



**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)
Version number of the PDD	4
Completion date of the PDD	23/12/2012
Project participant(s)	Roha Dyechem Pvt. Ltd. (Private Entity) First Climate (India) Private Limited (Private Entity)
Host Party(ies)	India
Sectoral scope and selected methodology(ies)	Sectoral Scope: 01 Methodology: ACM0002, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, Version 13.0.0, EB 67
Estimated amount of annual average GHG emission reductions	36367 tCO ₂ e

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

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Roha Dyechem Pvt. Ltd. (RDPL) has installed a greenfield 25 MW solar photovoltaic (PV) power plant in the solar park at Patan district in Gujarat. The purpose of the project activity is to generate electrical energy utilising solar energy and export the generated electricity to the regional grid. The PV system will mainly consists of PV modules, module mounting structures, inverters, regulators, monitoring devices etc. The project activity uses 172728 nos of 145 W¹ Nexpower (NT/ AX series) solar thin film modules which are installed in array configuration.² The project activity was commissioned on 04/03/2012.

In absence of the project activity equivalent amount of electricity would have been generated in the regional electricity grid which comprises of primarily fossil fuel based power plants. Therefore the baseline scenario of the project activity is generation of equivalent amount of electricity in the existing grid connected power plants and addition of new generation sources to the grid. Since the project activity is a Greenfield project the baseline scenario is same as pre-project scenario. Thus the project activity will result in avoidance of greenhouse gas emissions associated with equivalent amount of electricity generation and contribute to mitigation of global warming.

The project activity is expected to export, on an average, 39321 MWh of electrical energy to the North, East, West and North East Regional grid of India, for its life cycle of 25 years. This will result in average annual reduction of 36367 tCO₂ per annum from the project activity.

Contribution of the project activity to sustainable development:

The project contributes to the general well-being of the region and is in line with the sustainable development policies of the host country.

Social well-being:

The project activity will lead to employment generation during installation as well as operation phase of the project activity.

Economic well-being:

The project implementation will provide a fillip to economic activity in the region. Direct & indirect employment will be generated in the plant for the project implementation & management. The success of this project will encourage more business to be developed in the local region thus bringing in economic prosperity in the region.

Environmental well-being:

The project being a renewable energy power project would contribute to mitigation of global warming. Also the project activity also would not lead to any air pollution unlike fossil fuel based power plants.

Technological well-being:

The project activity involves installation of a 25 MW solar photovoltaic power plant. This is one of the first solar power plants of this scale in this India. Thus the project activity will lead to technological up-gradation in the solar energy generation market.

The project being a large scale project activity the project proponent will spend 2% of the revenue earned from the sale of CERs for sustainable development including/society/community development of the region. The table below provides an estimation of the revenue that will be contributed towards sustainable development activities.

List the activities/support PP like provide to the identified villages
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¹Nominal power output of 145 W

² For detailed technical specification, please refer section A.3 below.



S No	Village Name	Activities/Support proposed over the project life time	Percentage
1	Charanka	Health & Sanitation, Community development: <ul style="list-style-type: none"> • Organising medical camps • Vaccination campaigns • Construction and operation of water supply schemes (Bore Well, Tube Well etc) 	0.5%
2	Fangali	Health & Sanitation, Community development: <ul style="list-style-type: none"> • Organising medical camps • Vaccination campaigns • Construction and operation of water supply schemes (Bore Well, Tube Well etc) 	0.5%

A.2. Location of project activity**A.2.1. Host Party(ies)**

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India

A.2.2. Region/State/Province etc.

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State: Gujarat

A.2.3. City/Town/Community etc.

