

**Gold Standard for the Global Goals
Key Project Information & Project Design Document (PDD)**



Version 1.1 – August 2017

KEY PROJECT INFORMATION

Title of Project:	100 MW Solar Power plant in Maharashtra
Brief description of Project:	The project activity is a 100 MW (145 MWp) solar power project, promoted by Juniper Green Energy Pvt. Ltd. and Nisagra Renewable Energy Pvt. Ltd. The purpose of the project activity is to generate clean electricity with utilization of solar energy.
Expected Implementation Date:	NA
Expected duration of Project:	25 years
Project Developer:	Juniper Green Energy Pvt. Ltd. Nisagra Renewable Energy Pvt. Ltd.
Project Representative:	Infinite Solutions
Project Participants and any communities involved:	Juniper Green Energy Pvt. Ltd. Nisagra Renewable Energy Pvt. Ltd.
Version of PDD:	05
Date of Version:	04/08/2020
Host Country / Location:	India
Certification Pathway (Project Certification/Impact Statements & Products)	Impact statements & products
Activity Requirements applied: (mark GS4GG if none relevant)	Renewable Energy activity requirement
Methodologies applied:	ACM0002: Grid-connected electricity generation from renewable sources - Version 19.0
Product Requirements applied:	GHG Emissions Reductions & Sequestration Product Requirements
Regular/Retroactive:	Retroactive
SDG Impacts:	1 - SDG 7 Affordable and Clean Energy 2 - SDG 8 Decent Work and Economic Growth 3 - SDG 13 Climate Action
Estimated amount of SDG Impact Certified	1 - SDG 7 (Affordable and Clean Energy): - Juniper Green Energy Pvt. Ltd. : 17,913 MWh/annum Nisagra Renewable Energy Pvt. Ltd. : 167,858 MWh/annum Total: 239,771 MWh/year 2- SDG 8 (Decent Work and Economic Growth): - Juniper Green Energy Pvt. Ltd. : - Number (employees): 19 persons - Number(Trainings): Minimum 1 training/year. - The income to all the unskilled workers are made on day to day basis in line with minimum wage requirements. Nisagra Renewable Energy Pvt. Ltd.: Number (employees): 48 persons - Number(Trainings): Minimum 1 training/year. - The income to all the unskilled workers are made on day to day basis in line with minimum wage requirements. 3- SDG 13 (Climate Action): - Juniper Green Energy Pvt. Ltd. : 67,368 tCO₂/annum Nisagra Renewable Energy Pvt. Ltd.: 157,249 tCO₂/annum Total: 224,617 tCO₂e per annum.

SECTION A. Description of project

A.1. Purpose and general description of project

>> (Provide a brief description of the project including the description of scenario existing prior to the implementation of the project.)

The main purpose of the project activity is to generate electrical energy through sustainable means using solar power resources, the generated green electricity will contribute to climate change mitigation efforts. This project activity is a large scale solar project. Juniper Green Energy Private Limited and Nisagra Renewable Energy Private Limited are the project investors for this project activity. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 224,617 tCO₂e per annum, thereon displacing 239,771 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian electricity grid, which is mainly dominated by thermal/ fossil fuel based power plant.

The projects have been selected through a competitive bidding process set up under the 'Mukhyamantri Sour Krishi Vahini Yojana' (or Chief Minister Agricultural Solar Feeder Scheme), a recent scheme that the state of Maharashtra has come up wherein the power generated will be directly fed into dedicated agricultural feeders. The projects are being set up under phase-I of the scheme and are among the first such projects in the country.

The project activity is the installation of a new grid-connected renewable power plant/unit and this is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

The details of the project are mentioned in the table:

Project Investors' Name	Capacity in MW	Capacity in MWp	State
Juniper Green Energy Pvt. Ltd.	30 MW (10 MW x 3)	43.5 MWp	Maharashtra
Nisagra Renewable Energy Pvt. Ltd.	70 MW (10 MW x 7)	101.5 MWp	Maharashtra

The details of the total capacity commissioned is as below:

Project Investors' Name	Commissioning Date	Capacity in MW	Village/Taluka	District
Nisagra Renewable Energy Pvt. Ltd.	31/12/2019	10 MW	Indave, Sindhkheda	Dhule
	30/12/2019	10 MW	Varul, Shirpur	Dhule
	07/01/2020	10 MW	Chhail, Sakri	Dhule
	29/03/2020	10 MW	Mukti	Dhule
	08/01/2020	10 MW	Bahirane, Baglan (Satana)	Nashik
	16/01/2020	10 MW	Dahidi, Malegaon	Nashik
	07/03/2020	10 MW	Vichkheda, Parola	Jalgaon
Juniper Green Energy Pvt. Ltd.	22/01/2020	10 MW	Vahelgaon, Nandgaon	Nashik
	23/01/2020	10 MW	Rajapur, Yeola	Nashik
	21/03/2020	10 MW	Dahiwad, Deola	Nashik

Scenario existing prior to the implementation of the project activity

As the project activity is the installation of a new grid-connected renewable power plant/unit. The scenario existing prior to the implementation of project activity 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" (Version 07).

Baseline Scenario

Baseline scenario and Scenario existing prior to the implementation of the project activity are both same.

Sustainable Development

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

- **Social well being**
The project activity will provide job opportunity to local people during erection, commissioning and maintenance of the Solar power project. Frequency of visiting to villages and nearby areas by skilled, technical and industrialist has increased due to installation /site visit/operation and maintenance work related to the project at plant site. This directly and indirectly positively effects the economy of nearby populace.
- **Environmental well being**
Solar power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions. The impact on land, water, air and soil is negligible. Thus the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.
- **Economic well being**
 - ✓ This scheme will help ease the problems of electric supply in the agricultural sector - especially to run the agro-feeders. The main target is to provide power at least 12 hours a day.
 - ✓ Since the prices of the electric supply system are cheaper, the farmers will be able to use them as production units at lesser costs. Hence it will boost the agricultural produce.
 - ✓ At present the farmers suffer because there is an issue of interruption in agricultural works due to power cuts. This problem will be readily addressed when this scheme comes into effect.
 - ✓ The agricultural workers will have an extra source of income from the land they are renting out for this purpose.
- **Technological well being**
The project activity is step forward in harnessing the untapped solar potential and further diffusion of the solar technology in the region. The project activity leads to the promotion and demonstrates the success of solar projects in the region which further motivate more investors to invest in solar power projects. Hence, the project activity leads to technological well-being.

A.2. Eligibility of the project under Gold Standard

>> (Describe how the project meets the eligibility criteria as per section 3.1.1 of GS4GG Principles & Requirements document and the relevant activity requirements document)

The project activity meets the eligibility criteria as per section 3.1.1 of GS4GG Principles & Requirements document as described below.

- The project applies methodology ACM0002, which is an approved methodology under Gold Standard.
- The project type is solar which is an eligible project type as it is in accordance with 1.1.1 a) and 1.1.1 b) of the Eligible Project Types & Scope under Renewable Energy Activity Requirements.
- The project activity results in displacement of electricity from thermal power stations while contributing to sustainable development of India. Hence, the project contributes to the Gold Standard Vision and Mission.
- Solar projects are an approved project type and do not require further approval from Gold Standard.
- This project activity is not associated with geo-engineering or energy generated from fossil fuel or nuclear, fossil fuel switch, nor does it enhances or prolongs such energy generation.

General Eligibility Criteria under Renewable Energy Activity Requirements

Project Type	: As discussed above, the project type is eligible.
Project Location	: The project is located in India.
Project scale	: The project activity is a 100 MW solar project and thus qualifies under large scale projects.

The PP would like to declare that the proposed project activity is neither registered with any other GHG mechanism nor has applied for any other GHG credits. The project is not registered under the REC mechanism of India and the same can be cross-checked at <https://recregistryindia.nic.in>.

A declaration mentioning the same is submitted from the Project Developer.

A.3. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

>> (Justify that project owner has full and uncontested legal ownership of the products that are generated under Gold Standard Certification and has legal rights concerning changes in use of resources required to service the Project for e.g water rights, where applicable.)

The project participants have received Evacuation Approvals from Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL); also the Power Purchase Agreement demonstrating the PP as the legal owner has already been signed with MSEDCL. Thus the project participants Juniper Green Energy Private Limited and Nisagra Renewable Energy Private Limited are the legal owners of the project and have the legal rights for the credits that shall be generated by this project activity.

A.4. Location of project

A.4.1. Host Country

India

A.4.2. Region/State/Province etc.

Maharashtra

A.4.3. City/Town/Community etc.

At the time of decision making, the PP decided to set up the projects at the below mentioned locations. However, during the course of project implementation, some locations were changed (but within the same Taluka), in line with the signed PPA.

Original Locations (at the time of decision making):

S. No.	Project Investors' Name	Capacity	District	Taluka/Tehsil	Village
1	Juniper Green Energy Pvt. Ltd.	10 MW	Nashik	Deola	Dahiwad
2	Juniper Green Energy Pvt. Ltd.	10 MW	Nashik	Yeola	Mamdapur
3	Juniper Green Energy Pvt. Ltd.	10 MW	Nashik	Nandgaon	Aswaldara
4	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Nashik	Baglan (Satana)	Chirai
5	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Nashik	Malegaon	Sayne
6	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Jalgaon	Parola	Bodarde
7	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Dhule	Sindkheda	Indave
8	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Dhule	Sakri	Nagpur
9	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Dhule	Dhule	Borsule
10	Nisagra Renewable Energy Pvt. Ltd.	10 MW	Dhule	Shirpur	Varul

