CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD) Version 03 - in effect as of: 28 July 2006

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

>>

Solar Thermal Power Plant by Godawari Green Energy Limited.
Version 04
14/11/2012

A.2. Description of the project activity:

>>

Godawari Green Energy Limited is implementing a new 50 MW large-scale grid connected solar thermal power project ("Project activity") in Jaisalmer district, Rajasthan, India. Project activity comprises of state-of-the-art, environment friendly, solar thermal power generation using parabolic trough technology. Project activity comes under the purview of large-scale, solar thermal power technology based project to be implemented in India.

Electricity generated from the project activity will be sent to Combined Regional grid i.e. Northern, Eastern, Western, and North-Eastern grids(NEWNE) of India. As a result of commissioning, the gross electricity generation in the project activity is 130,263 MWh/year and the auxiliary electricity consumption in the project activity is 11,397 MWh/year. Accordingly this project activity is expected to supply 118,866 MWh net electricity to the grid per year and abates 1,131,600 tonnes of Carbon Dioxide emissions, in the project boundary, during the crediting period.

a) The scenario existing prior to the start of implementation of project activity is same as to the baseline scenario.

b) Baseline Scenario

In the baseline scenario, the equivalent amount of electricity is being generated by the power plants connected with the NEWNE grid. These plants are dominated by the use of fossil fuels to generate electricity.

c) Project Scenario

In the project scenario, electricity generation will be through solar thermal power generation technology. Technology for implementation of project activity will be sourced from reputed international suppliers leading to the transfer of technology.

Contribution to the Sustainable Development

The project proponent commits 2% of CERs equivalent towards the welfare of local community leading to sustainable development. Contribution of project activities to the sustainable development is discussed below.

1. Social well-being

a) Project activity would create employment opportunities during construction and operation stages. Such opportunities lead to higher income levels leading to removal of social

disparities prevalent in Jaisalmer district in Rajasthan.

b) As the project activity is located in rural areas of combined regional grid, project activity would help in improvement of necessary basic infrastructure, such as roads.

2. Economic well-being

a) The project activity would promote the application of solar energy based power generation investment which is a significant investment in a green field project in the region.

b) Encourage investors to make similar investments in promoting renewable power generation technologies.

3. Environmental well-being

a) Project activity has no negative environmental impact as relies on natural solar radiation for power generation technology.

b) Energy generated by the project activity leads to reduced emission intensity in Combined regional grid which otherwise would have generated from fossil fuel.

4. Technological well-being

a) Technology to be used in the project activity would be robust, State-of-the-Art, first-of-its-kind thermal solar power generation technology.

b) Project activity promotes environmentally safe and sound technology.

A.3. Project participants:

>>

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) Project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Private Entity : Godawari Green Energy Limited	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity

>>

A.4.1.1. Host Party(ies):

>>

India

A.4.1.2. Region/State/Province etc.:

>>

Rajasthan

A.4.1.3. City/Town/Community etc.:

>>

Nokh Village, Pokaran Tehsil, Jaisalmer District

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity:

>>

The project site is at Nokh Village , Tehsil Pokran in Jaisalmer District in the state of Rajasthan. The location map is as given below:

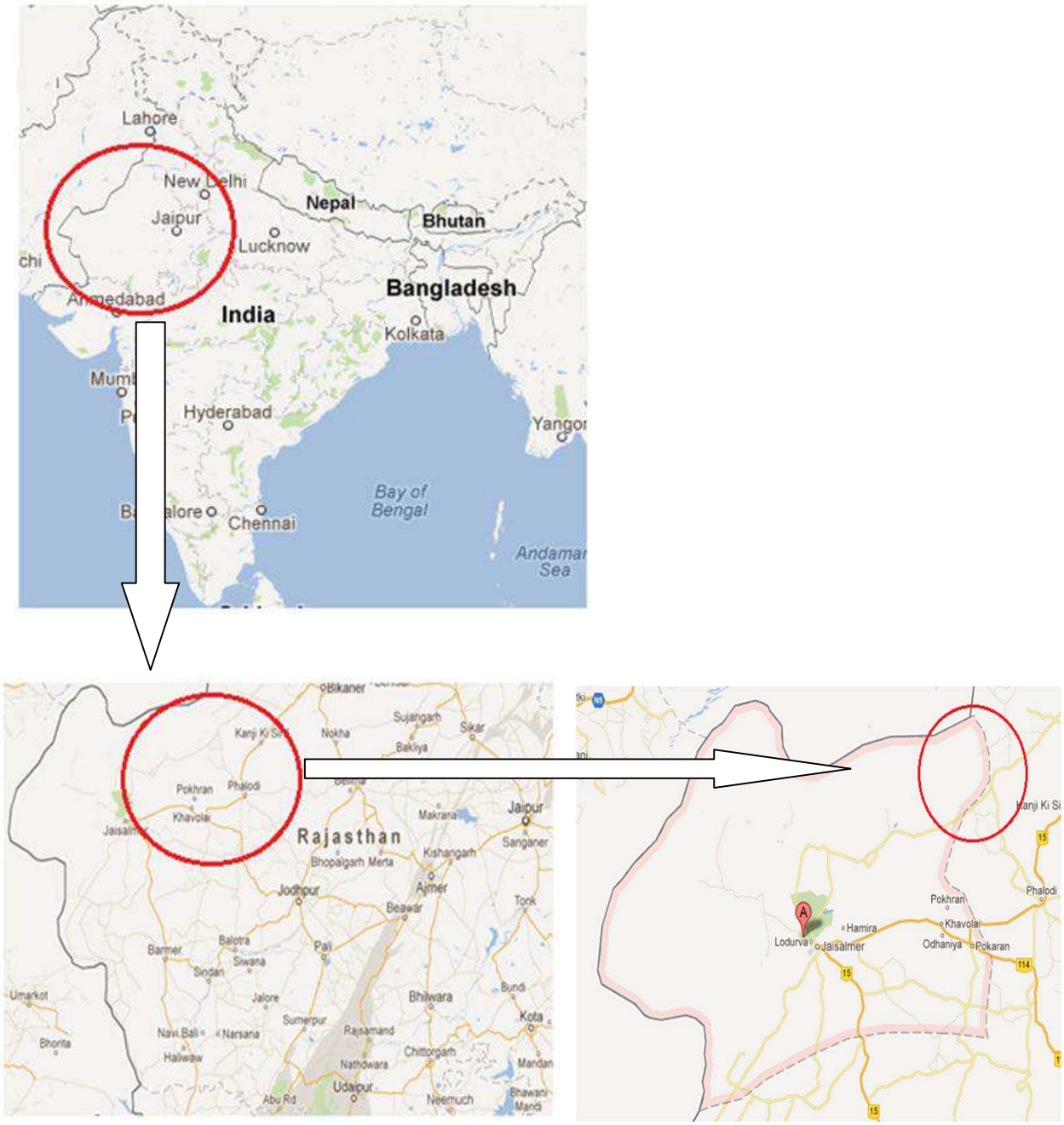


Figure: 1 Map of India, Rajasthan and Project site (Source: Google Maps)

Unique identification of the project activity is as below:

Latitude	27˚ 36’13’’ N
Longitude	72˚ 14’9.2’’ E

A.4.2. Category (ies) of project activity:

>>

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

A.4.3. Technology to be employed by the project activity:

>>

Project activity proposes implementation of grid-connected large-scale 50 MW solar thermal power generation facility using environmentally safe and sound technology..

In the pre project scenario, the equivalent amount of electricity is being generated by the power plants connected with the NEWNE grid. These plants are dominated by the use of fossil fuels to generate electricity.

In the project scenario, electricity generation will be through solar thermal power generation technology. Technology for implementation of project activity will be sourced from reputed international suppliers leading to the transfer of technology. The list of major equipment and manufacturer/technology provider is given in Table 1. The whole plant will be executed under EPC contract by M/s Lauren Engineers & Constructors India Pvt Ltd. and operated by Godawari Green Energy Limited.