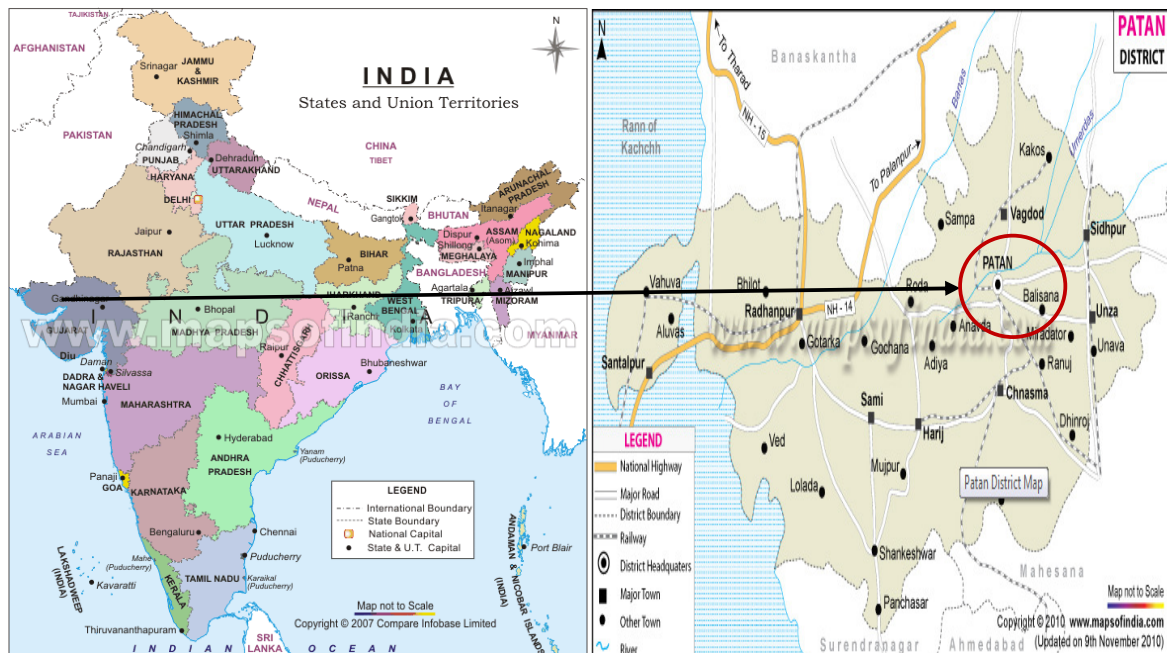
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Village: Charanka
Taluka: Santalpur
District: Patan

A.2.4. Physical/Geographical location

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The proposed project activity is located at Charanka village of Patan district in Gujarat. The nearest railway station is at Santalpur and the nearest airport is at Ahmedabad and the nearest highway is NH-15. The geographical coordinates of the project site has been provided below:

Geo-coordinates	Decimal degrees	Degree-minute-second
Latitude	23.90 N	23° 53' 59" N
Longitude	71.20 E	71° 12' 01" E

A pictorial representation of the location of the project activity on the map of India is provided as follows:



