		-
Salvage value (INR Mn.)	85.83	Calculated Value	
Net Depreciable Value (INR Mn.)	772.47	Calculated Value	
Residual Value (INR Mn.)	154.23	Calculated Value	-
IT Depreciation			
IT Depreciation(%)	7.69%	IT act	https://www.incometaxindia.gov.in/charts%20%20tables/depreciation%20rates.htm
Income Tax			
Financial Year	FY 2017-18		
Income tax rate (%)	30.00%	As Per Income Tax Rule, Pg 29, Para E(I)	http://indiabudget.nic.in/budget2015-2016/ub2015-16/fb/bill.pdf
Corporate Tax / MAT (%)	33.00%	As Per IT rule	https://www.bankbazaar.com/tax/corporate-tax.html
Service Tax (%)	15.00%	As Per Income Tax Rule	http://taxguru.in/service-tax/service-tax-rate-chart-effect-01062016.html
Surcharge (%)	10.00%	As Per Income Tax Rule	http://taxguru.in/income-tax/income-tax-rate-chart-assessment-year-201516-financial-year-201415.html
Education cess (%)	3.00%	As Per Income Tax Rule, Pg 5, 11 and 12	http://taxguru.in/income-tax/income-tax-rate-chart-slabs-for-ay-2017-18-fy-2016-17.html
Final Tax rates			
Income tax rate (%)	33.99%	Calculated Value	
MAT (%)	37.39%	Calculated Value	
Service Tax (%)	15.45%	Calculated Value	

Benchmark estimation:

Appendix in EB 85, Annex 12 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **11.10%**

Inflation Forecast for India as per RBI website⁵:

Since RBI publishes the inflation forecast for 5 years and 10 years, PP has considered the maximum 10 year inflation considering the renewable crediting period of total 30 years.

Benchmark Calculations	Value	Sources Link	Document Date	Decision making Date
Default Value for India as per UNFCCC guidelines	11.10%	EB 85 Annex 12	24-07-15	14-11-2015
Inflation forecast (WPI Mean) as per RBI for 10yrs	3.60%	https://rbi.org.in/Scripts/PublicationsView.aspx?id=16696	29-09-15	
Benchmark (with 10yrs Forecast)	15.10%	Calculated		

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):

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.

Key Assumptions supporting financial projections are provided in excel spreadsheet to the DOE and the same has been summarized in Appendix-1 of this report.

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 2d: Sensitivity Analysis

Addressing Guidance 28 & 29 of EB 92, Annex 5, following factors has been subjected to sensitivity analysis:

1. PLF
2. O&M Cost
3. Project Cost
4. Tariff

⁵ <https://rbi.org.in/Scripts/PublicationsView.aspx?id=16696>

The rationale of sensitivity is, "The ultimate objective of the sensitivity analysis is to determine the likelihood of the occurrence of a scenario other than the scenario presented, in order to provide a cross-check on the suitability of the assumptions used in the development of the investment analysis."

The results of sensitivity analysis show that even with a variation of +10% & -10% in project cost, O&M cost, PLF and Tariff Rate Equity IRR is significantly lower than the benchmark. And it is evident from the results given above; the project remains additional even under the most favorable conditions.

Probability to breach the benchmark:
Sensitivity Parameter 1 : PLF
PLF considered in financials for is as per Third Party DPR in line with "Guidelines for the reporting and validation of Plant load factors" stated in EB48 Annex11 option 3(b). Hence, variation in PLF of more than 10% is unlikely to happen as the PLF has been reported as per the Third Party Report based on long term data.
Sensitivity Parameter 2 : O&M
The sensitivity analysis reveals that O&M will breach the benchmark at negative values and is hypothetical case. Since the O&M cost is subject to escalation (as evidence by the O&M agreement) and also subject to inflationary pressure, any reduction in the O&M costs is highly unlikely. Hence, the reduction in the O&M cost is highly unlikely.
Sensitivity Parameter 3 : Project Cost
Project Cost for financial analysis is considered from DPR of the project activity, being available at the time of investment making decision to go ahead with the project activity. The actual project cost is lower than the DPR cost. Since the Purchase Order cost is firm, there is no possibility of project cost going below this level. However, Sensitivity is carried out for threshold level below which benchmark is not breached.
Sensitivity Parameter 4 : Tariff Rate
The tariff is determined by PPA which is fixed for entire lifetime of the project activity. Hence, there is no probability to get variation for the same. However, Sensitivity is carried out for +/- 10% even then the benchmark is not breached.

Outcome of Step 2:

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

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice analysis

For the concerned project activity, Common Practice Analysis has been carried out for 77 MW capacity Solar Power Project at Karnataka.