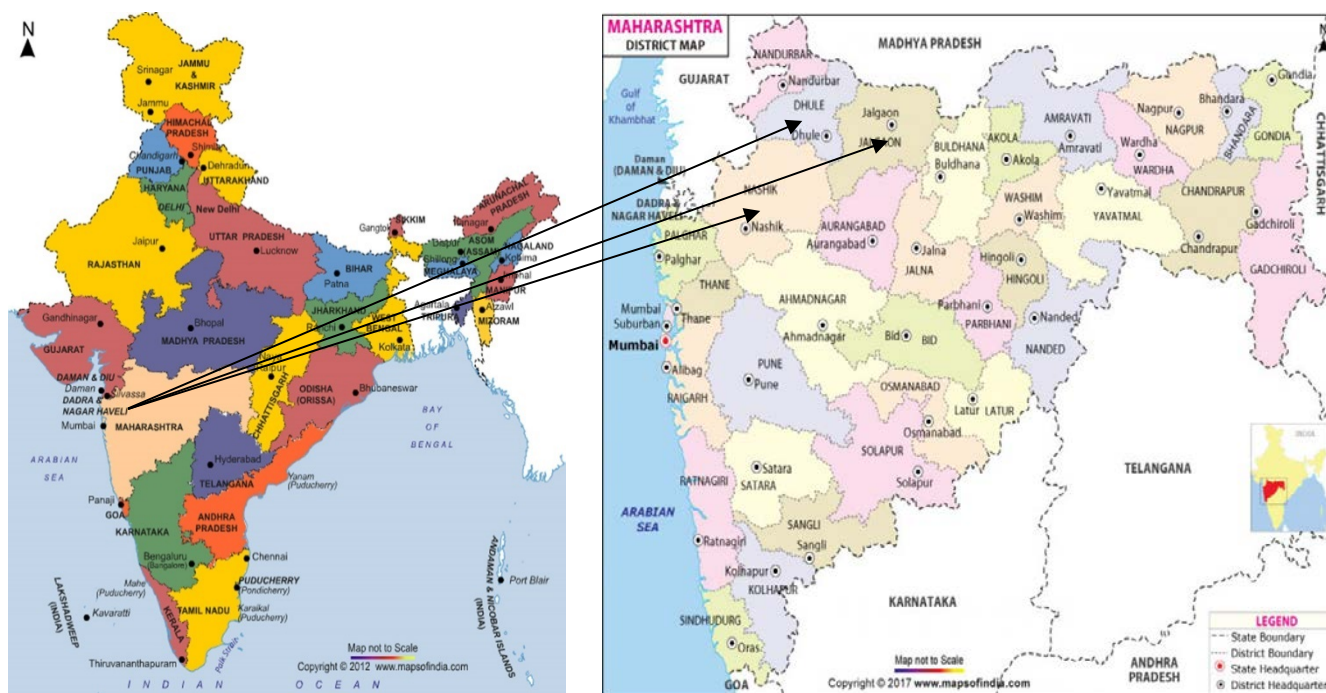
New Locations¹:

¹ Locations may further change during the course of implementation

Project Investors' Name	Commissioning Date	Capacity in MW	Village/Taluka	District
Nisagra Renewable Energy Pvt. Ltd.	31/12/2019	10 MW	Indave, Sindhkheda	Dhule
	30/12/2019	10 MW	Varul, Shirpur	Dhule
	07/01/2020	10 MW	Chhail, Sakri	Dhule
	08/01/2020	10 MW	Bahirane, Baglan (Satana)	Nashik
	16/01/2020	10 MW	Dahidi, Malegaon	Nashik
Juniper Green Energy Pvt. Ltd.	22/01/2020	10 MW	Vahelgaon, Nandgaon	Nashik
	23/01/2020	10 MW	Rajapur, Yeola	Nashik
Nisagra Renewable Energy Pvt. Ltd.	29/03/2020	10 MW	Mukti	Dhule
	07/03/2020	10 MW	Parola	Jalgaon
Juniper Green Energy Pvt. Ltd.	21/03/2020	10 MW	Dahiwad	Nashik

A.4.4. Physical/Geographical location

>> (Include information allowing the unique identification of this project.)



The Projects will be located in various villages of Nashik, Jalgaon & Dhule districts in Maharashtra state of India, as mentioned under Section A.4.3. The unique identification of this project are as below

Project Name	Investors'	Capacity in MW	Village/Taluka	District		
Nisagra Renewable Energy Pvt. Ltd.		10 MW	Indave, Sindhkheda	Dhule	20° 19' 59.009" N	74° 40' 13.13" E
		10 MW	Varul, Shirpur	Dhule	21° 24' 25.565" N	74° 44' 15.691" E
		10 MW	Chhail, Sakri	Dhule	20° 53' 44.233" N	74° 16' 26.768" E
		10 MW	Mukti	Dhule	20° 52' 19.656" N	74° 56' 42.761" E
		10 MW	Bahirane, Baglan (Satana)	Nashik	20° 35' 56.762" N	74° 12' 7.588" E
		10 MW	Dahidi, Malegaon	Nashik	20° 42' 37.157" N	74° 33' 29.097" E
		10 MW	Vichkheda, Parola	Jalgaon	20° 53' 60" N	75° 5' 59.999" E
Juniper Green Energy Pvt. Ltd.		10 MW	Vahelgaon, Nandgaon	Nashik	20° 25' 23.7" N	74° 16' 49.7" E
		10 MW	Rajapur, Yeola	Nashik	20° 2' 58.1280" N	74° 29' 11.8248" E
		10 MW	Dahiwad, Deola	Nashik	20° 25' 12.110" N	74° 17' 59.999" E

A.5. Technologies and/or measures

>> (Describe the technologies and measures to be employed and/or implemented by the project, including a list of the facilities, systems and equipment that will be installed and/or modified by the project. Include information essential to understand the purpose of the project and how it will contribute positively to three SDGs.)

The project activity aims to harness solar energy through installation of PV with total installed capacity of 100 MWac (corresponding to 145 MWp). The solar PV power plant will have solar PV modules, inverters, transformers and other protection system and supporting components.

Technical Specifications at the time of commissioning:

A. Solar PV modules:

Module Make	Trina Solar
Module Model	Poly C-Si
Technology Used	Multi Crystalline
Capacity (p)	330Wp, 325 Wp
SwitchGear Panel	
Make	Technocraft
Capacity	11 Kv

Number of Modules installed :

S. No.	Village	Number of Modules installed of each type
Juniper Green Energy Pvt. Ltd.		
1.	Dahiwad	325 Wp/330 Wp/375 Wp Total: 44,313
2.	Yeola, Rajapur	325/330 Wp Total 44100
3.	Vahelgaon	325/330 Wp Total 44064 Nos.
Nisagra Renewable Energy Pvt. Ltd.		
4.	Indave	325 Wp/330 Wp Total: 44232

5.	Kasare	325 Wp/330 Wp Total: 44,232 Nos
6.	Mukti	325 Wp/330 Wp Total: 44,400 Nos
7.	Parola	325 Wp/330 Wp Total: 43,584 Nos
8.	Tembhe, Malegaon	325 & 330 Wp Total: 44232 Nos
9.	Tingri	325 & 330 Wp Total: 44232 Nos
10.	Varul	325 Wp/330 Wp Total: 44064 Nos.

B. Inverters:

S.No.	Make	
1.	Manufacturer	Huawei
2.	Rated Capacity	160 KW
3.	No. of Inverters	63

C. Transformers

S.No.	Make	
1.	Manufacturer	Sudhir
2.	Type	ONAN Step up
3.	Capacity	5 MVA Each
4.	No. of Transformers	2
5.	Serial Numbers	SPL-949, SPL-951

D. Metering Equipment Details

S.No.	Make	Solar Plant End
1.	Manufacturer	Secure Make
2.	Type	ABT meters
3.	Accuracy Level	0.2s

The solar PV modules have a useful life of 25 years.

For monitoring equipment, their location and technical specifications, refer Section B.7.3. For Plant Load Factor (PLF), please refer Section B.6.4.

Baseline Scenario

As the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following as per applied methodology: *“Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.*

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

Purpose of the Project

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The purpose of the project activity is to generate electrical power using solar energy, thereby displacing non-renewable fossil resources resulting in sustainable, economic and environmental development. In the absence of the project activity equivalent amount of power generation would have taken place through fossil fuel dominated power generating stations. Thus the renewable energy generation from project activity will result in reduction of the greenhouse gas emissions.

Positive contribution of the project to the following Sustainable Development Goals

1. **SDG13: Climate Action** : The project would lead to reduction of approx. 224,617 tCO₂ per annum due to implementation of project activity.
2. **SDG 7: Affordable and Clean Energy** : The project is expected to generate 239,771 MWh of clean energy per annum
3. **SDG 8: Decent Work and Economic Growth** : The project is expected to provide direct employment to around 67 persons, 19 employed for JGEPL and 48 employed in NREPL. The project leads to Trainings & workshops which are conducted for the O&M staff of the PP.

A.6. Scale of the project

>> (Define whether project is micro scale, small scale or others. Justify the scale referring to relevant activity requirement.)

Renewable energy project activities with a maximum output capacity of 15 megawatts (or an appropriate equivalent) are small scale project activity and project activities of more than 15 MW are considered as large-scale CDM project activity.

As the project activity is of 100 MW capacity, hence clearly it is Large Scale project.

A.7. Funding sources of project

>> (Provide the public and private funding sources for the project. Confidential information need not be provided.)

Private funding and funding from bank. The PP hereby confirms that there is no public funding from Annex 1 countries and no diversion of Official Development Assistance (ODA) involved in the project activity.

A.8. Assessment that project complies with 'gender sensitive' requirements

>> (Answer the four mandatory questions included under Step 1 to 3 in "Gold Standard Gender Equality Guidelines and Requirements" available [here](#).)

Question 1: Does the project reflect the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy? Explain how.

Response: As per Gold Standard Gender Policy, para 13(i) "Foundational gender-sensitive requirement - This strengthens Gold Standard's 'do no harm' approach and addresses safeguards to prevent or mitigate adverse impacts on women or men and girls and boys. Such action is mandatory for all projects seeking Gold Standard certification and includes compliance with the gender 'do no harm' safeguards, gender gap analysis and gender sensitive stakeholder consultations." The project being a renewable energy project is not gender sensitive project. The project does not adversely impact women or men.

Question 2: Does the project align with existing country policies, strategies and best practices? Explain how.

Response: India is party to "Convention on the Elimination of All Forms of Discrimination against Women²" and the project has aligned its policies which does not discriminate on gender.

Question 3: Does the project address the questions raised in the Gold Standard Safeguarding Principles & Requirements document? Explain how.

Response: The Project shall complete the following gender assessment questions below:

1. *Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits?* No, the Project being a solar project does not reduce access to or control of resources for women.

2 <http://hrlibrary.umn.edu/research/ratification-india.html>

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2. *Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?* No, the Project beneficiaries in terms of employment and social upliftment of the area are common for both the gender.
3. *Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?* No, the CSR activities that are planned to be carried out by the project proponent shall be discussed with the community, consisting both the genders, before the actual implementation.
4. *Does the Project take into account gender roles and the abilities of women or men to benefit from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?* Yes the project takes into account gender roles and abilities of women/men. Job profile is allocated based on the type of work to be carried out.
5. *Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?* No, on the contrary the project leads to increased availability of electricity in the regional grid thereby uplifting the living standards.
6. *Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?* No, since the project is a renewable electricity generation project, thus it will not have discriminated against women.
7. *Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?* No, in fact, the project leads to improved electricity in the regional grid thereby leading to less usage of fuel for lighting.
8. *Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?* No, in fact, due to improved electricity availability the usage of fuel for lighting would be reduced as well as indoor air quality would be improved.