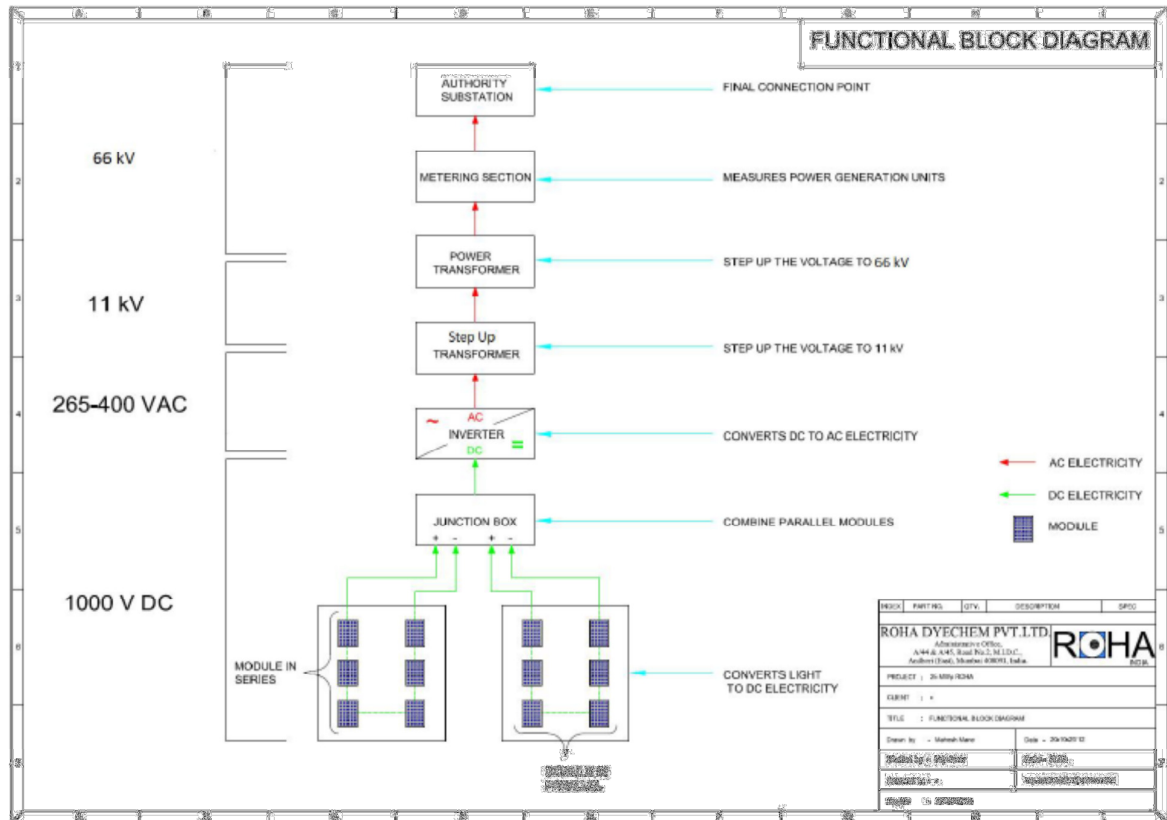
A.3. Technologies and/or measures

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The project activity involves installation of 25 MW grid connected solar photovoltaic power plant. The PV system will mainly consists of PV modules, module mounting structures, inverters, regulators, monitoring devices etc. The thin film system will consist of 145 W (Nominal Power) Nexpower (NT/ AX series) Solar Thin film modules. The system shall consist of following equipments:

- Solar PV modules:** 172728 solar modules of nominal power capacity of 145 W($\pm 5\%$) shall be installed in array configuration. Nine solar modules shall be connected in series to form one string. 19158 such strings will be in parallel, connected to 450 Array Junction Boxes (AJBs). Therefore the total power generation capacity of the modules installed at site translates to 25.04 MW (i.e. 25 MW).
- Module Mounting structure:** There are 6400 mounting structures designed for each having a maximum of 27 modules. Some of the mounting structures are having less than 27 modules.
- Inverters :** 50 Nos of 500 kW Satcon make inverters shall be utilized in the project activity
- Data logging systems :** There are total of 4789.5 arrays shall be monitored by the WEM (Wipro Energy Manager) sub systems in cluster rooms and main master in the MRSS (Main Receiving Substation)
- Transformers and Distribution Control Panels:**
 Transformers: 25 Nos of 1.25MVA Transformer, 1 No of 160KVA Auxiliary Transformer & 1 No of 27.5MVA Main transformer shall be utilized in the project.
 Control Panels: 3 Control Relay Panel (CRP), 1 On Load Tap Changer (OLTC) Panel, Capacitor bank Panel, 31 Cluster Panels (5 in each cluster room from segment 1 to 6 and 1 Panel in segment 7). 11 Panels in MRSS, 7 cluster room incomers and 1 main out going, 1 Auxiliary supply, 1 spare and 1 for APFC (Automatic Power Factor Control) Panel.