Table 1: Major Equipment List with Name of Manufacturer/ Technology Provider

Equipment	Manufacturer’s / Technology provider
Steam turbo generator (STG)	Siemens, Sweden
Heat exchanger	Alborg CSP, Denmark
Solar collector loops	Design by SBP, Germany
Cooling tower	Paharpur cooling tower, India
Boiler feed pump	Sulzer India
Heat Transfer Fluid (HTF) vessel	Ravi Industries, India
HTF pump	Sulzer India
Deaerator	Ravi Industries, India
Reflectors	Flagbag, Germany
Receiver Tube	Schott Glass, Germany

The pre-project scenario and baseline scenario are same.
The schematic diagram of the proposed project activity with project boundary are shown below in Figures: 2, 2a & 3.

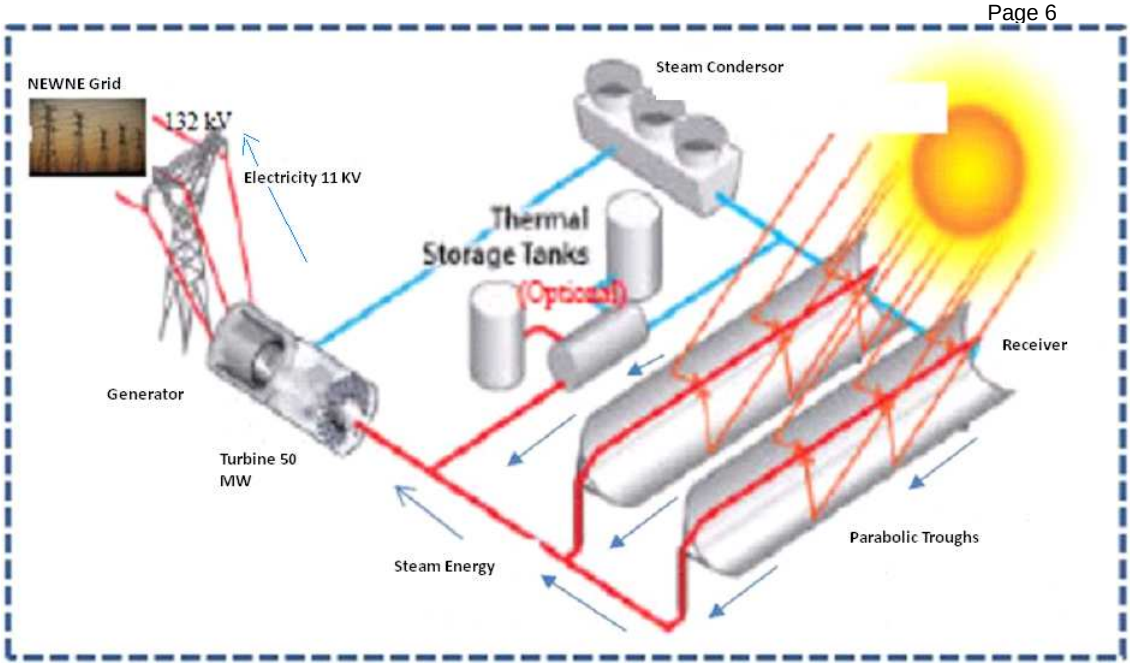


Figure 2: Technology and Project Boundary

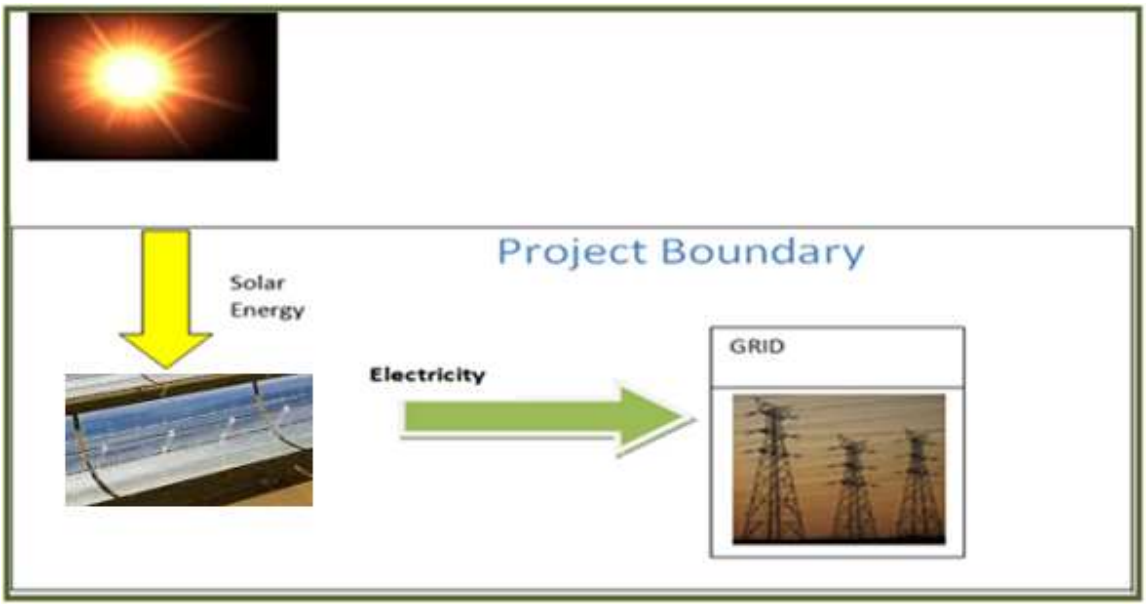


Figure 2 a: Technology and Project Boundary

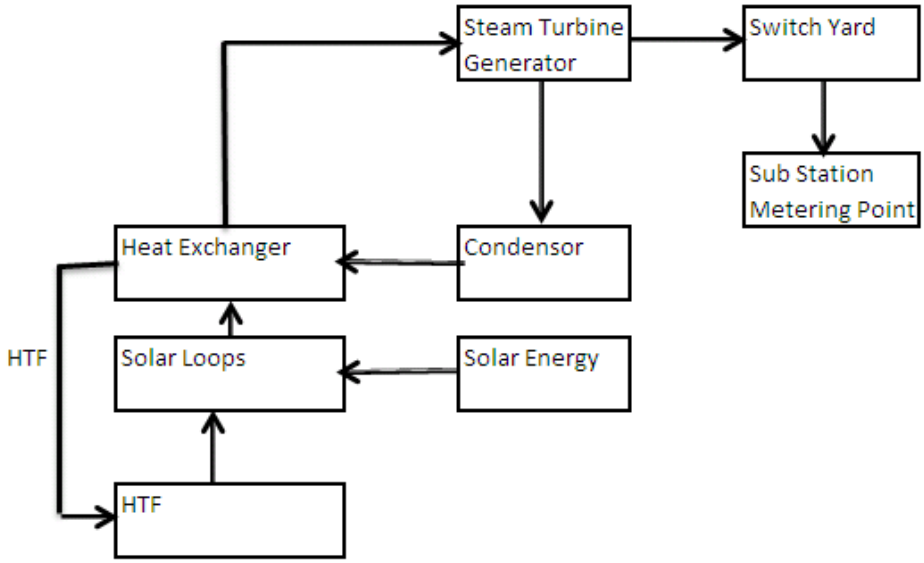


Figure 3: Schematic Diagram of Project

Technical Description:

The parabolic trough solar thermal technology employs trough-shaped glass mirrors that reflect and focus sunlight onto a receiver tube that runs along the mirrors' focal point, carrying a heat transfer fluid to a series of heat exchangers that generate steam used to power a steam turbine generator.

The main components of the parabolic trough solar power plant are:

1. **Solar Field**
The solar field would be modular in nature and composed of many parallel rows of solar collectors aligned on a north-south horizontal axis. Each solar collector shall consist of linear, parabolic shaped mirrors that focus the sun's direct beam radiation on linear receiver tubes that are located at the parabola focal point and contain the Heat Transfer Fluid (HTF).
The collectors will track the sun from east to west during the day to ensure that the sun's energy is continuously focused on the linear receiver tubes (Heat Collector Elements - HCEs), heating the HTF which then proceeds to the power island.