Question 4: Does the project apply the Gold Standard Stakeholder Consultation & Engagement Procedure Requirements? Explain how.

Response: Since the project is applying retroactively for GS registration, a Stakeholder Feedback round shall be carried out at a later stage. However, a stakeholder consultation was conducted in line with CDM requirements on 31-Jan-19 and 1-Feb-19 at two separate locations in a way to cover all individual locations. The project representative explained how such power projects help in providing clean energy and thereby help in mitigating impacts due to Global Warming and the impacts of solar power projects which lead to providing clean energy, increase in employment opportunities both long term and short term, increased income and thereby leading to improvement in living standard of the people. The stakeholders shared full support for the solar power project operations.

SECTION B. Application of selected approved Gold Standard methodology

B.1. Reference of approved methodology

>>

Title : Grid-connected electricity generation from renewable sources.
References : Approved Large Scale Consolidated Methodology: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 19.0, EB 100 Annex 6)³

ACM0002 draws upon the following tools which have been used in the PDD:

- Methodological Tool: Tool to calculate the emission factor for an electricity system - Version 07.0

3 <https://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD>

B.2. Applicability of methodology

>> (Justify the choice of the selected methodology(ies) by demonstrating that the project meets each applicability condition of the applied methodology(ies))

As per para 2 of ACM0002 (Version 19.0, EB 100 Annex 6), “This methodology applies to project activities that include retrofitting, rehabilitation (or refurbishment), replacement or capacity addition of an existing power plant or construction and operation of a Greenfield power plant”. The project activity meets the applicability conditions of the approved consolidated baseline and monitoring methodology ACM0002, Version 19.0, Sectoral Scope 1, EB 100 for Greenfield projects as described below:

Applicability	Project activity vis-à-vis applicability Conditions
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 operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	The project activity is installation of a new grid connected solar power plant/ unit at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.
The 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.	The proposed project activity is an installation of a new grid connected solar power plant/ unit and hence criteria under point (a) is met. The project does not involve any capacity additions, retrofits or replacements and therefore this criteria under point (b) 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/m ² ; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m ² ; 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/m ² , 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/m ² ; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;	The proposed project activity is an installation of a new grid connected solar power plant/ unit and not Hydro power plant, therefore this criteria is not applicable for this project activity.

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m² shall be: - Lower than or equal to 15 MW; and - Less than 10 per cent of the total installed capacity of integrated hydro power project.	
In the case of integrated hydro power projects, project proponent shall: - Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or - Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The proposed project activity is an installation of a new grid connected solar power plant/ unit and not Hydro power plant, therefore this criteria is not applicable for this project activity.
The methodology is not applicable to: - Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; - Biomass fired power plants/units.	The project activity is installation of a new grid connected solar power project/ unit and does not involve switching from fossil fuel to renewable energy, therefore criterion described in point (a) is not relevant to the project activity. This is a solar power plant/ unit and not a biomass fired plant, therefore criterion described in point (b) is not applicable to the project activity.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	The project activity is a new grid connected solar power plant/ unit and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.
Applicability conditions of “Tool to calculate the emission factor for an electricity system”, - Version 07.0	
This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	This condition is applicable. OM, BM and CM are estimated using the tool under section B.6.3 for calculating baseline emissions.
Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in “Appendix 1: : Procedures related to off-grid power generation” should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total	Since the project activity is grid connected, this condition is applicable and the emission factor has been calculated accordingly.

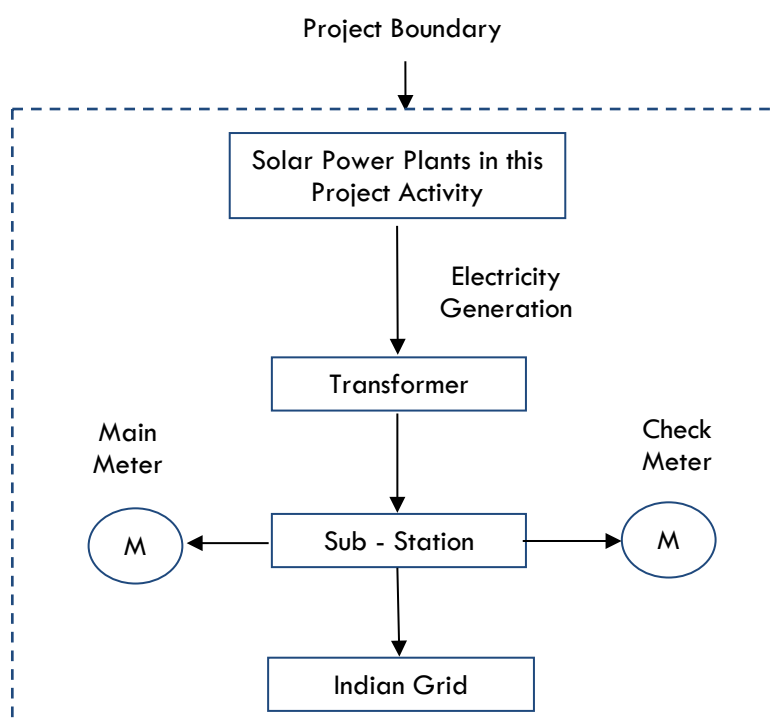
electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project activity is located in India, a non-Annex I country. Therefore, this criterion is not applicable for the project activity.
Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero.	The project activity is a grid connected solar power project/ unit and does not involve emission from biofuels. Therefore, this criterion is not applicable.

B.3. Project boundary

>> (Present a flow diagram of the project boundary, physically delineating the project, based on the description provided in section A.5 above.)

Project boundary has ascertained using para 20 of ACM0002 (Version 19.0, EB 100 Annex 6) - "The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to."

Hence the project boundary includes the Solar Project activity, sub-station, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Indian grid.



Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Grid connected electricity generation	CO ₂	Yes	Main emission source
		CH ₄	No	Minor emission source
		N ₂ O	No	Minor emission source
Project scenario	Greenfield Solar Power Project Activity	CO ₂	No	No CO ₂ emissions are emitted from the project activity
		CH ₄	No	No, Project Activity does not emit CH ₄
		N ₂ O	No	No, Project Activity does not emit N ₂ O

B.4. Establishment and description of baseline scenario

>> (Explain how the baseline scenario is established in accordance with guidelines provided in GS4GG Principles & Requirements and the selected methodology(ies). In case suppressed demand baseline is used then same should be explained and justified.)

As per the approved consolidated Methodology ACM0002 (Version 19.0, EB 100 Annex 6) para 22 “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 “TOOL07: Tool to calculate the emission factor for an electricity system”.

The project activity involves setting up of solar plant to harness the power generation from solar radiations to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

The combined margin ($EF_{grid,CM,y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM), in accordance with the Tool to calculate the emission factor for an electricity system - Version 07. Calculations for this combined margin must be based on data from an official source⁵ (where available) and made publically available. In India, Central Electricity Authority (CEA), Government of India provides this data, and accordingly the same has been used.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9368 tCO ₂ /MWh	Combined margin CO ₂ emission factor for the project electricity system in year y	Calculated ⁶ as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO ₂ Emission Database, Version 14 published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,OM,y}$	0.9610 tCO ₂ /MWh	Operating margin CO ₂ emission factor for the project electricity system in year y	Calculated as the last 3 year (2015-16, 2016-17, and 2017-18) generation-weighted average, sourced from Baseline CO ₂ Emission Database, Version 14, published by Central Electricity Authority (CEA), Government of India.
$EF_{grid,BM,y}$	0.8644 tCO ₂ /MWh	Build margin CO ₂ emission factor for the project electricity system in year y	Baseline CO ₂ Emission Database, Version 14, published by Central Electricity Authority (CEA), Government of India.

B.5. Demonstration of additionality

>> (If the proposed project is not a type of project that is deemed additional, as stated below, then follow guidelines in section 3.5.1 of GS4GG Principles & Requirements to demonstrate additionality.)

⁵ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/user_guide_ver14.pdf

⁶ http://www.cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_12.zip

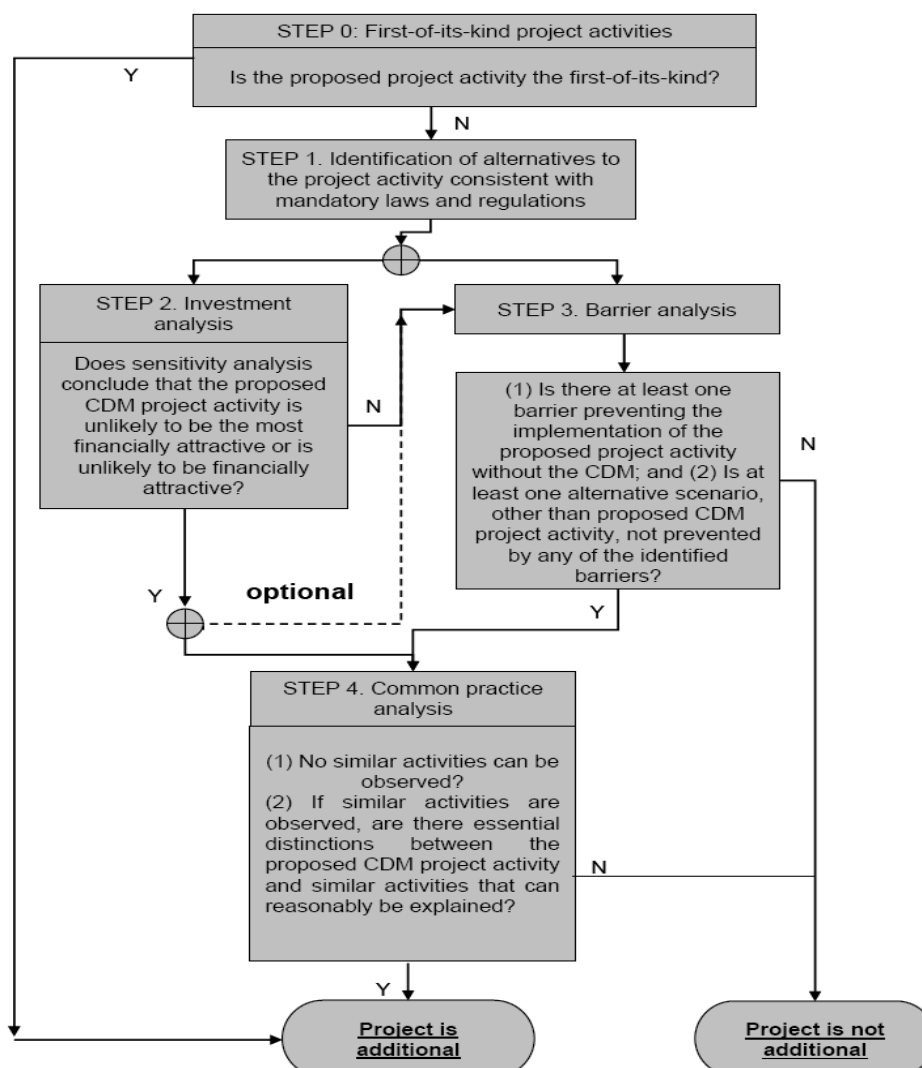
The table below is only applicable if the proposed project is deemed additional, as defined by the applied approved methodology or activity requirement or product requirement.