A schematic diagram of the project activity is presented below:



The project activity is expected to operate at a plant load factor of 18%, exporting 39321 MWh of electrical energy to the North, East, West and North East Regional grid of India, throughout its entire life span of 25 years. This will result in average annual reduction of 36367 tCO₂ per annum from the project activity. The project activity does not involve any technology transfer.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Roha Dyechem Pvt. Ltd. (Private entity)	No
India (host)	First Climate (India) Private Limited (Private entity)	No

A.5. Public funding of project activity

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There is no public funding from any Annex-I party for the project activity under consideration. A declaration to this effect has been attached as Appendix 2 to this PDD.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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Title : Consolidated baseline methodology for grid-connected electricity generation from renewable sources



Methodology : Approved Consolidated Baseline and Monitoring Methodology ACM0002
Version : 13.0.0
Date : Valid from 11th May 2012 onwards
Reference : [ACM0002 version 13.0.0](#)

Tool	Version	Reference
Tool for the demonstration and assessment of additionality	06.1.0	http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf
Tool to calculate the emission factor for an electricity system	02.2.1	http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

B.2. Applicability of methodology

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In the project activity large scale methodology ACM0002, Version 13.0.0 has been applied and application of the methodology is justified below:

Applicability Criteria	Justification
<p><i>“This methodology is applicable to grid-connected renewable power generation project activities that</i></p> <p><i>(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);</i></p> <p><i>(b) involve a capacity addition;</i></p> <p><i>(c) involve a retrofit of (an) existing plant(s); or</i></p> <p><i>(d) involve a replacement of (an) existing plant(s).”</i></p>	<p><u>Applicable and fulfilled:</u></p> <p>The proposed project activity is a grid-connected³ solar power generation project (i.e. renewable power generation project activity) and installs a new power plant at the project site where no renewable power plant was operated prior to the implementation of the project activity (i.e. greenfield plant). Hence, the project category qualifies under clause (a) of the above paragraph in the methodology describing the category of projects applicable.</p>
<p><i>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;</i></p>	<p><u>Applicable and fulfilled</u></p> <p>The proposed project activity involves installation of a greenfield solar photovoltaic power plant utilizing solar energy to generate electricity and supply to the regional grid (NEWNE grid). Hence, the project activity satisfied this criterion.</p>
<p><i>In the case of capacity additions, retrofits or replacements (except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected: 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 addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;</i></p>	<p><u>Not applicable</u></p> <p>The proposed project activity being a greenfield grid connected solar power project this clause is not applicable.</p>
<p><i>In case of hydro power plants, at least one of the</i></p>	<p><u>Not applicable</u></p>

³Ref: Power Purchase Agreement with Gujarat Urja Vikas Nigam Limited dated 9th December 2010



<p><i>following conditions must apply:</i></p> <ul style="list-style-type: none"> • <i>The project activity is implemented in an existing reservoir, with no change in the volume of any of the reservoir; or</i> • <i>The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m² after the implementation of the project activity; or</i> • <i>The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m² after the implementation of the project activity.</i> 	<p>The proposed project activity is not a hydro power project. Hence, this clause is not applicable.</p>
<p><i>In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m² all the following conditions must apply:</i></p> <ul style="list-style-type: none"> • <i>The power density calculated for the entire project activity using equation 5 is greater than 4 W/m²;</i> • <i>Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project 4 that collectively constitute the generation capacity of the combined power plant;</i> • <i>Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity;</i> • <i>Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m², is lower than 15 MW;</i> • <i>Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m², is less than 10% of the total installed capacity of the project activity from multiple reservoirs.</i> 	<p><u>Not applicable</u> The proposed project activity is not a hydro power project. Hence, this clause is not applicable.</p>
<p>Exclusion Criteria: <i>The methodology is not applicable to the following:</i></p>	
<p><i>Project activities that involve switching from fossil</i></p>	<p><u>Not applicable</u></p>

⁴This requirement can be demonstrated, for example: (i) by the fact that water flow from upstream power units spilling directly to the downstream reservoir; or (ii) through the analysis of the water balance. Water balance is the mass balance of water fed to power units, with all possible combinations of multiple reservoirs and without the construction of reservoirs. The purpose of such water balance is to demonstrate the requirement of specific combination of multiple 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 three years prior to implementation of CDM project activity.