2. **Power Block**
The main components of the power block are the steam generating train, which utilizes the energy contained in the HTF in order to produce super-heated steam which is fed to steam turbine generator set to generate electricity.

3. **Common Areas**
The common areas will include plant cooling systems, raw water storage, process water treatment and makeup systems, fire protection system, waste water management systems, switchyard, electricity transmission station, maintenance workshop and plant administration facility.

The quantity of net electricity generated (118,866 MWh/year) to be supplied to the grid will be measured using Availability Based Tariff (ABT) meter which will be installed at 132 kV sub-station.

Technology proposed to be deployed in the project activity would state-of-the-art offering several advantages. These advantages include inter-alia lesser equipment, higher equipment reliability, higher power cycle efficiency, lesser parasitic and pumping losses, no volatile organic compound emissions,
lesser area compared to the same power output etc.

Technology used in the project would result in transfer of technology from another annex-1/non-annex-1 to the host country. The construction of the project activity power plant will transfer environmentally safe and sound technology, and the know-how to use it, to the Host Country

Efficiencies & Load Factors

For measurement of efficiency of solar thermal power plant, capacity utilization factor (CUF) is used. The estimated CUF of project is 29.74% The gross electricity generation in the project activity is 130,263 MWh/year. The auxiliary electricity consumption in the project activity is 11,397 MWh/year. The net electricity generated to be supplied to grid is 118,866 MWh/year.

Age and Technical Life Time

The expected operational life time of the project activity is 25 years.

Emission Sources and Greenhouse Gases involved:

There are no GHG emissions involved with the generation of electricity in the project activity.

Above discussed factors confirm technology proposed to be used in project activity is environmentally sound and safe and Project activity will annually evacuate 118,866 MWh of electricity to the combined regional grid, reducing 113,160 tCO_{2e} annually during the crediting period.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

>>

Years	**Annual estimation of emission reductions (in tonnes of tCO_2e)**
Year 1 : 09/05/2013 to 31/12/2013	73,476
Year 2 : 01/01/2014 to 31/12/2014	113,160
Year 3 : 01/01/2015 to 31/12/2015	113,160
Year 4 : 01/01/2016 to 31/12/2016	113,160
Year 5 : 01/01/2017 to 31/12/2017	113,160
Year 6 : 01/01/2018 to 31/12/2018	113,160
Year 7 : 01/01/2019 to 31/12/2019	113,160
Year 8 : 01/01/2020 to 31/12/2020	113,160

Year 9 : 01/01/2021 to 31/12/2021	113,160
Year 10 : 01/01/2022 to 31/12/2022	113,160
Year 11 : 01/01/2023-08/05/2023	39,684
Total estimated reductions (tonnes of CO_2 e)	1,131,600
Total number of crediting years	**10**
Annual average over the crediting period of emission reductions	**113,160**

A.4.5. Public funding of the project activity:

>>

No public funding shall be used for the project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

>>

Methodology: ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0, EB 66)

The following tools have been used for the project activity under consideration –

- Tool to calculate emission factor for an electricity system
  Reference: Version 02.2.1/EB – 63, Annex 19
- Demonstration and assessment of additionality
  Reference: Version 06, EB 65, Annex 21

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

>>

Methodology ACM0002 is described as under:

Applicability Condition	This methodology is applicable to grid-connected renewable power generation project activities that: a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); b) involve a capacity addition; c) involve a retrofit of (an) existing plant(s); or d) involve a replacement of (an) existing plant(s).
Justification	The project activity consists of installation of new solar power plant at a site where no renewable power plant was operated prior to the implementation of the project activity. Thus, it meets the said applicability condition.

Applicability Condition	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;
Justification	The project activity is grid-connected renewable power generation project that install a new renewable solar power plant at a site where no renewable power plant was operated prior to the implementation of the Greenfield plant project activity. **Hence the applicability condition is met.**

Applicability Condition	In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter $EG_{PJ,y}$): the existing plant 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 or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;
Justification	The project activity does not involve capacity additions. Hence this criterion is not applicable to the project activity.

Applicability Condition	In case of hydro power plants, one of the following conditions must apply: o The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or o The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or o The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after the implementation of the project activity. In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m^2 after the implementation of the project activity all the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2; • All reservoirs and hydro power plants are located at the same river and where are designed together to function as an integrated project that collectively constitutes the generation capacity of the combined power plant; • The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • The total installed capacity of the power units, which are driven using water from the reservoirs with a power density lower than 4 W/m^2, is lower than 15MW; • The total installed capacity of the power units, which are driven using water from reservoirs with a power density lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.
Justification	Project activity is the installation of state-of-the art solar thermal power plant. **Hence, this condition is not applicable for project activity.**

Compliance of the project activity to the non-applicable conditions is demonstrated as described hereunder.

Applicability Condition	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; Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m^2.

Justification	Project activity does not involve: • Switching from fossil fuels to renewable energy sources at the site of the project activity. • Biomass fired plants. • Construction of new reservoir or increase **Hence, this condition is not applicable for project activity.**

Applicability Condition	In the case of retrofits, 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, i.e. 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".
Justification	The project is not a retrofit, replacements, or capacity additions, hence this criterion is not applicable.

The compliance of the tools referred in section B.1 are demonstrated in section B.5 & B.6.1 of this PDD.

B.3. Description of the sources and gases included in the project boundary:

>>

The spatial extent of the project boundary for the proposed project activity encompasses the proposed project power plant and all power plants connected physically to the electricity system that the proposed project power plant is connected to, as illustrated in the Figure: 2 in section A.4.3.

The GHGs and emission sources included in / excluded from project boundary are shown in Table below.

Source		Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in a fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project Activity	CO_2 emissions for electricity generation in solar thermal power plant	CO_2	No	Minor emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

>>

As per EB22, Annex-3, national and/or sectoral policies and circumstances are to be taken into account on the establishment of a baseline scenario. The Board agreed to differentiate the following two types of national and/or sectoral policies that are to be taken into account when establishing baseline scenarios:

(a) E+ policy: National and/or sectoral policies or regulations that give comparative advantages to more emissions-intensive technologies or fuels over less emissions-intensive technologies or fuels; If these policies have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11 December 1997), these shall be taken into account when developing a baseline scenario.

(b) E- policy: National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs). If these policies have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001), no need to consider these policies in developing a baseline scenario.

National Policies & Circumstances:

The following national and sectoral policies and circumstances are taken into account on the baseline establishment:

1. **Electricity Act-2003 published in 26th May 2003[1]:** The Act aims to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies constitution of Central Electricity Authority, Regulatory Commissions.

2. **National Electricity Policy 2005[2]:** The National Electricity Policy 2005 stipulates that progressively the share of electricity from non-conventional sources would need to be increased; such purchase by distribution companies shall be through competitive bidding process; considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the commission may determine an appropriate deferential in prices to promote these technologies.

3. **Tariff Policy 2006[3]:** The Tariff Policy announced in January 2006 has the following provision: Electricity regulatory Commission shall fix a minimum percentage for purchase of energy from nonconventional souces taking into account availability of such resources in the region and its impact on retail tariffs. Such percentages for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by April 01, 2006. Procurement of nonconventional energy by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission.

4. **The Jawaharlal Nehru National Solar Mission 2010[4]** was launched on the 11th January, 2010 by the Prime Minister. The Mission has set the ambitious target of deploying 20,000 MW of grid connected solar power by 2022 is aimed at reducing the cost of solar power generation in the country through (i) long term policy; (ii) large scale deployment goals; (iii) aggressive R&D; and (iv) domestic production of critical raw materials, components and products, as a result to achieve grid tariff parity by 2022. Mission will create an enabling policy framework to achieve this objective and make India a global leader in solar energy.

[1] http://www.powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf
[2] http://pib.nic.in/archieve/others/2005/nep20050209.pdf
[3] http://www.powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf
[4] http://www.mnre.gov.in/solar-mission/jnnsm/introduction-2/

All policies & circumstances mentioned above are E-policies and were implemented after 11th November 2001. Hence following EB 22, Annex 3 none of the above policies has been considered for baseline development.