Specify the methodology or activity requirement or product requirement that establish deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	Not Applicable
Describe how the proposed project meets the criteria for deemed additionality.	Not Applicable

The proposed CDM project generates power using solar energy which is a renewable, zero emission source of energy. Baseline considerations for the project are based on approved consolidated baseline methodology ACM0002 (Version 19.0).

Thus the project follows section 5.3.2 of the applied methodology which requires the project proponent to determine the additionality based on “Tool for the demonstration and assessment of additionality”, Version 07.0.0.

The step-wise approach to establish additionality of the project activity has been followed, details of which are provided in the following paragraphs:



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

The proposed project activity is solar project; hence not the first of its kind. Hence, this step is not applicable.

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

As per the applied methodology ACM0002 version 19.0; Para 22, *"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 plant and by the addition of new generation sources"*.

As per the applied methodology ACM0002 version 19.0; Para 22, 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 plant and by the addition of new generation sources.

As the baseline scenario is prescribed by applied methodology, hence no further analysis is carried out to identify alternatives.

Step 2: Investment Analysis

As per para 29 of "Tool for the demonstration and assessment of additionality" v7.0.0, it is determined that the proposed project activity is not an economically or financially feasible option.

To conduct the investment analysis, Methodological tool: Investment analysis, version 9.0 (EB 101 Annex 11) has been referred.

Sub-step 2a: Determine appropriate analysis method

As per "Tool for the demonstration and assessment of additionality" (version 07.0.0), for financial analysis of the project, the following three options are available:

- Option I: Simple Cost Analysis
- Option II: Investment Comparison Analysis
- Option III: Benchmark Analysis

The project will generate revenues from sale of electricity, therefore Option I is not applicable. Option II also does not apply since there is no comparable investment alternative available to the project participant in line with para 32 of the Tool for the demonstration and assessment of additionality (version 07.0.0).

The most appropriate financial analysis method is therefore option III: the benchmark analysis, where the returns on investment in the project activity are compared to benchmark returns that are available to any investors in the country.

Sub-step 2b: Option III. Apply benchmark analysis

Project proponents have considered Post-Tax Equity IRR for investment analysis at the time of decision-making. As Project proponents are only interested in the returns project is generating on the portion of investment costs, which is financed by them in the form of equity.

As per Para 15 of EB101, Annex 11 states that Required/expected returns on equity are appropriate benchmarks for an equity IRR. Therefore, the Expected return on equity is considered appropriate benchmark. Accordingly, the post-tax Equity IRR has been considered as the relevant financial indicator for Investment Analysis.

Default Value Benchmark

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) in the 'Methodological tool: Investment analysis'

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

Nominal Benchmark⁷ = $\{(1 + \text{Real Benchmark}) * (1 + \text{Inflation rate})\} - 1$

Where:

- Default value for Real Benchmark = 9.79% (as per Appendix of EB101, Annex 11)
- Inflation Rate forecast for by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India.

Benchmark estimation

The Cost of Equity has been considered using the “Methodological tool: Investment analysis” available at the time of decision making.

Table under Appendix in EB101, Annex 11 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 9.79%⁸

Thus, minimum cost of equity considered for calculation of Benchmark = 9.79%

Inflation Forecast for India as per RBI website⁹ and corresponding benchmark values:

Project Promoters' Name	Inflation Forecast		Benchmark	
	5 Years	10 Years	5 Years	10 Years
Juniper Green Energy Pvt. Ltd.	4.50%	4.50%	14.73%	14.73%
Nisagra Renewable Energy Pvt. Ltd.	4.50%	4.50%	14.73%	14.73%

Thus, the benchmark for both the projects is 14.73%.

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

Kindly refer the financial spread sheets for the key assumptions (web links & sources of input parameters) supporting the financial projections.

Considering the input values, Equity IRR is given below:

Project Promoters' Name	Equity IRR without CDM	Benchmark (Equity IRR)
Juniper Green Energy Pvt. Ltd.	9.40%	14.73%
Nisagra Renewable Energy Pvt. Ltd.	9.60%	14.73%

The project activity cannot be considered as financially attractive as the equity IRR for the project activity is less than the Benchmark.

Sub-step 2d: Sensitivity Analysis

Addressing Guidance 27 & 28 of EB101, Annex 11, following factors has been subjected to sensitivity analysis:

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

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 are as follows:

Juniper Green Energy Pvt. Ltd.

⁷ As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

⁸ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf>

⁹ <https://rbi.org.in/Scripts/PublicationsView.aspx?id=17759>

Variation %	-10%	Normal	10%	Breaching Value
PLF	7.04%	9.40%	11.92%	19.37%
O&M	9.67%	9.40%	9.14%	-200.75%
Project Cost	11.90%	9.40%	7.51%	-17.59%
Tariff Rate	7.04%	9.40%	11.92%	19.37%

Nisagra Renewable Energy Pvt. Ltd.

Variation %	-10%	Normal	10%	Breaching Value
PLF	7.21%	9.60%	12.17%	18.36%
O&M	9.87%	9.60%	9.33%	-190.48%
Project Cost	12.16%	9.60%	7.68%	-16.83%
Tariff Rate	7.21%	9.60%	12.17%	18.36%

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 favourable conditions.

	Probability to breach the benchmark
PLF	Not possible as the PLF has been reported as per the Third Party Report based on long term data and hence a PLF fluctuation of more than 10% is unlikely to happen.
O&M	With the country experiencing more than 5% inflation on an average, the question of O&M coming down is ruled out. Moreover, the O&M agreement provides for a 5% escalation in the cost every year. Even the tariff order of Maharashtra provides for a 5% escalation in the O&M cost.
Project Cost	The Loan Sanction letter cost is similar as that mentioned in the DPR, which was considered during decision making. Since the Loan sanction project cost is firm, there is no possibility of project cost going below this level. However, we have conducted sensitivity analysis for project cost being 10% less than that considered during decision making. Still, the IRR does not breach the Benchmark.
Tariff Rate	The tariff is determined by PPA which is fixed for 25 years mentioned. Hence, there is no probability to get variation for the same.

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). 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

Stepwise approach for common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB84, 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%	150	MW
Capacity of the proposed project activity	100	MW
-50%	50	MW

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

- The projects are located in the applicable geographical area;
- The projects apply the same measure as the proposed project activity;
- 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;
- 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;
- The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
- 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:

- As the project is located in Maharashtra state of India, therefore, the applicable geographical area of Maharashtra has been chosen for analysis.
- 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, all projects applying same measure (b) as the proposed project activity are candidates for similar projects.
- The energy source used by the project activity is solar. Hence, only solar energy projects have been considered for analysis.
- The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.
- The capacity range of the projects is within the applicable capacity range from 50 MW to 200 MW.
- The start date of the project activity is 10-Jul-19. As Kyoto Protocol was ratified by India on 26-Aug-2002¹⁰, therefore projects which had started commercial operation between 26-Aug-2002 to 10-Jul-19, have been identified.

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

$$N_{\text{solar}} = 8$$

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,

$$N_{\text{all}} = 8$$

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:

- Size of Installation
- Investment climate on the date of the investment decision

¹⁰ http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php

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Since, this is the only project (as compared to the projects under N_{all}) which is feeding electricity directly into the agricultural feeder, making the project economics quite different from the other commissioned projects. Hence, projects where either of the conditions is satisfied those projects are counted for calculating N_{diff} projects.

Thus:

$$N_{diff} = 8$$

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.

$$\begin{aligned} \text{Calculate } F &= 1 - N_{diff}/N_{all} = 1 - (8/8) = 0 \\ N_{all} - N_{diff} &= 8 - 8 = 0 \end{aligned}$$

Outcome of Step 5:

As,

- i. $F = 0$; is less than 0.2, and
- ii. $N_{all} - N_{diff} = 0$; is less than 3, thus:

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

B.6. Sustainable Development Goals (SDG) outcomes

B.6.1. Relevant target for each of the three SDGs

>> (Specify the relevant SDG target for each of three SDGs addressed by the project. Refer most recent version of targets [here](#).)

Item	Goals and Targets	Indicators
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SDG 7: Affordable and Clean Energy	7.2: By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1: Renewable energy share in the total final energy consumption
	Target: Juniper Green Energy Pvt. Ltd. : 17,913 MWh per annum Nisagra Renewable Energy Pvt. Ltd.: 167,858 MWh per annum Total : 239,771 MWh per annum	
SDG 8: Decent Work and Economic Growth	8.6: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	8.6.1: Average hourly earnings of female and male employees, by occupation, age and persons with disabilities
	Target: Juniper Green Energy Pvt. Ltd. : • Training: 1 nos annually • Employment of 19 staff out of which 13 are local employees Nisagra Renewable Energy Pvt. Ltd.: • Training: 1 nos annually • Employment of 48 staff out of which 43 are local employees	
SDG 13: Climate Action	13.2: Integrate climate change measures into national policies, strategies and planning	13.2.1: Number of countries that have communicated establishment or operationalization of an integrated policy/ strategy/ plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)
	Target: Juniper Green Energy Pvt. Ltd. : 67,368 tCO ₂ Nisagra Renewable Energy Pvt. Ltd.: 157,249 tCO ₂ Total: 224,617 tCO ₂ per annum	

B.6.2. Explanation of methodological choices/approaches for estimating the SDG outcome

>> (Explain how the methodological steps in the selected methodology(ies) or proposed approach for calculating baseline and project outcomes are applied. Clearly state which equations will be used in calculating net benefit.)