Stepwise approach for common practice analysis has been carried out as per Methodological tool “Common Practice”, version 03.1 EB 84, Annex 7:

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

Range	Capacity	Unit
+50%	115.5	MW
Capacity of the proposed project activity	77	MW
-50%	38.5	MW

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) As the projects is located in Karnataka state of India, therefore, projects in the geographical area of Karnataka has been chosen for analysis. The project activity involves generation of electricity from solar energy. The project activity are located in the state of Karnataka in India and the policy applicable for the solar projects is regulated by respective state policy. The policies/tariff for each state is regulated by State Electricity Regulatory Commissions of respective states and they differ for respective states. The project implemented in Karnataka state is claimed as different since the policies and regulations differ in each state. Each state have different

policies regarding renewable energy, hence Karnataka state is considered as geographical region for common practice analysis.

b) The project activity is a green-field solar 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, projects applying same measure (b) 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 38.55 MW to 115.5 MW.

f) The start date of the concerned project activity is 11-May-2017. Therefore projects, which have started commercial operation before 11-May-2017, have been considered for analysis.

Numbers of Similar projects identified, which fulfil above-mentioned conditioned are

$$N_{\text{solar}} = 6$$

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} .

CDM project activities, which have got registered or are under validation have been excluded in this step. The list of the power plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects.

$$N_{\text{all}} = 3$$

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} .

As per the tool on Common Practice, the project activities have been separated from the different technologies on the basis two criteria:

1. Size of Installation – Since project activity is large scale project, small and micro scale projects are considered as different technology project. Based on this criteria, there are no any different technology project out of similar identified projects.

2. Investment climate on the date of the investment decision – For proposed project activity, there are no any different technology project considered out of similar identified projects.

Hence, projects where either of the conditions is satisfied those projects are counted for calculating N_{diff} projects.

$$N_{\text{diff}} = 0$$

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.

Calculate $F = 1 - N_{diff}/N_{all}$

$$F = 1 - (0/3) = 1$$

As per methodological tool “common practice” version 03.1⁶, 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 practice otherwise, the project activity is treated as not a common practice.

Outcome of Common Practice analysis:

As,

- i. $F = 1$; is greater than 0.2
- ii. $N_{all} - N_{diff} = 3$; is not greater than 3

Thus, the proposed project activity is not a “common practice” within a sector in the applicable geographical area.

The above discussions show that solar PV Project (Instance 6: Karnataka) power development is not a common practice and the project activity is not financially attractive; hence the project activity is additional.

⁶ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf>

APPENDIX 2: CALIBRATION SCHEDULE OF ENERGY METERS

Project activity instances	Project site	Main Meter	Check Meter	Meter Details	Calibration Date	Validity
Instance – 1: Bhadla	Bhadla, Rajasthan	13194946	13194947	Energo 0.2 s	26/02/2014	25/02/2019
Instance – 2: Achampet	Achampet, Telangana	02781573	02781574	Elster 0.2 s	07/07/2014	06/07/2019
Instance – 3: Kalwakurthy	Kalwakurthy, Telangana	02781577	02781578	Elster 0.2 s	26/06/2014	25/06/2019
Instance – 4: Salakpur	Mutsyal, Telangana	13194257	13194258	L&T 0.2s	15/09/2014	14/09/2019
Instance – 5: Alladurg	Alladurg, Telangana	02781621	02781631	Elster 0.2 s	27/07/2014	26/07/2019
Instance – 6: Karnataka	Shirahatti, Karnataka	16102125	16102130	L&T 0.2s	11/08/2017 ⁷	10/08/2022
	Ramadurg, Karnataka	16102135	16102133	MTE 0.2 s	27/01/2017	26/01/2022
	Mulbangal, Karnataka	14194780	14194782	L&T 0.2s	10/10/2017	09/10/2022
	Vijaypur, Karnataka	X0488422	X0488423	MTE 0.2 s	23/02/2018	22/02/2023
Instance – 7: Vijaypur	Vijaypur, Karnataka	X0488419	X0488421	MTE 0.2 s	23/02/2018	22/02/2023

⁷ At the time of commissioning, pre calibrated meters are installed. However for this SPV, there is delay in calibration applied and 0.2% error factor is applied from May 17 to August 17 conservatively.

Instance – 8: Hotgi	Hotgi, Maharashtra	05288830	05288838	Elster 0.2 s	15/06/2018	14/06/2023
Instance – 9: Gotan	Gotan, Jodhpur	RJB 90318	RJB 90317	Premier 0.2 s	17/01/2018	16/01/2023
Instance – 10: Sevagram	Sevagram , Gujarat	HT 01180175	HT 01180176	EDMI 0.2 s	13/08/2018	12/08/2023
Instance – 11: Pune	Pune, Maharashtra	Y 0355612	Y 0355568	Secure 0.2 s	01/02/2018	31/01/2023