The project activity is implementation of the Greenfield plant project activity.

The baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by 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, baseline scenario could be concluded as electricity delivered to the grid which otherwise would have been generated by fossil fuel sources.

The Combined Margin has been calculated using the "Tool to calculate the emission factor for an electricity system" Version 02.2.1. The Operating Margin (OM) and Build Margin (BM) emission factors have been considered from the information (CO2 Baseline Database for the Indian Power Sector -Version 7.0[5]) published by the Central Electricity Authority (CEA), Ministry of Power, Govt. of India which has been computed according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system", version 02.2.1. Considering the individual weightings assigned to the OM and the BM emission factors respectively, as prescribed in the 'Tool to calculate the emission factor for an electricity system (Version 02)', the combined margin emission factor for the NEWNE Grid has been estimated at 0.952 tCO_2e/MWh.

Parameter	NEWNE grid
OM, Operating Margin – Generation weighted	0.984
BM, Build Margin	0.858
CM, Combined Margin (tCO_2/ MWh)	**0.952**

The estimated net electricity would be delivered to grid is 118,866 MWh/year as per Detailed Project Report (DPR). The gross electricity generation in the project activity is 130,263 MWh/year. The auxiliary electricity consumption in the project activity is 11,397 MWh/year.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

>>

The project activity is generating electricity from Solar energy for which GHG emission is nil. The generated electricity is supplied to grid. Thus the power generated in the project activity is actually displacing the electricity generated from the fossil fuels in the NEWNE grid. In case the project activity would not have been there, the same amount of electricity would have been generated from the power plants connected to the grid of which majority of the power plants are based on fossil fuels. Thus the project is replacing the anthropogenic emission from the fossil fuel based power plant connected to the state electricity grid.

According to decision 17/CP.7 para 43, a project will be defined additional if the anthropogenic GHG emissions from the source are reduced below that would have occurred in the absence of the

[5] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

registered project activity. Within the scope of the adopted baseline methodology, the additionality of the project activity has been demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" (Version 06.0.0 from EB 65[6]). The tool prescribes the following steps for proving additionality of a project.

Step 1: Identify realistic and credible alternative baseline scenarios for power generation

Apply Step 1 of the "Combined tool to identify the baseline scenario and demonstrate additionality[7]". The options considered should include:

P1: The project activity not implemented as a CDM project; and

P2: The continuation of the current situation, i.e. to use all power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance.

The additional power generated under the project would be generated in existing and new grid-connected power plants in the electricity system.

Option P1 is prevented from implementation as the project activity faces the barrier of "first of its kind."

Option P2 is considered as credible and realistic alternative to the project activity since the project activity is displacing the equivalent amount of electricity in the carbon intensive grid system. In the absence of the project activity, the equivalent amount of electricity would be imported from the grid electricity system through its currently operating power plants and by the new capacity addition in the grid. This is the baseline assumed by the applicable methodology, ACM0002.

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

Sub-step 1a. Identification of alternatives to the project activity:

Alternative to the project activity is the continuation of baseline scenario, i.e., equivalent electricity generated by the operation of gird-connected power plants and by addition of new generation sources, as reflected in the combined margin calculations.

Outcome of Sub-Step 1(a)

Hence the alternative to the project activity is the continuation of existing scenario, i.e., equivalent electricity generation from a coal based power generation projects.

Sub-step 1(b). Enforcement of applicable laws and regulations:

Neither the Indian Electricity Act 2003[8] nor National Electricity Plan restrict / suggest the usage of

[6] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf
[7] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf
[8] http://www.powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf

fuels or technology for power generation. Hence no regulatory provision / law restrict the continuation of existing scenario. Decision of project participant, for the implementation of project activity is voluntary and it is not mandatory or a legal requirement.

Outcome of Sub-step 1(b):

As the continuation of existing scenario is in compliance with all mandatory legislation and regulations, taking into account the enforcement in the Combined Region gird and India, and also EB's decision.

Step 2. Investment analysis

Project participant proposes to conduct the Step 3: barrier analysis to demonstrate the barrier due to prevailing practice. Hence, Step 2: Investment analysis is not demonstrated as per the Additionality tool.

Step 3. Barrier Analysis

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed CDM project activity:

Barriers due to prevailing practice/Demonstration of first of its kind

Applicable Geographical Area: As per EB 69, annex 7[9], para 1, the host country i.e. India is considered as the applicable geographical area as a default.

Measure: As per EB 69, annex 7, para 2, project activity falls under the option (b) of the measures i.e. switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies.

Output: As per EB 69, annex 7, para 3, Electrical power is considered as output of the project activity.

As per para 4 of EB69, annex 7, technologies that deliver same output i.e. electric power and differ by atleast one of the following conditions are considered as different in the context of "first of its kind":

i) Energy sources/fuel
ii) Feedstock
iii) Size of installation (power capacity)
    -Micro (as defined in paragraph 24 of Decision 2/CMP.5 and paragraph 39 of Decision 3/CMP.6)
    -Small (as defined in paragraph 28 of Decision 1/CMP.2)
    -Large

As explained in the definition of applicable geographical area, measure and output, the electrical power in considered as output. For the demonstration of "First of its Kind", in the host country i.e. India, all the technologies which has the output as "Electrical Power" and have started the operation

[9]EB 69 Report, Annex 7 "Guidelines on Additionality of First-of-Its-Kind Project activities, (Version 02.0)".

commercially before the start date of this project activity i.e. 20/08/2011 are considered. The start date of this project activity is earlier than the PDD of this project activity was published (on 17/02/2012) for global stakeholder consultation.

The technologies which have the output as "Electrical Power" in the host country i.e. India are tabulated as under:

Serial No	Technology	Output	Host Country	Energy Source/Fuel
1	Wind Turbine based power project	Electrical Power	India	Wind
2	Hydro electric power project	Electrical Power	India	Water
3	Thermal based power project	Electrical Power	India	Fossil fuel like coal, diesel, lignite etc.
4	Nuclear power project	Electrical Power	India	Nuclear energy
5	Solar (Both Solar Photovoltaic & Solar Thermal based power project	Electrical Power	India	Sun energy
6	Biomass based power plant (power plant and Co-generation plant)	Electrical Power	India	Biomass
7	Tidal-Mechanical &Thermal power project	Electrical Power	India	Energy of tides
8	Geothermal power project	Electrical Power	India	Thermal energy generated and stored in the earth.

The proposed project activity i.e. 50 MW Solar Thermal Power Generation is a large scale project (more than 15 MW) and using solar energy source for the generation of electrical power. As per para 4 of EB69, annex 7, the technologies that uses energy source/ fuel other than solar energy are considered under
different technology". Hence technologies other than Solar (both Solar PV and Solar thermal) are not
considered for further analysis in the demonstration of first of its kind.

The solar power projects that have started commercial operation in the host country i.e. India before the project start date i.e. 20/08/2011 are considered for further analysis as per EB 65, annex 21 under "Barrier due to prevailing practice" Substep 3a, para 2. (a). (ii). The projects commissioned before project start date are listed below:

Sr. No	**State**	**Project developer**	**Capacity (MWp)**	**PV/ST**	**Location**	**Month and Year of Commissioning**
1	Andhra Pradesh	Sri Power Generation (India) Pvt. Ltd.	2	PV	Varadayapalem Mandal, District: Chittoor, A. P.	March 2011
2	Delhi	Reliance Industries Ltd.	1	PV	Thyagaraj Stadium, Delhi	April 2010
3	Delhi	North Delhi Power Ltd.	1	PV	Keshavpuram, Delhi	December 2010