The company shall conduct regular surveys during construction as well as O&M phases in the villages near project locations to check the requirement of facilities by the villages. Based on the surveys, PP shall identify and works on several scope(s) of developmental activities such as health camps, distribution of furniture & sports kits in schools, toilet requirements in government schools, drinking water requirements etc. For this project activity, following SDGs are expected to be impacted:

SDG 7 : Affordable and Clean Energy

The baseline for the project is no project, thus leading to generation in the relevant grid which is dominated by fossil fuel. The clean energy generated by the project is calculated based on the amount of electricity generated by the project per annum. The project is expected to generate 239,771 MWh of clean energy per annum.

SDG 8: Decent Work and Economic Growth

The project leads to Trainings & workshops which are conducted for the O&M staff of the PP. It is expected that a minimum of 1 training (either of the above) would be carried out annually.

The project will also provide employment to approximately 67 persons including O&M staff, management, outsourced jobs as well as security guards during the O&M phase.

SDG13 : Climate Action :

The project leads to mitigation of 224,617 tCO₂ per annum.

As per the approved consolidated Methodology ACM0002 (Version 19.0, EB 100, Annex 6), Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

Baseline Emissions:

Baseline Emissions for the amount of electricity supplied by project activity, BE_y is calculated as

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

Where:

BE_y = Baseline emissions in year y (t CO₂/yr)

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

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO₂/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for

- Greenfield plants,
- Retrofits and replacements, and
- Capacity additions

The project activity is the installation of solar projects and it is a green field project. So the formula in option (a) i.e., greenfield plants is used to calculate the value of $EG_{PJ,y}$. In accordance with para 44 of the applied methodology:

$$EG_{PJ,y} = EG_{facility,y}$$

Where:

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

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

The proposed project activity falls under Indian grid, which constitutes of both fossil fuels and non-fossil fuels sources of electricity generation. Emission reductions due to the project activity are considered to be equivalent to the baseline emissions, since the solar project would not lead to any project emission and leakage emissions. Emission reductions are related to the electricity exported by the project and the emission coefficient of the grid system.

Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin and build margin factors according to the procedures prescribed in the latest tool for calculating the emission factor for an electricity system. The steps of calculation are as follows:

Step 1: Identify the relevant electricity systems

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As described in tool “For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity systems”. It also states that “If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used”. Keeping this into consideration, the Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into five regional grids viz. Northern, Eastern, Western, North-eastern and Southern. However, all the 5 zones have been synchronized and called as Indian Grid.

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

Option I is opted for the project activity i.e. only grid connected power plants are included in the calculation.

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

According to the tool, the calculation of the operating margin emission factor is based on one of the following methods:

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

Any of the four methods can be used for calculating OM. However, the simple adjusted OM and dispatch data analysis OM cannot be currently applied in India due to lack of necessary data however, the simple OM method (option a) can only be used if low cost/must-run resources constitute less than 50% of total grid generation in:

- 1) average of the five most recent years, or
- 2) based on long-term averages for hydroelectricity production.

The Share of Low Cost / Must-Run (% of Net Generation) in the generation profile of the different grids in India in the last five years is as follows:

	Share of Must-Run (Hydro/Nuclear) (% of Net Generation)				
	2013-14	2014-15	2015-16	2016-17	2017-18
Indian Grid	18.6%	16.8%	15.1%	14.6%	14.3%

Source: CO2 Baseline Database for the Indian Power Sector - Central Electricity Authority (CEA)

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the Indian regional grid is less than 50% of the total generation. Hence the Simple OM method can be used to calculate the Operating Margin Emission factor. The average operating margin method cannot be applied, as low cost/ must run resources constitute less than 50% of total grid generation.

The project proponent has chosen an ex ante option for calculation of the OM with a 3-year generation weighted average, based on the most recent data available, without requirement to monitor and recalculate the emissions factor during the crediting period.

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

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Based on the net electricity generation, and a CO2 emission factor of each power unit. (Option A), or
- Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option B)

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO2 Baseline Database provides information about the Combined Margin Emission Factors of the Indian grid. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the “Tool to calculate the emission factor for an electricity system”. We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

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The CEA database uses the option A i.e. data on net electricity generation and CO₂ emission factor for each power unit, the average efficiency of each power unit and the fuel type(s) used in each power unit, to calculate the OM of the different regional grids.

$$EF_{grid,OMsimple,y} = \sum (EG_{m,y} \times EF_{EL,m,y}) / \sum EG_{m,y}$$

Where:

$EF_{grid,OMsimple,y}$: Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)
 $EG_{m,y}$: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
 $EF_{EL,m,y}$: CO₂ emission factor of power unit m in year y (tCO₂/MWh)
 m : All power units serving the grid in year y except low-cost / must-run power units
 y : The relevant year as per the data vintage chosen in step 3

In India, the Central Electricity Authority (CEA) has estimated the baseline emission factor for the power sector. This data has also been endorsed by the DNA and is the most authentic information available in the public domain.

Following tables shows the simple OM and Net generation¹¹ respectively for the recent three years:

Simple Operating Margin Emission Factors (t CO ₂ /MWh) (incl. Imports)			
	2015-16	2016-17	2017-18
Indian Grid	0.9655	0.9636	0.9543

Net Generation in Operating Margin (GWh) (incl. imports)			
	2015-16	2016-17	2017-18
Indian Grid	871,753	916,278	960,693

Therefore the 3 years net generation weighted OM average for Indian grid comes out to be 0.9610 tCO₂/MWh

The emission factor of each power unit m has been determined as follows:

$$EF_{EL,m,y} = (\sum FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}) / EG_{m,y}$$

Where:

$EF_{EL,m,y}$: CO₂ emission factor of power unit m in year y (tCO₂/MWh)
 $FC_{i,m,y}$: Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)
 $NCV_{i,y}$: Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
 $EF_{CO2,i,y}$: CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)
 $EG_{m,y}$: Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
 m : All power units serving the grid in year y except low-cost / must-run power units
 i : All fossil fuel types combusted in power unit m in year y
 y : The relevant year as per the data vintage chosen in step 3

Step 5: Calculate the build margin (BM) emission factor

The sample group of power units m used to calculate the build margin consists of either:

- The set of five power units that have been built most recently, or
- The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation. Accordingly, the CEA database calculates the build margin as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The build margin emission factor has been calculated

¹¹ CO₂ Baseline Database for the Indian Power Sector, Version 14, Dec 2018

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ex-ante based on the most recent information available on units already built for sample group m at the time of PDD submission to the DOE for validation. This option does not require monitoring the emission factor during the crediting period.

The build margin emissions factor is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = (\sum EG_{m,y} \times EF_{EL,m,y}) / \sum EG_{m,y}$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO ₂ emission factor of power unit m in year y (tCO ₂ /MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

The CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 4 (a) for the simple OM, using option A1 for y most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

Build margin emission factor is calculated, ex-ante as per the most recent data available¹¹. So, build margin emission factor for Indian grid for 2017-2018 is 0.8644 tCO₂/MWh

Step 6: Calculate the combined margin (CM) emission factor ($EF_{grid,CM,y}$)

The emission factor EF_y of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as $EF_{OM,y}$ and $EF_{BM,y}$ then the EF_y is given by:

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

Where:

$EF_{grid,BM,y}$	= Build margin CO ₂ emission factor in year y (t CO ₂ /MWh)
$EF_{grid,OM,y}$	= Operating margin CO ₂ emission factor in year y (t CO ₂ /MWh)
w_{OM}	= Weighting of operating margin emissions factor (per cent)
w_{BM}	= Weighting of build margin emissions factor (per cent)

According to “Tool to calculate the emission factor for an electricity system” the weights for OM and BM are 0.75 and 0.25 respectively.

Using the values for operating and build margin emission factor provided in the CEA database and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) is 0.9368 tCO₂e/MWh.

Project Emission

As per the ACM0002 ver-19.0, Project Emission for most renewable energy power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y	= Project emissions in year y (tCO ₂ e/yr)
$PE_{FF,y}$	= Project emissions from fossil fuel consumption in year y (tCO ₂ /yr)
$PE_{GP,y}$	= Project emissions from the operation of geothermal power plants due to the release of non condensable gases in year y (tCO ₂ e/yr)
$PE_{HP,y}$	= Project emissions from water reservoirs of hydro power plants in year y (tCO ₂ e/yr).

The project activity involves the generation of electricity from the installation of solar projects. Hence, as per ACM0002, Version 19.0, there is no project emission for solar projects. Therefore, project emissions are zero.

Leakage Emissions

No leakage emissions are considered in the project activity. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). Since the emissions sources are small, it is neglected.

B.6.3. Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

(Include a compilation of information on the data and parameters that are not monitored during the crediting period but are determined before the design certification and remain fixed throughout the crediting period like IPCC defaults and other methodology defaults. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator	SDG13 : Climate Action
Data/parameter	EF _{OM, y}
Unit	tCO ₂ e/MWh
Description	Operating Margin Emission Factor of Indian Grid
Source of data	Calculated from CEA database, Version 14, Dec 2018 ¹¹
Value(s) applied	0.9610
Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system," as 3-year generation weighted average using data for the years 2015-16, 2016-2017 & 2017-18. The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Relevant SDG Indicator	SDG13 : Climate Action
Data/parameter	EF _{BM, y}
Unit	tCO ₂ e/MWh
Description	Build Margin Emission Factor of Indian Grid
Source of data	Calculated from CEA database, Version 14, Dec 2018 ¹¹
Value(s) applied	0.8644
Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system,". The data are obtained from "CO ₂ Baseline Database for Indian Power Sector" version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Relevant SDG Indicator	SDG13 : Climate Action
Data/parameter	EF _{CM, y}
Unit	tCO ₂ e/MWh
Description	Combined Margin Emission Factor of Indian Grid
Source of data	Calculated from CEA database, Version 14, Dec 2018 ¹¹
Value(s) applied	0.9368

Choice of data or Measurement methods and procedures	Calculated as per “Tool to calculate the emission factor for an electricity system,”. The data is obtained from “CO2 Baseline Database for Indian Power Sector” version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comment	-

B.6.4. Ex ante estimation of outcomes linked to each of the three SDGs

>> (Provide a transparent ex ante calculation of baseline and project outcomes (or, where applicable, direct calculation of net benefit) during the crediting period, applying all relevant equations provided in the selected methodology(ies) or as per proposed approach. For data or parameters available before design certification, use values contained in the table in section B.6.3 above. For data/parameters not available before design certification and monitored during the crediting period, use estimates contained in the table in section B.7.1 below)

SDG 7: Affordable and Clean Energy - Project expected to generate 239,771 MWh clean energy every year

SDG 8: Decent Work and Economic Growth - Minimum 1 training to be carried out annually, apart from providing employment to approximately 67 persons.

SDG13 : Climate Action - The project leads to mitigation of 224,617 tCO2 per annum.

Calculation of Outcome for SDG13 : Climate Action

Baseline emissions

The baseline emissions are the product of electrical energy baseline $EG_{PJ,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by an emission factor.

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

Where,

$EG_{PJ,y}$ = Total quantity of net electricity delivered to the Indian grid.

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y
= 0.9368 t CO2/MWh.

Project Participant	Capacity	PLF (%)	Generated Power (MWh/year)	Baseline Emission Factor (tCO2/MWh)	Baseline emissions (tCO2/ year)
Juniper Green Energy Pvt. Ltd.	30 MW	27.75%	72,927	0.9368	67,368
Nisagra Renewable Energy Pvt. Ltd.	70 MW	27.76%	170,224	0.9368	157,249

$$BE_y = 239,771 * 0.9368 \text{ t CO}_2/\text{year} = 224,617 \text{ tCO}_2/\text{year}$$

Project emissions

$$PE_y = 0$$

Leakage

No leakage emissions are applicable.

Emission reductions

$$ER_y = BE_y - PE_y = 224,617 - 0 = 224,617 \text{ tCO}_2/\text{year}$$

B.6.5. Summary of ex ante estimates of each SDG outcome

SDG 7: Affordable and Clean Energy

Year	Baseline estimate	Project estimate	Net benefit
Year 1	0 MWh	243,151 MWh	243,151 MWh
Year 2	0 MWh	241,449 MWh	241,449 MWh
Year 3	0 MWh	239,759 MWh	239,759 MWh
Year 4	0 MWh	238,081 MWh	238,081 MWh
Year 5	0 MWh	236,414 MWh	236,414 MWh
Total	0 MWh	1,198,855 MWh	1,198,855 MWh
Total number of crediting years			
Annual average over the crediting period	0 MWh	239,771 MWh	239,771 MWh

The proposed project activity falls under Indian grid, which constitutes of both fossil fuels and non-fossil fuels sources of electricity generation hence in baseline, the affordable and Clean Energy generated was 0. Since the project is a solar energy project, therefore the Affordable and Clean Energy produced by the project is 239,771 MWh per year.

SDG 8: Decent Work and Economic Growth

Year	Baseline estimate	Project estimate	Net benefit
Year 1	0 Training, 0 Jobs	1 Training, 67 Jobs	1 Training, 67 Jobs
Year 2	0 Training, 0 Jobs	1 Training, 67 Jobs	1 Training, 67 Jobs
Year 3	0 Training, 0 Jobs	1 Training, 67 Jobs	1 Training, 67 Jobs
Year 4	0 Training, 0 Jobs	1 Training, 67 Jobs	1 Training, 67 Jobs
Year 5	0 Training, 0 Jobs	1 Training, 67 Jobs	1 Training, 67 Jobs
Total	0 Training, 0 Jobs	5 Trainings, 67 Jobs	5 Trainings, 67 Jobs
Total number of crediting years			
Annual average over the crediting period	0 Training, 0 Jobs	1 Training, 67 Jobs	1 Training, 67 Jobs

There was no training in the baseline however the training and jobs generated by the project activity is 1 and 67 jobs.

SDG13 : Climate Action

Year	Baseline estimate	Project estimate	Net benefit
Year 1	227,784 tCO2	0 tCO2	227,784 tCO2
Year 2	226,190 tCO2	0 tCO2	226,190 tCO2
Year 3	224,606 tCO2	0 tCO2	224,606 tCO2
Year 4	223,034 tCO2	0 tCO2	223,034 tCO2
Year 5	221,473 tCO2	0 tCO2	221,473 tCO2
Total	1,123,087 tCO2	0 tCO2	1,123,087 tCO2
Total number of crediting years			
Annual average over the crediting period	224,617 tCO2	0 tCO2	224,617 tCO2

The proposed project activity falls under Indian grid, which constitutes of both fossil fuels and non-fossil fuels sources of electricity generation hence in baseline, the estimated emission is 224,617 tCO₂ per year. Since the project is solar energy project, therefore the project does not emit any GHG.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Include specific information on how the data and parameters that need to be monitored in the selected methodology(ies) or proposed approaches or as per mitigation measures from safeguarding principles assessment or as per feedback from stakeholder consultations would actually be collected during monitoring. Copy this table for each piece of data and parameter.)

Relevant SDG Indicator	SDG 7.2.1 : Affordable and Clean Energy
Data / Parameter	EG _{PJ,y}
Unit	MWh
Description	Quantity of net electricity supplied to the grid
Source of data	Generation statement provided by MSEDCL every month.
Value(s) applied	239,771 MWh

Measurement methods and procedures	Data Type: Measured Monitoring equipment:Energy Meters of accuracy class 0.2s Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually. Archiving Policy: Paper &/or Electronic Calibration frequency: Once in 5 years as per CEA guidelines ¹² Electricity exported/imported to the grid is in kWh. However for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from Monthly Meter reading reports provided by MSEDCL as per below equation: $EG_{PJ,y} = EG_{Export} - EG_{Import}$ Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the Invoices/ Monthly Bill raised by the Project Participants to MSEDCL. Metering Details: Make: Accuracy: 0.2 S			
	Juniper Green Energy Pvt. Ltd.			
	Details	Main Meter	Check Meter	Date of commissioning
	Dahiwad GSS	2892234	2892233	20.03.2020
	Rajapur GSS (5MW Bay-1)	2892216	2892213	22.01.2020
	Rajapur GSS (5MW Bay-2)	2892226	2892227	22.01.2020
	Vahelgaon GSS (5MW Bay-1)	2892214	2892211	21.01.2020
	Vahelgaon GSS (5MW Bay-2)	2892215	2892228	21.01.2020
	Nisagra Renewable Energy Pvt. Ltd.			
	Indave GSS (5MW Bay-1)	2872718	2872719	31.12.2019
Indave GSS (5MW Bay-2)	2872736	2872737	31.12.2019	
Kasare GSS (5MW Bay-1)	2872724	2872725	07.01.2020	
Kasare GSS (5MW Bay-2)	2872726	2872727	07.01.2020	
Mukti GSS	2872728	2872729	29.03.2020	
	2874872	2874873	29.03.2020	
Monitoring frequency	Monthly			

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http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12

QA/QC procedures	Calibration of all the meters will be undertaken once in 5 years as per CEA guidelines. The meters will be of accuracy class 0.2s.
Purpose of data	The Data/Parameter is required to calculate the baseline emission
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

Relevant SDG Indicator	SDG 8.5.1: Decent Work and Economic Growth
Data / Parameter	- Quantitative employment, - Quality of employment - Income generation
Unit	- Number(Trainings) - Number (employees) - INR (salary)
Description	- Number of Trainings provided to employees & O&M staff - Number of project employees with Number of male/female, permanent/temporary, age and person with disabilities. - Salary given to the employees of the project. The income to all the unskilled workers are made on day to day basis in line with the minimum wage requirements. Annual records of income paid to all the employees would be available.
Source of data	Training Records (HSE & HR) Salary Slip of the project employees.
Value(s) applied	The trainings & workshops will be given to the O&M staff are: - HSE Training Record - Soft Skill Training It is expected that a minimum of 1 training (either of the above) would be carried out annually. The training programmes help in making the workforce efficient and skilled at their job. This not only helps the company but adds to growth of individual employees. Thus, the project has a positive impact on the parameter.
Measurement methods and procedures	- Training Attendance sheets. - Employee Records - Salary slip of the employees
Monitoring frequency	Once in a Monitoring period
QA/QC procedures	The number of persons employed would be mentioned in the plant register, which can be crossed checked with daily attendance register. Salary slip can be checked for earnings of employees
Purpose of data	Continuation of regular trainings/workshops for employees & O&M staff
Additional comment	-

Relevant SDG Indicator	SDG13.2.1 : Climate Action
Data / Parameter	Air quality
Unit	tCO2
Description	Reduction in CO2 emission reduction due to implementation of project activity
Source of data	Calculated as per "Tool to calculate the emission factor for an electricity system,". The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 14.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) applied	224,617 tCO2 emission reductions estimated per annum

Measurement methods and procedures	Calculated from CEA database and Energy Generation
Monitoring frequency	Calibration and Testing of Meters will be done by the accredited agency as per norms. Once in 5 years as per CEA guidelines ¹³
QA/QC procedures	A check meter is also installed near to the export meter to cross check the electricity exported to the grid. The check meter reading would also be used in case of failure of export meter
Purpose of data	Calculation of baseline emissions
Additional comment	-

Relevant SDG Indicator	Safeguarding principal 4.3.5:
Data / Parameter	Hazardous and Non-hazardous Waste
Unit	-
Description	The manufacture, trade, release, and use of hazardous and non-hazardous chemicals and/or materials
Source of data	Plant Records
Value(s) applied	0
Measurement methods and procedures	Manual
Monitoring frequency	Once in a Monitoring period
QA/QC procedures	The waste will be disposed to the waste handlers and the firm will comply with all the local laws for monitoring and disposal.
Purpose of data	Analysis of safeguarding principle
Additional comment	-

B.7.2. Sampling plan

>> (If data and parameters monitored in section B.7.1 above are to be determined by a sampling approach, provide a description of the sampling plan.)

Sampling is not required for the given project activity.

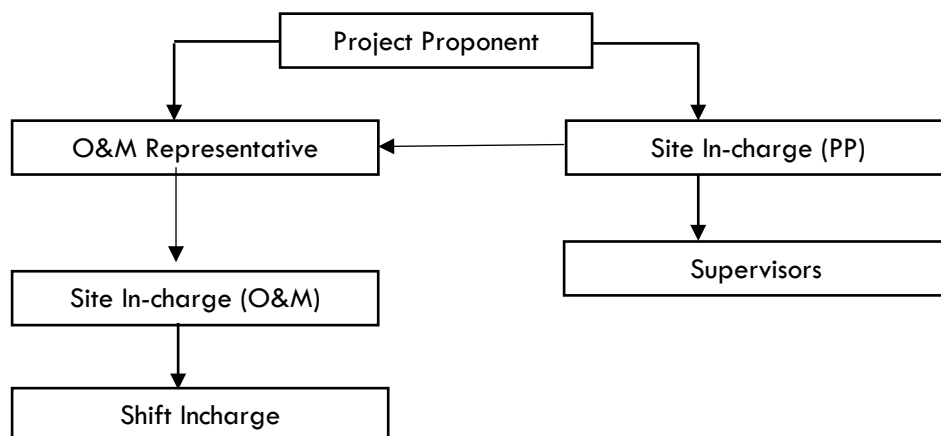
B.7.3. Other elements of monitoring plan

>>

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

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant.