4	Gujarat	Lanco Infratech Limited	5	PV	Charanka Solar Park, District : Patan, Gujarat	January 2011
5	Gujarat	Sun Edison	1	PV	Gandhinagar, near PDP Uni., Gujarat	January 2011
6	Gujarat	Azure Power Private Ltd.	5	PV	Khadoda Village. District : Sabarkhanta, Gujarat	June 2011
7	Karnataka	Karnataka Power Corporation Limited	3	PV	Yelasandra village, Bangarupet Taluka, District : Kolar, Karnataka	November 2009
8	Karnataka	Karnataka Power Corporation Limited	3	PV	Itnal village, Chikodi Taluka, District : Belgaum, Karnataka	December 2009
9	Maharashtra	Maharashtra State Power Generation Co. Ltd	1	PV	Chandrapur STPS, Chandrapur, Maharashtra	April 2010
10	Maharashtra	Tata Power Company	3	PV	Mulshi, District : Pune, Maharashtra	March 2011
11	Maharashtra	Dr. Babasaheb Ambedkar Sahkari Sakhar Karkhana Ltd.	1	PV	Arvindnagar, Keshegaon, Tq. & District Osmanabad, Maharashtra	July 2011
12	Orissa	Raajratna Energy Holdings Private Limited	1	PV	Sadeipali, District : Bolangir , Orissa	June 2011
13	Punjab	Azure Power Private Limited	2	PV	Village Ahwan, Tehsil Ajanal, District Amritsar, Punjab	December 2009
14	Rajasthan	Reliance Industries Limited, Solar Group	5	PV	Khasra No. 1133, Village Khimsar, Tehsil : Khimsar, District. : Nagaur, Rajasthan	July 2010
15	Rajasthan	ACME Tele Power Ltd.	2.5	CSP Tower	Bherukhada, Bikaner, Rajasthan	May 2011

16	Tamil Nadu	Sapphire Industrial Infrastructures Private Limited	5	PV	Village Rettai Pillai, District : Sivaganga, Tamil Nadu	December 2010
17	Tamil Nadu	B & G Solar Private Limited	1	PV	Komal West Village, Mayiladuthurai, Tamil Nadu	June 2011
18	Tamil Nadu	R L Clean power Pvt. Ltd.	1	PV	Marakathoor village, Kalayarkoil Taluk, Sivaganga District, Tamil Nadu	July 2011
19	West Bengal	West Bengal Green Energy Development Corporation Limited	1	PV	Seebpore Power Station of DPSC Ltd., Block Jamuria, Asansol, West Bengal	August 2009

Reference: Ministry of New and Renewable Energy, Govt. of India[10].

The above table demonstrates that all solar power projects that started commercial operation before project start date are small scale projects as defined in paragraph 28 of Decision 1/CMP.2.

The proposed project activity is a large scale project with installed capacity of 50 MW. Since the project activity is a large scale activity, the projects listed in the table above are considered under "different technology" as per criteria defined in para 4.C. EB 69, annex 7.

The analysis presented above demonstrates that the proposed project activity is the first in India that applies a technology that is different from any other technologies able to deliver the same output i.e. "electrical power" and that have started commercial operation in India before the project activity start date which is earlier than the PDD of this project activity that was published for global stake holder consultation.

The project envisages to implement one of the measures and also chosen fixed crediting period maximum of 10 years with no option for renewal. This complies to para 5 of EB 69, Annex 7.

Hence project activity fulfills the conditions of first of its kind.

Step 4. Common practice analysis

Since this project is first of its kind. Common practice analysis is not required to be demonstrated as per Additionality tool.

[10] http://mnre.gov.in/file-manager/UserFiles/powerplants_241111.pdf and http://www.mnre.gov.in/related-links/jnnsm/introduction-2/

CDM Consideration

Early consideration of CDM for the project activity has been demonstrated using the "Guidance on the Demonstration and Assessment of Prior Consideration of CDM" (EB 62, Annex 13)[11].

As per para 2 of guidance on the demonstration and assessment of prior consideration of CDM:

"for project activities with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status. Such notification must be made within six months of the project activity start date and shall contain the precise geographical location and a brief description of the proposed project activity".

The project proponent sent intimations to both the host party DNA and the UNFCCC (dated 30/05/2011 sent to UNFCCC and dated 10/08/2011 to the host DNA) about the project activity and intention of the project proponent to apply for registration under the Clean Development Mechanism of UNFCCC. These notifications were made within six (6) months of the project activity start date.

The CDM consideration and decision process is presented as follows:

Key events of project implementation	Date
Meeting of Board Directors of GGEL	29/12/2010
EPC contract signed with Lauren Engineers & Constructors India Private Ltd. (Start date)	20/08/2011
Intimation sent to UNFCCC regarding prior consideration of CDM	30/05/2011
Intimation sent to Host Country DNA regarding prior consideration of CDM	10/08/2011

Hence the project activity conforms to the para 2, Annex 13, EB 62

Hence, it has been demonstrated that the project proponent was aware of the CDM benefits during the conceptualization of the project activity and took adequate steps towards achieving the same.

The starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun (EB33, Para 76/CDM Glossary of terms/EB41, Para 67). In this project activity, the start date in the date at which the EPC contract was signed with the contractor for the implementation of the project activity. The benefits of CDM were seriously considered by the project proponent as it is evident in the board resolution, Detailed project report as well as prior consideration of CDM. Hence the project activity conforms to the Para 68 of Annex 12 of EB 41.

[11] **cdm**.unfccc.int/Reference/Guidclarif/reg/reg_guid04.pdf

B.6. Emission reductions:

>>

B.6.1. Explanation of methodological choices:

>>

Project emissions:

As per ACM 0002 version 12.3.0, "*for most renewable power generation project activities, $PE_y = 0$*".

As the power generated from solar modules are clean and renewable source of energy, hence, project emissions for the project activity are considered to be zero.

Baseline emissions (BEy)

As per ACM 0002, *baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows*:

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

Where:

BEy =Baseline emissions in year y (tCO_2/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)

$EFgrid_{,CM,y}$ =Combined margin CO_2 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" (tCO_2/MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants, (b) retrofits and replacements, and (c) capacity additions.

Since the project activity is a Greenfield project activity, option (a) is applicable to the project activity: (a) Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

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)

Calculation of $EF_{grid,CM,y}$

Step1. Identify the relevant electricity systems:

A **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

Also, "*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. If this information is not available, project participants should define the project electricity system and any connected electricity system, and justify and document their assumptions in the CDM-PDD"*.

The Central Electricity Authority (CEA), Government of India has divided the Indian Power Sector into two regional grids. This is the national grid definition for the electricity grids of India.

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

The project activity lie in the state of Rajasthan. The state forms a part of the NEWNE grid (as per the latest CEA guidelines). Hence, relevant Operating margins and Build margins shall be used for calculations.

Step2. Choose whether to include off-grid power plants in the project electricity system (optional):

For calculating the grid emission factor for the project activity, "*Option I (only grid power plants are included in the calculation)*" of this step has been chosen. PP has chosen not to include off-grid power plants in the project electricity system.

Step3. Select a method to determine the Operating Margin (OM):

For the purpose of this project activity, the simple OM method has been used. However, as per the tool, *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.*

As per CEA Data, the share of low cost must run sources for the five most recent years are as follows [12]

Year	2006-07	2007-08	2008-	2009-	2010-	**Average**
NEWNE	18.5%	19.0%	17.4%	15.9%	17.6%	**17.7%**

Hence, simple OM can be used as the share of low cost must run sources are less than 50% for the
NEWNE grid of India.

For OM calculations, *"a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period"* option shall be used. Hence simple OM is fixed ex-ante for the entire crediting period.

Step4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

For the project activity, the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission has been considered. The data is published annually by the Central Electricity Authority[12]. Thus:

Simple OM	**NEWNE Grid (tCO_2/MWh)**	**Generation (GWh)**
2008-09	1.0075	4,21,802.63
2009-10	0.978	4,62,327.09
2010-11	0.971	4,76,986.72
Generation weighted simple OM (tCO_2/MWh)	**0.984**	

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

The value of the BM has been taken from the data published by the CEA. The BM has been calculated as per option 1 (*Calculate the Build Margin emission factor $EF_{BM,y}$* ***ex-ante*** *based on the most recent information available on plants already built for sample group m at the time of PDD submission.* BM is calculated ex-ante based on the most recent information available at the time of submission of PDD and is fixed for the entire crediting period.