¹³ http://www.aegcl.co.in/Metering_Regulations_Of_CEA_17_03_2006.pdf, page 12



Responsibilities of Site Incharge (PP): Overall functioning and maintenance of the project activity, the Site incharge shall coordinate with the O&M operator as well as the site supervisors.

Responsibilities of O&M Representative: Co-ordination between Site incharge of the O&M operator as well as the project participant and further report to PP head office.

Responsibilities of Site In-charge (O&M Operator): Responsibility for maintaining the data records, ensures completeness of data, and reliability of data (calibration of equipment) as well as data recording for all the parameters.

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

Data Measurement

Projects activity comprises of installation Energy meters at a Pooling Substation prior to the Delivery point.

The export and import energy will be measured continuously using above mentioned meters installed at Substation. Export & Import readings of meters shall be taken on monthly basis by authorized officer of MSEDCL in the presence of representative(s) of PP. The meter reading will be taken jointly and signed by the representatives of the MSEDCL and representative(s) of PP. Based on the readings, invoices/ monthly bills will be raised by PP. These invoices/ monthly bills can be used for cross checking the meter readings taken for the respective project activity.

In case of pooling of multiple Projects at the same Substation, power from multiple Projects will be pooled at a Pooling Substation prior to the Delivery point and the combined power will be fed at Delivery point through a common transmission line from the Pooling Substation. In such cases, sub-meters also to be set up at pooling substation for individual projects in addition to the meters at Delivery Point.

It is to be noted that though the PP or their representatives are available during meter reading, the calculations of net electricity supplied to grid is completely under purview of MSEDCL and PP does not have any control on it. Also accuracy class of meters and calibration frequency is under purview of MSEDCL/Discom officer and PP does not have any control on it. PP gets the monthly credit report from where net electricity supplied to grid is obtained and used for emission reduction calculations.

Data collection and archiving

Export & Import readings from the meters will be collected under the supervision of the O&M Team or authorized representatives of PP. The net electricity supplied to grid would be calculated based on export & import readings. Export and Import data would be recorded and stored in electronic &/or Paper format. The records are checked periodically by the Head (Operations) and discussed thoroughly with the O&M Team. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of GS CERs for the project activity whichever occurs later.

Mismatch in Monitoring Period and the Billing Period

In case the dates of a particular monitoring period do not match with the dates of the billing period, the net electricity exported to the grid would be calculated from:

$$D = (A/B)*C$$

Where,

A = Difference of number of days which are not matching of billing period and monitoring period.

B = Number of days of the billing period/ month which was not matched with the monitoring period.

C = Net Electricity supplied to the grid for that given billing period/ month.

The calculated value after apportioning would be used for calculation of emission reductions during that period.

Emergency preparedness

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

In the unlikely event of failure of all Main & Check meters installed at Substation, where all the faulty meters are required to be repaired or replaced simultaneously, the export & import readings from Main & Check Meters installed at the inter-connection point at the project site will be used for monitoring of net electricity exported to the grid.

Personnel training

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

SECTION C. Duration and crediting period

C.1. Duration of project

C.1.1. Start date of project

>> (Specify start date of the project, in the format of DD/MM/YYYY. Describe how this date has been determined as per the definition of start date provided in section 3.4.3 of GS4GG Principles & Requirements document and provide evidence to support this date.)

10-Jul-2019 (Date of 1st Purchase Order)

C.1.2. Expected operational lifetime of project

>> (Specify in years)

25 years

C.2. Crediting period of project

C.2.1. Start date of crediting period

>> (Specify in dd/mm/yyyy. This can be start of project operation or two years prior to the date of Project Design Certification, whichever is later.)

31-Dec-2019, or two years prior to the date of Project Design Certification, whichever is later.

C.2.2. Total length of crediting period

>> (Specify the total length of crediting period sought in line with GS4GG Principles & Requirements or relevant activity requirements.)

5 years

SECTION D. Safeguarding principles assessment

D.1. Analysis of social, economic and environmental impacts

>> (Refer the GS4GG Safeguarding Principles and Requirements document for detailed guidance on carrying out this assessment.)

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
3.1 Human Rights	1. The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights. 2. The Project shall not discriminate with regards to participation and inclusion.	No	1. During construction and operation of the project the project proponent respected all the human rights. The project is not in any kind of conflict with the livelihood of local people. Project proponent had conducted stakeholder's consultation and sought their opinion. 2. The project will not employ any personnel based on gender, race, religion, sexual orientation or any other basis. As the Constitution of the host country prohibits discrimination on the basis of a person's race, sex, religion, place of birth, or social status. The host country has signed the Convention 100 (equal remuneration) and convention 111 (discrimination in employment /occupation) under the ILO Declaration on Fundamental Principles and rights¹⁴.	Not Required
3.2 Gender Equality and Women's Rights	The Project shall complete the following gender assessment questions in order to inform Requirements, below: 1. Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits? 2. Is there a possibility that the Project can adversely affect men and women in marginalised or	No	1. The project does not decrease women's access to or control of resources. 2. No, there is no possibility of adverse effect.	Not Required

14 <http://www.mfcindia.org/main/bgpapers/bgpapers2013/am/bgpap2013c.pdf>

	vulnerable communities (e.g., potential increased burden on women or social isolation of men)? 3. Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)? 4. Does the Project take into account gender roles and the abilities of women or men to benefit from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)? 5. Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities? 6. Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to		3. No, the Project does not consider gender roles and in fact actively engages both women and men. Community meetings are scheduled considering participation by both Men and Women. 4. The project does not discriminate on basis of gender, caste or religion. 5. No the Project was not designed to increase women's workload nor add care responsibilities. 6. There is no place for discrimination against women in this Project. The project does not discriminate on basis of gender, caste or religion.	
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	opportunities and benefits? 7. Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services? 8. Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards? The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women. 1. Sexual harassment and/or any forms of violence against women - address the multiple risks of gender-based violence, including sexual exploitation or human trafficking. 2. Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls. 3. Restriction of women's rights or access to resources (natural or economic). 4. Recognise women's ownership rights regardless of marital status - adopt project measures where possible to support		7. The Project will not limit women's ability regarding natural resources. The project being solar power project thus does not have any major impact on natural resources of the region. 8. No the Project will not expose women and girls to further risks or hazards. The project proponent has a grievance cell which would look into complaints. 1. There is no such risk for the project. Participation in the project is 100% voluntary. The project proponent has a grievance cell which would look into complaints. 2. The project does not involve in slavery, imprisonment or coercion of women and girls. 3. The Project will not restrict women's rights or access regarding natural resources. The project proponent does not discriminate on gender, caste, religion etc. 4. Marital status is completely irrelevant to the Project. The project proponent does not discriminate on gender, caste, religion etc.	
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	to women's access to inherit and own land, homes, and other assets or natural resources. Projects shall apply the principles of nondiscrimination, equal treatment, and equal pay for equal work, specifically: 1. Where appropriate for the implementation of a Project, paid, volunteer work or community contributions will be organised to provide the conditions for equitable participation of men and women in the identified tasks/activities. 2. Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. 3. Ensure that these conditions do not limit the access of women or men, as the case may be, to Project participation and benefits. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks.		Yes, the Project has equal opportunity for women and men to contribute both in volunteer and working positions 1. The project proponent has a stipulated CSR policy, Appointment Policy, Domestic travel policy, Leave Policy and Timekeeping/ Attendance Policy that takes into account participation by both men and women. Further, the CSR projects designed are implemented for equal participation of both men and women. 2. There is no limit on the access to Project participation and benefits from either of these conditions. 3. There are no such conditions that limit the access of women or men for participation. The project is aligned to India's strategy for elimination of all discrimination. India ratified the International Convention on the Elimination of All Forms of Racial Discrimination on 03/12/1968 with certain reservation¹⁵.	
3.3 Community Health, Safety and Working Conditions	The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the	No	The project is in compliance with all relevant local and national laws. The Project does not threaten human health or environment and does not adversely affect the	Not Required

¹⁵ http://nhrc.nic.in/documents/india_ratification_status.pdf

	workers and the community.		health of the workers and the community.	
3.4.1 Sites of Cultural and Historical Heritage	Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, or practices)?	No	The project does not alter, damage or remove any cultural heritage. As per the list of cultural heritage sites in India by UNESCO ¹⁶ , it is clear that the project site is not a cultural heritage site.	Not Required
3.4.2 Forced Eviction and Displacement	Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)?	No	The project does not involve and is not complicit in involuntary resettlement of peoples in any way. The Project Developer has also obtained all necessary clearances from nodal agencies and NOCs from all the Gram Panchayats for establishing the project.	Not Required
3.4.3 Land Tenure and Other Rights	1. Does the Project require any change to land tenure arrangements and/or other rights? 2. For Projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership?	No	1. The project has all the legal, customary rights on the land and does not require any change to land tenure arrangements. The proponent has also obtained necessary clearances from nodal agencies for establishing the plant. 2. This is not applicable as the project does not require any change to land tenure arrangements.	
3.4.4 Indigenous Peoples	Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?	No	The project is a solar power project and it is not located on land/territory claimed by any indigenous peoples.	Not Required
3.5 Corruption	The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects.	No	The proponent confirms that there is no corruption involved in the project activity. The host country has strict laws ¹⁷ and robust arrangements to prevent such activities.	Not Required
3.6.1 Labour Rights	1. The Project Developer shall	No	1. The proponent assures that there was no bonded or forced	Not Required

¹⁶ <http://whc.unesco.org/en/statesparties/in>

¹⁷ <http://cbi.nic.in/>

	ensure that there is no forced labour and that all employment is in compliance with national labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organization (ILO) fundamental conventions. Where these are contradictory and a breach of one or other cannot be avoided, then guidance shall be sought from Gold Standard. 2. Workers shall be able to establish and join labour organisations. 3. Working agreements with all individual workers shall be documented and implemented. These shall at minimum comprise: (a) Working hours (must not exceed 48 hours per week on a regular basis), AND (b) Duties and tasks, AND (c) Remuneration (must include provision for payment of overtime), AND (d) Modalities on health insurance, AND (e) Modalities on		labor during construction and operation of the project activity. Uniform policy was implemented for all employees. The host country has robust laws in place prohibiting forced and compulsory labor¹⁸. 2. The proponent confirms that all the fundamental rights of the employees will be respected. The rights of industrial trade unions and their members have been protected by law in India since 1926 by The Trade Unions Act, 1926¹⁹. 3. Working agreements with all individual workers are documented and implemented.	
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¹⁸ <http://labour.nic.in/content/>