The data published by the Central Electricity Authority has been taken to determine the build margin. The tool to calculate the emission factor requires the project proponent to choose between the following two options for the vintage of data,

Option 1: For the first crediting period, the build margin emission factor should be calculated ex-ante based on the most recent information available on units already built for sample group m at the

time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, expost, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 has been chosen from the above mentioned options and the build margin has been calculated ex-ante based on the most recent information available on the plants already built for a sample group m at
the time of PDD submission. The build margin emission factor will be updated with the most recent information available during the second crediting period and the build margin emission factor will be kept the same as that of the second crediting period for the third crediting period. There will not be any monitoring of the emission factor during the crediting period.

As per the CEA CO2 Baseline Database version 7[13], the BM for the 2010-11 has been calculated to be
$EF_{grid, BM,y}$

BM	NEWNE Grid
2010-11	0.858

STEP 6. Calculate the combined margin (CM) emissions factor ($EF_{grid, CM, y}$)

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM}$$

Where:
EFgrid, OM,y = Operating Margin CO_2 emission factor in the year *y* (tCO_2/GWh)
EFgrid, BM,y = Build Margin CO_2 emission factor in the year *y* (tCO_2/GWh)
WOM = Weighting of operating margin emission factor (%)
WBM = Weighting of build margin emission factor (%)

Owing to their intermittent and non-dispatchable nature, the default weights for wind and solar projects are as follows: w_{OM} = 75% and w_{BM} = 25%

$EF_{grid,CM,y}$ = 0.984 x 0.75 + 0.858 x 0.25
= 0.952

[13] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

In the project activity, **combined margin has been chosen as the baseline emission factor** for grid emission factor. The value chosen is taken from relevant official sources and is publicly available.

Parameter	NEWNE grid
OM, Operating Margin – Generation weighted	0.984
BM, Build Margin	0.858
CM, Combined Margin (tCO_2/ MWh)	**0.952**

The combined margin thus obtained shall be fixed ex-ante for the entire crediting period of the project activity.

The OM and BM have been fixed *ex-ante* for the entire crediting period of the project activity.

Leakage:

As per ACM 0002, "*no leakage emissions are considered. 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). These emissions sources are neglected*".

Hence, leakage emissions are considered to be zero.

Emission reductions

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)

BE_y = Baseline emissions in year *y* (t CO_2/yr)

PE_y = Project emissions in year *y* (t CO_2e/yr)

Since $PE_y = 0$;

Emission reductions can be calculated as:

$$\mathbf{ER_y = BE_y}$$

Detailed application of the methodological choices and $EF_{grid, CM, y}$ are discussed in Annex3 of the PDD.

B.6.2. Data and parameters that are available at validation:

>>

Data / Parameter:	$EF_{grid, OM, y}$
Data unit:	tCO_2/MWh
Description:	This is the operating margin for the NEWNE grid of India

Source of data used:	"CO_2 Baseline Database for Indian Power Sector" version 7 published by the CEA, MoP, GoI. Weblink: www.cea.nic.in
Value (s) applied:	0.984
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per ACM0002 with 3 years vintages (2008-09,2009-10,2010-11) data obtained from "CO_2 Baseline Database for Indian Power Sector" version 7 published by the CEA, MoP, GoI, which is based on " tool to calculate emission factor for an electricity system, version 2.2.1"
Any comment	This is fixed ex-ante and it will remain same throughout during the crediting period.

Data / Parameter:	$EF_{grid, BM, y}$
Data unit:	tCO_2/MWh
Description:	This is the build margin for the NEWNE grid of India
Source of data used:	CO_2 Baseline Database for Indian Power Sector" version 7 published by the CEA, MoP, GoI.
Value applied:	0.858
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as per ACM0002 with year 2010-11 data obtained from "CO_2 Baseline Database for Indian Power Sector" version 7 published by the CEA, MoP, GoI. Which is based on " tool to calculate emission factor for an electricity system, version 2.2.1"
Any comment:	This is fixed ex-ante and it will remain same throughout during the crediting period.

B.6.3. Ex-ante calculation of emission reductions:

>>

BaselineEmissions (BE_y):

Baseline for the project activity is power generated from renewable energy source multiplied by the grid emission factor of NEWNE grid calculated in transparent and conservative manner.

$BE_y = EG_{BL,y} \text{ X } EF_{Grid, CM, y}$

The ex-ante calculation of baseline emissions in one crediting year of project activity:

$EG_{BL,y}$ = 118,866 MWh

$EF_{Grid, CM,y}$ = 0.952 tCO_2e/MWh

BE_y = 118,866 MWh * 0.952 tCO_2e/ MWh
= 113,160 tCO_2/ annum

Project emissions
As per ACM 0002, project emissions for solar power project activities is zero.
$PE_y = 0$

Leakage
No leakage emission are considered. The main emission emissions potentially giving rise to leakage in the context of electrical 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). These emissions sources are neglected.

Emission reductions
As per the methodology, emission reductions are calculated based on the following formula
$ER_y = BE_y - PE_y$
or

$ER_y = BE_y$ as $PE_y = 0$

ER_y = 113,160 tCO_2e/ annum

Year	**Net Electricity generated by the Project Activity - $EG_{PJ,y}$ (In MWh)**	**Combined Margin of project boundary - EF Grid, CM, y (in tCO_2/MWh)**	**Baseline Emissions - BE_y (tonnes of CO_2)**
Year 1 : 09/05/2013 to 31/12/2013	77,181	0.952	73,476
Year 2 : 01/01/2014 to 31/12/2014	118,866	0.952	113,160
Year 3 : 01/01/2015 to 31/12/2015	118,866	0.952	113,160
Year 4 : 01/01/2016 to 31/12/2016	118,866	0.952	113,160
Year 5 : 01/01/2017 to 31/12/2017	118,866	0.952	113,160
Year 6 : 01/01/2018 to 31/12/2018	118,866	0.952	113,160
Year 7 : 01/01/2019 to 31/12/2019	118,866	0.952	113,160
Year 8 : 01/01/2020 to 31/12/2020	118,866	0.952	113,160
Year 9 : 01/01/2021 to 31/12/2021	118,866	0.952	113,160
Year 10 : 01/01/2022 to 31/12/2022	118,866	0.952	113,160
Year 11 : 01/01/2023 to 08/05/2023	41,685	0.952	39,684

B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2 e)
Year 1 : 09/05/2013 to 31/12/2013	0	73,476	0	73,476
Year 2 : 01/01/2014 to 31/12/2014	0	113,160	0	113,160
Year 3 : 01/01/2015 to 31/12/2015	0	113,160	0	113,160
Year 4 : 01/01/2016 to 31/12/2016	0	113,160	0	113,160
Year 5 : 01/01/2017 to 31/12/2017	0	113,160	0	113,160
Year 6 : 01/01/2018 to 31/12/2018	0	113,160	0	113,160
Year 7 : 01/01/2019 to 31/12/2019	0	113,160	0	113,160
Year 8 : 01/01/2020 to 31/12/2020	0	113,160	0	113,160
Year 9 : 01/01/2021 to 31/12/2021	0	113,160	0	113,160
Year 10 : 01/01/2022 to 31/12/2022	0	113,160	0	113,160
Year 11 : 01/01/2023 to 08/05/2023	0	39,684	0	39,684
Total	**0**	**1,131,600**	**0**	**1,131,600**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/Year
Description:	Quantity of net electricity generated and fed into the grid in year *y*
Source of data to be used:	The ABT meter will be employed for monitoring the quantity of net electricity generation supplied by the project plant to the grid in a year.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	118,866
Description of measurement methods and procedures to be applied:	Data Type**:** Measured Monitoring equipment**:** Energy Meter is used for continuous monitoring Accuracy class : 0.2S Recording Frequency**:** Monthly from Energy Meter, Summarized Annually Archiving Policy**:** Paper & Electronic The net electricity exported to the grid by the project activity is measured by tri-vector type Availability Based Tariff (ABT) meter which would provide the net diffrence of the electricity exported to the grid and the electricity imported from the grid.The meter reading of net electricity supplied to grid will be taken jointly by a representative of RSEB and the PP on monthly basis. The meter reading will be taken jointly and will be signed by the authorized officer of RSEB and the PP. If the representative of the PP is not present, then the RSEB will provide the PP with the signed copy of the meter reading. The PP will prepare monthly invoices based on the joint meter readings. Monitoring procedure shall follow the CEA rules 2006, provisions of PPA and national grid codes.
QA/QC procedures to be applied:	Quantity of net electricity supplied will be cross-verified with the invoice raised. Installation of meters, meter testing, meter calibration and meter reading shall follow CEA (Installation and Operation of Meters) Regulations 2006.The calibration frequency for ABT meter will be at least once in five year as per provision of PPA.
Any comment:	

B.7.2. Description of the monitoring plan:

>>

The project proponent has proposed operational & management structure in order to monitor the emission reduction. and processes in place. Monitoring plan will include roles and responsibilities for individuals, selection, metering and calibration of monitoring equipment, metering of $EG_{facility,Y}$, and other relevant aspects. Annex 4 describes the complete monitoring plan along with the Organizational Structure, selection, metering and calibration of monitoring equipment with the management.

B.8. Date of completion of the application of the baseline study and monitoring

methodology and the name of the responsible person(s)/entity (ies):

>>

Date of Completion	30/12/2011
Carried-out by	Ritesh Agrawal (Consultant to the Project Participant)
Address	PE Sustainability Solutions Pvt. Ltd. - a subsidiary of PE INTERNATIONAL Germany 14, First Floor, Commercial Complex Nehru Nagar, Bhilai- 490020 India Phone +91 [0]788 4050009 Mobile +91 [0]97550 19144 Fax +91 [0]788 4050004

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

Start date of the project activity is 20/08/2011, i.e. date of the equipment purchase and EPC Contract date is 20/08/2011. This complies with the definition of the start-date as the date on which project participant has committed to the expenditure related to the implementation of the project activity.

C.1.2. Expected operational lifetime of the project activity:

>>

25 years

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

>>

Not applicable.

C.2.1.2. Length of the first crediting period:

>>

Not applicable.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

09/05/2013 or date of registration of the project with UNFCCC (whichever is later)

C.2.2.2. Length:

>>

10 years

SECTION D. Environmental impacts

>>

As per Environmental Impact Assessment Notification – 2006[14], issued by Ministry of Environment and Forests, Government of India, no environmental impact assessment is required for project activity.

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

As per the notification from MoEF dated September 14, 2006[15] and its amendment notification S.O.-3067(E) dated 1/12/2009[16], the list of project activities which require prior environmental clearance is stipulated. This does not include the proposed project activity type as it involves solar power generation. Hence the proposed project activity does not require any Environmental impact analysis.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

Not applicable.

[14] Environmental Impact Assessment Notification - 2006 http://envfor.nic.in/legis/eia/eia-2006.htm

[15] http://envfor.nic.in/legis/eia/so1533.pdf

[16] http://moef.nic.in/downloads/rules-and-regulations/3067.pdf

SECTION E. Stakeholders' comments

>>

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>

Management of GGEL organized stakeholders consultation meeting that was held on 15/11/2011 to appraise the stake holders / villagers regarding the project activity.

Before implementing any project, project investors / developers need to identify the stakeholders, prepare necessary documents, approach the identified stakeholders directly and obtain required clearances / approvals. The stakeholders after review of documents and investment profile, would accord approvals / licenses or send comments in writing to project investors for further clarifications / corrections. In case they are not satisfied with the project design or they feel that the project affects negatively any of the local environment / social / economical environments, they would not issue clearances / approvals to the project.

To identify local stakeholders, a preliminary visit was made to Godawari Green Energy Limited on 10/11/2011. Consequent to the discussion with official of GGEL, it was decided to organize the stakeholder meeting on 15/11/2011 at GGEL premises at 10:30 AM.

The various stakeholders viz. employees, contractual workers, people from nearby villages, locally elected representative, Government officials were invited to attend the CDM stakeholder consultation meeting.

On the eve of stakeholder consultation meeting, the following activities were undertaken under the chairmanship of Shri Lakshman Prasad, Advisor, Mining and Environment, GGEL.

The presentation was divided in three parts. First, Mr. J P Tiwari, CEO of GGEL made an introduction about the company and their environment and quality policies. Then an introduction of the 50 MW Solar Thermal power plant was presented. Advantages of Solar Thermal power plant in comparison to the conventional coal based thermal power plant and environmental benefits were also delivered in the presentation. Last, Mr. Rajesh Singh, MD PE Sustainability Solutions Pvt Ltd made the presentation about the project activity; this consisted of an introduction to the greenhouse effect, Global Warming, the Kyoto Protocol and the Clean Development Mechanism, CDM requirements, the meaning and objectives of the stakeholder consultation process, a description of the project activity, its expected emission reductions and environmental benefits. Then there was time for questions and information was given about the channels of information available for future comments and questions.

Finally it was requested from the assembled stakeholders for their comments. No negative comments were received and all have welcomed the project.

.

E.2. Summary of the comments received:

>>

Stakeholders' Involvement

The local population represented by village panchyat welcomed the project due to various benefits, such as development of infrastructure in the area, increase of income due to the project activity and improvement in their standards of living

The following stakeholders asked the queries:

1) Sarpanch - Mr Gulam Ali , Nokh Village
2) Contractor – Mr Dilip Singh Bhatti, Nokh Village
3) Contractor – Mr Sudhir Nayak, Nokh Village
4) Former Sarpanch – Mr Nand Kishore Vyas, Nokh Village
5) Gram Sarankshak – Mr Bhonuram, Nokh Village

Q1. Mr. Gulam Ali, Nokh Village asked about the possible positive impact on environment due to implementation of this project.
A. It was clarified that this project is a renewable energy project, using Solar Energy which replaces fossil fuel such as coal.

Q2. Mr. Dilip Singh Bhatti, Nokh Village reiterated about the increase in local employment due to this project.
A. It has been replied that, skilled and trained people will be given priority during the recruitment stage and non-skilled worker will be taken from local region only.

Q3. Mr. Nand Kishore Vyas, Nokh Village asked query related to housekeeping and cleanliness surrounding to the project.
A. It was replied that the manpower shall be deployed to ensure proper housekeeping and cleanliness of the plant and its surroundings.

Q4. Mr. Sudhir Nayak, Nokh Village asked about the polluting control measures.
A. It was clarified Solar Thermal Power project is a non polluting clean energy project.

Q5. Mr. Bhonuram, Nokh Village asked about the contribution of company towards peripheral development and increase of transport.
A. It was clarified that the company will provide assistance for social development in the nearby villages on regular basis and with development of project better transport road and overall development will take place.

The stakeholders also needed the following clarifications related to social activities support from GGEL

The queries were responded as follows:

The project will contribute to sustainable development by utilizing Solar Thermal for power generation saving the fossil fuel like coal and reducing environmental impacts of coal combustion such as emission of particulate matter, SO2, NOx and generation of fly ash which also lead to land degradation. GGEL has committed to MoEF for contribution of 2% of CER towards the various

community development activities. Vacancies/ employment opportunities created on account of the proposed project should be for youth from the local villages. It was clarified that most of the work would require technically skilled manpower. Such manpower if available with appropriate skills in the local villages would be given preference.

The stake holders appreciated and expressed their good wishes.

The action plan for MoEF contribution of minimum 2% of the CERs revenue towards Sustainable

E.3. Report on how due account was taken of any comments received:

>>

No adverse comments received; hence, no actions are applicable.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Godawari Green Energy Limited
Street/P.O.Box:	Hira Arcade, 1st Floor, , Pandri
City:	Raipur
State/Region:	Chhattisgarh
Postfix/ZIP:	492004
Country:	India
Telephone:	+91 (0)771 – 4082749
FAX:	+91 (0)771 – 4057601
E-Mail:	lkp46ster@gmail.com
URL:	www.hiragroupindia.com
Represented by:	
Title:	Advisor
Salutation:	Mr.
Last Name:	Prasad
Middle Name:	
First Name:	Lakshman
Department:	
Mobile:	91 9893900103
Direct FAX:	91 771 4057601
Direct tel:	91 771 4082749
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project will not involve any public funding from annex – 1 parties.