¹⁹ <http://ncw.nic.in/acts/TheTradeUnionsAct1926.pdf>

	termination of the contract with provision for voluntary resignation by employee, AND Provision for annual leave of not less than 10 days per year, not including sick and casual leave. 4. The Project Developer shall justify that the employment model applied is locally and culturally appropriate. 5. Child labour, as defined by the ILO Minimum Age Convention is not allowed. The Project Developer shall use adequate and verifiable mechanisms for age verification in recruitment procedures. Exceptions are children for work on their families' property as long as: (a) Their compulsory schooling (minimum of 6 schooling years) is not hindered, AND (b) The tasks they perform do not harm their physical and mental development, AND (c) The opinions and recommendations of an Expert Stakeholder shall be sought and demonstrated as being included in the Project design. 6. The Project Developer shall ensure the use of appropriate equipment, training		4. The Project Developer ensures that local workers/employees are preferred, to the extent possible, for employment during construction as well as operation phase of the project ensuring skill development in the local populace. 5. Child labor is strictly prohibited in the country²⁰. The proponent assures that no child labor will be employed during construction and operation of the plant. The project proponent has a set mechanism to ensure the age of all the temporary/ permanent employees during the life time of the project.	
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²⁰ http://www.indianchild.com/child_labour_law_in_india.htm

	of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures.		6. The Project Developer has an active HSE team which ensures that all employees are given appropriate equipment and training. The same is properly documented and appropriate measures taken in case of emergencies.	
3.6.2 Negative Economic Consequences	1. The Project Developer shall demonstrate the financial sustainability of the Projects implemented, also including those that will occur beyond the Project Certification period. 2. The Projects shall consider economic impacts and demonstrate a consideration of potential risks to the local economy and how these have been taken into account in Project design, implementation, operation and after the Project. Particular focus shall be given to vulnerable and marginalised social groups in targeted communities and that benefits are socially-inclusive and sustainable.	No	1. Financial Sustainability of the project has been discussed under Section B.5 above. The calculations are for the entire life of the project. 2. There are no negative economic impacts or potential risks to the local economy due to the project activity.	Not Required
4.1.1 Emissions	Will the Project increase greenhouse gas emissions over the Baseline Scenario?	No	The project is a solar power project and does not lead to any greenhouse gas emissions in project scenario.	Not Required
4.1.2 Energy Supply	Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such as wood, biomass) that provides for other local users?	No	The project is connected to the grid, as well as being a solar power project it will be a net provider of power to the local grid.	Not Required
4.2.1 Impact on natural	Will the Project affect the natural or pre-existing pattern of	No	The project being a solar power project will not have any such impacts.	Not Required

water patterns and flow	watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?			
4.2.2 Erosion and/or water body stability	1. Could the Project directly or indirectly cause additional erosion and/or water body instability or disrupt the natural pattern of erosion? If 'Yes' or 'Potentially' proceed to question 2. 2. Is the Project's area of influence susceptible to excessive erosion and/or water body instability?	No	1. No the Project activity has no effect on soil conditions because it has no waste coming out. 2. The project area is not susceptible to excessive erosion or water body instability.	Not Required
4.3.1 Landscape modification and soil	Does the Project involve the use of land and soil for production of crops or other products?	No	The project does not involve the use of land and soil for production of crops or other products.	Not Required
4.3.2 Vulnerability to Natural Disaster	Will the Project be susceptible to or lead to increased vulnerability to solar, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions?	No	The Project will not be susceptible to or lead to increased vulnerability to solar, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions.	Not Required
4.3.3 Genetic Resources	Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g., contamination, collection and/or harvesting, commercial development)?	No	The project does not have any impact by used of GMOs.	Not Required
4.3.4 Release of pollutants	Could the Project potentially result in the release of pollutants to the environment?	No	The project being a solar power project does not lead to release of any pollutants. The report on "Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects" prepared by MNRE dated September 2013 ²¹ clearly	Not Required

²¹ <http://mnre.gov.in/file-manager/UserFiles/report-on-developmental-impacts-of-RE.pdf>

			mentions that Solar farms operations do not result in direct air pollution, noise pollution.	
4.3.5 Hazardous and Non-hazardous Waste	Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials?	No	The project during operational phase does not use any type of oil/lubricants, grease which are classified as hazardous.	Not Required
4.3.6 Pesticides and fertilizers	Will the Project involve the application of pesticides and/or fertilisers?	No	The Project will not involve the application of pesticides and/or fertilisers.	Not Required
4.3.7 Harvesting of forests	Will the Project involve the harvesting of forests?	No	The Project does not involve the harvesting of forests.	Not Required
4.3.8 Food	Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	No	The Project does not have any impact on the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives.	Not Required
4.3.9 Animal Husbandry	Will the Project involve animal husbandry?	No	The Project will not involve animal husbandry.	Not Required
4.3.10 High Conservation Value Areas and Critical Habitats	Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified?	No	Being Solar project, it does not affect or alter largely intact or HCV ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified.	Not Required
4.3.11 Endangered Species	1. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? 2. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?	No	1. There are no endangered species identified as potentially being present within the Project boundary. 2. The Project does not impact other areas where endangered species may be present through transboundary affects.	Not Required

E.1. Solicitation of comments from stakeholders

The Local Stakeholder Meetings were organized for local stakeholder consultation and informed local stakeholder regarding the meeting. The following are the stakeholders for the project activity:

- Local community
- Local village administration
- Technology suppliers
- Local vendors

All the stakeholders have been invited through public notice which were displayed to the nearby areas. Further, stakeholders were invited individually to attend the stakeholders meeting. The stakeholder consultation meetings were conducted on 31-Jan-19 and 1-Feb-19 at two separate locations in a way to cover all individual locations.

In the introductory speech, the representatives of Project Participant welcomed the gathering and gave a brief about the project activity. Subsequent to the introductory speech, stakeholders were explained about the electricity generation from the solar project is an environmental friendly power generation technology contributing to reduction in GHG emissions. They were also explained about the benefits of the solar power projects like, increasing energy availability and improving quality of power and its assistance to the local population by providing employment opportunities to both skilled & unskilled labours.

Apart from this, Stakeholder Feedback round has been carried out inline with the requirements of Gold Standard process at Yeola, Nashik district, Parola Jalgaon district and Varul Dhule district.

The Minutes of LSH meeting and Feedback round along with List of Attendees, copy of Public Notice and invitation are submitted to the DOE.

E.2. Summary of comments received

The representative of project participant explained about the power generation process from this proposed solar power Plant and emphasised on the positive impacts that this project would leave on the local community via:

- This would create employment opportunity for a large number of people during construction period and continued employment opportunities for the local skill set over the project life time.
- This would improve the standard of living of the local community
- In addition as this project would utilise available solar resource to generate power and there would be no associated emissions which would help in maintaining the environment clean.

The stakeholder's unanimously agreed to the given explanation and ensured their support to make this a successful one. They were in favour of such projects being set up in their locality as it would help them in standardising their economic conditions.

The villagers raised various queries and clarification provided is as summarised below:

Name of the stakeholder:	Laxman Wagh
Comment: How would locals be employed by the company Response: Employment opportunities are available in both technical and non-technical areas. For technical jobs qualified persons have been employed, however for non-technical jobs like security and transportation, construction preference has been for employment of local persons.	

Name of the stakeholder:	Sudhakar Patil
Comment: Is there any child labour requirement exist for the project activity? Response: No, the project does not have any such requirements. Juniper Group of companies strictly opposes the child labour and has established policy against the same.	

Name of the stakeholder:	Mahendra Patil
Comment: What will be the impacts on rains due to the operation of solar power projects?	
Response: There is no impact of weather/rains due to operation of solar power projects.	

Name of the stakeholder:	Yogita Prakash Sawale
Comment: Is there any toxic or pollutants emitted on land, air and water from the operation of solar plants?	
Response: No, Solar power project does not involve any such pollutants emission on land, air and water and is emission free power generation technology.	

Name of the stakeholder:	Mahendra Patil
Comment: Is there any impact of Solar PV modules in raising the temperature of surrounding areas?	
Response: No, Solar power project does not involve any such impacts on surroundings. There is no rise of temperature of project surrounding.	

Name of the stakeholder:	Narendra Dilip Marathe
Comment: Would such CSR activities also be carried out in other areas.	
Response: The implementation of CSR activities is a long-term goal and company is planning for establishing a policy to execute the same. Once the same has been formulated and approved at company level then execution of same will be done as per action plan, started with the villages which are near to the site first, however these activities would be spread gradually over the time.	

Name of the stakeholder:	Rakesh Rajaram Raghuwanshi
Comment: what impact does the project have in reducing the shortage of electricity faced in the area particularly for agriculture fields?	
Response: The project activity is supporting the farmers in particular as the 'Chief Minister's solar agriculture feeder programme'. A solar agriculture feeder is essentially a 1–10 MW community-scale solar PV power plant, which is interconnected to the 33/11 kV sub-station electricity generated by the project helps the grid to meet its demand and as a result over the past few years the hours for electricity shut downs has decreased and now electricity is available with only minor disruptions. The urgent need for providing agriculture with reliable and affordable daytime electricity makes it imperative for the sector to adopt such an approach.	

E.3. Report on consideration of comments received

There were no negative comments raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

Appendix 1. Contact information of project participants

Organization name	Juniper Green Energy Pvt. Ltd.
Registration number with relevant authority	U40100DL2011PTC228318
Street/P.O. Box	Plot No. 18
Building	1st Floor, Institutional Area, Sector 32,
City	Gurugram
State/Region	Haryana
Postcode	122001
Country	India
Telephone	+91-124 4739600
Fax	
E-mail	ankush.malik@junipergreenenergy.com
Website	
Contact person	Mr. Ankush Malik
Title	Vice President
Salutation	Mr.
Last name	Malik
Middle name	
First name	Ankush
Department	Business Development
Mobile	+ 91-9810067467
Direct fax	
Direct tel.	+91-124 4739600
Personal e-mail	ankush.malik@junipergreenenergy.com

Organization name	Nisagra Renewable Energy Pvt. Ltd.
Registration number with relevant authority	U40106DL2018PTC331399
Street/P.O. Box	Plot No. 18
Building	1st Floor, Institutional Area, Sector 32,
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State/Region	Haryana
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Appendix 2. Summary of post registration design changes

NA

Revision History

Version	Date	Remarks
1.1	24 August 2017	Updated to include section A.8 on 'gender sensitive' requirements
1	10 July 2017	Initial adoption