Annex 3

BASELINE INFORMATION

The project activity is generation of electricity using solar energy and exporting the same to the grid system. This grid system is also fed by other fuel sources like fossil and non-fossil types. Emission reduction due to this project activity is taken as equivalent to the emission avoided in the baseline scenario by displacing the grid electricity. This emission reduction is related to the electricity exported by the project and the actual generation mix in the grid system.

The Emission Factor has to be calculated in a transparent and conservative manner. A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the Emission Factor for an electricity system'.
In the project activity, **combined margin has been chosen as the baseline emission factor** for grid emission factor. The value chosen is taken from relevant official sources[17] and is publicly available. More of baseline information has been described in **Section B.6.1.**

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE

VERSION	**7.0**
DATE	**Jan-12**
BASELINE METHODOLOGY	**ACM0002 / Ver 12.2.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 2.2.1**

Weighted Average Emission Rate (tCO2/MWh) (incl. Imports) (2)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.82	0.81	0.83	0.82	0.80
South	0.72	0.72	0.76	0.75	0.75
India	0.80	0.79	0.81	0.81	0.79
Simple Operating Margin (tCO2/MWh) (incl. Imports) (1) (2)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	1.01	1.00	1.01	0.98	0.97
South	1.00	0.99	0.97	0.94	0.94
India	1.01	1.00	1.00	0.97	0.96
Build Margin (tCO2/MWh) (not adjusted for imports)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.63	0.60	0.68	0.81	0.86
South	0.70	0.71	0.82	0.76	0.73
India	0.65	0.63	0.71	0.80	0.83
Combined Margin in tCO2/MWh (incl. Imports) (1) (2)					
	2006-07	2007-08	2008-09	2009-10	2010-11
NEWNE	0.82	0.80	0.84	0.90	0.91
South	0.85	0.85	0.90	0.85	0.84
India	0.83	0.81	0.85	0.88	0.90

[17] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Calculation of Combined margin for NEWNE grid

OM	tCO2/MWh	Net Generation including import (GWh)
Year 1(2008-09)	**1.007**	**421,803**
Year 2(2009-10)	**0.978**	**462,327**
Year 3(2010-11)	**0.971**	**476,987**
Simple OM	**0.984**	
BM(2010-11)	**0.858**	
CM	**0.952**	

Source: http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

The corresponding calculation spreadsheet of the operating margin and build margin emission factors is provided to validation team.

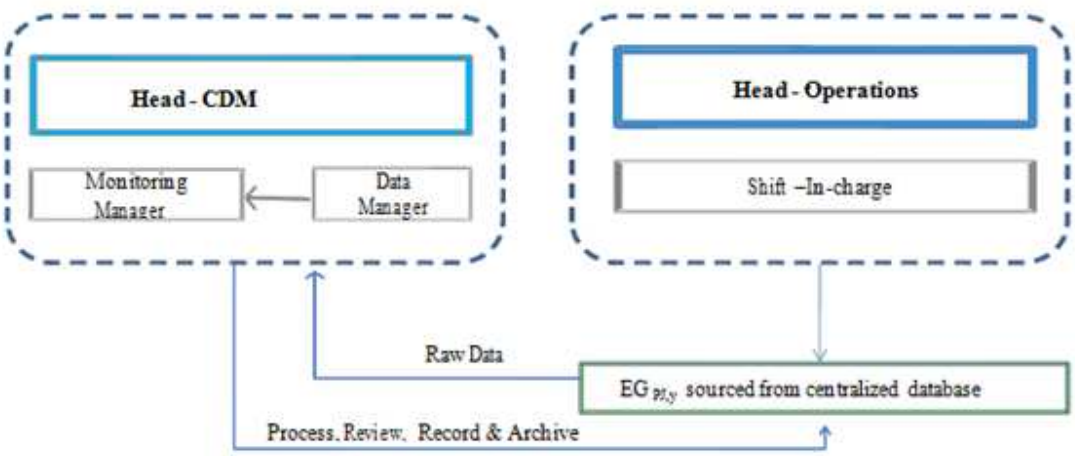
Annex 4

MONITORING INFORMATION

This section of the PDD serves as Monitoring plan for the project activity. Monitoring plan represents the modus operandi to meet management plan. This includes systems and protocols to be implemented by project participant in order to ensure reliability, transparency and consistency while carrying-out various critical activities such as metering, data management and computation of emission reductions achieved by the project activity.

1. **Organizational Structure:**

Organizational structure of the operational team is as follows:



Roles & Responsibilities

Designation	Responsibility
Head - CDM	a. Complete responsibility of CDM implementation of project activity including preparation of PDD, validation, verification and associated action thereto as indicated in PDD. b. Formulate monitoring compliance protocols & human resources training guidelines for O&M, & CDM teams to comply with Monitoring Plan requirements. c. Ensure adequate training is offered for O&M and CDM teams to comply with the requirements of project activity. d. Establish systems for data management and approve data submitted by CDM operational team.

Monitoring Manager – CDM	a. Implementation of compliance guidelines for O&M & CDM teams to comply with PDD including Monitoring Plan. b. Coordinating with O&M teams for collection of data. c. Ensure that O&M team and comply with monitoring of data, including calibration and archiving of date are carried-out as per the frequency indicated in data management section.

Designation	**Responsibility**
	d. Carry-out QA/QC checks on data collected by data managers, and conduct the consistency checks. e. Computation of Emission Reductions based on the data f. Conduct training programs for internal stakeholders.
Data Managers - CDM	a. Collection of data from O&M group. b. Carrying-out consistency checks on parameters and formats. c. Prepare the data for calculations, d. Storage of data including calibration and maintain data and retrieval of data.
Head – Operation	a. Monitor, measure, calibrate and store electricity generation data and other related data

2. **Measurement Methodology**

Monitoring Methodology will involve the following steps.

Following paragraph indicates the Monitoring methodology for the Monitoring parameter ($EG_{facility,y}$) .

The generated electricity at 11 kV will be stepped up to 132 kV grid voltage level in the on-site switchyard which is connected to the 132 kV sub-station. The net electricity is measured by Availability Based Tariff (ABT) meter to be installed in 132 kV sub-station. The meter reading of net electricity supplied to grid will be taken jointly by a representative of RSEB and the PP on a monthly basis at an appointed date and time. The net electricity is the difference between the exported electricity and imported electricity. The meter reading will be taken jointly and will be signed by the authorized officer of RSEB and the PP. If the representative of the PP is not present, then the RSEB will provide the PP with the signed copy of the meter reading. The PP will prepare monthly invoices based on the joint meter readings. Monitoring procedure shall follow the CEA rules 2006, provisions of PPA and national/international codes .

The ABT meter specification is of 0.2S class having accuracy of 0.2%. Head of Operations is responsible to monitor, measure, calibrate and store electricity generation data supplied to the grid. ABT meter is used for continuous monitoring of net electricity supplied to grid. The recording frequency of data from ABT meter is on monthly basis and summarized annually. Head - CDM is overall responsible for implementation of monitoring plan and computation of emission reduction. recorded and stored in logs as well as in electronic form. The records are checked periodically by the Head Operations and discussed thoroughly with the Data Manager CDM. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of CERs for the project activity whichever occurs later. Data shall be archived in paper and or electronic form.

Quantity of net electricity supplied will be cross-verified with the invoices raised.
Installation of meters, meter testing, meter calibration and meter reading shall follow CEA (Installation and Operation of Meters) Regulations 2006.The calibration frequency for ABT meter will be at least once in five year as per PPA provision.
The operators will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan. Head Operations is responsible for the training of the staff. Main meter and check meter will be installed with facilities to record export and import of energy and as per the standards stipulated in the Central Electricity Authority's Regulation 2006 and regulation issued by the State electricity regulatory commission.

3. **Data Management**

Data Management plan will develop to ensure adequate measures are in place during the operational phase of the project activity.

- - - - -