<i>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;</i>	The proposed project activity does not involve switching from fossil fuels to renewable energy sources. Hence, this clause is not applicable.
<i>Biomass fired power plants;</i>	<u>Not applicable</u> The proposed project activity is not a biomass fired power plant. Hence, this clause is not applicable.
<i>Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the reservoir is less than 4 W/m².</i>	<u>Not applicable</u> The proposed project activity is not a hydro power project. Hence, this clause is not applicable.
<i>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”.</i>	<u>Not applicable</u> The proposed project activity is a greenfield grid connected solar power project that does not involve any retrofit, replacement or capacity addition. Hence this clause is not applicable.

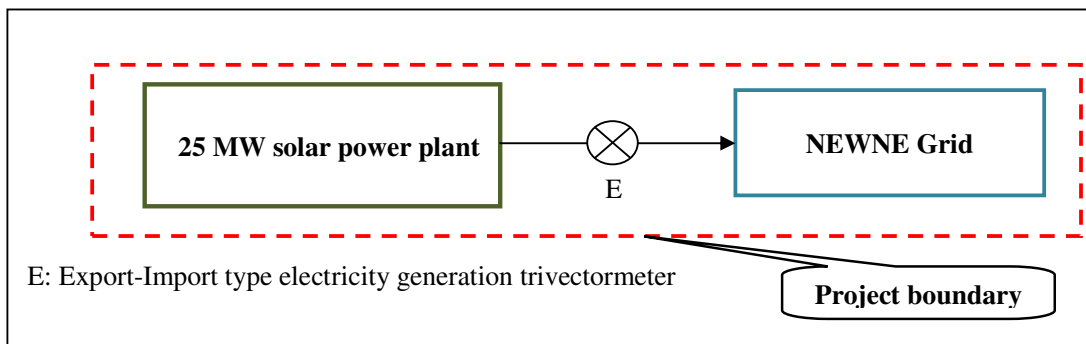
Thus the project activity fulfils all the relevant applicability criteria of the methodology.

B.3. Project boundary

As per the applicable methodology ACM0002, version 13.0.0,

“The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system⁵ that the CDM project power plant is connected to.”

The project activity supplies/displaces electricity to the regional grid (i.e. NEWNE grid) and hence the project boundary encompasses the physical extent of the NEWNE electricity grid, the project activity (i.e. 25 MW solar power plant) and all other power plants connected physically to the electricity system.



As per the applicable methodology ACM0002, Version 13.0.0 the following sources and gases are included in the project boundary

⁵ Refer to the latest approved version of the “Tool to calculate the emission factor for an electricity system” for definition of an electricity system.



	Source	GHGs	Included?	Justification/Explanation
Baseline scenario	CO ₂ emissions from electricity generation in 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 ₂ O	No	Minor emission source
Project scenario	For geothermal power plants, fugitive emissions of CH ₄ and CO ₂ from non-condensable gases contained in geothermal steam	CO ₂	No	The project activity is a solar photo-voltaic power project. Hence, these project emission sources and gases are not relevant.
		CH ₄	No	
		N ₂ O	No	
	CO ₂ emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO ₂	No	The project activity is a solar photo-voltaic power project. Hence, these project emission sources and gases are not relevant.
		CH ₄	No	
		N ₂ O	No	
	For hydro power plants, emissions of CH ₄ from the reservoir	CO ₂	No	The project activity is a solar photo-voltaic power project. Hence, these project emission sources and gases are not relevant.
		CH ₄	No	
		N ₂ O	No	

B.4. Establishment and description of baseline scenario

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For the project category (new grid connected renewable energy power plant) under consideration, the methodology ACM0002, version 13.0.0 specifies that:-

If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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”.

In absence of the project activity, equivalent power would have been generated by the existing grid connected power plants and addition of new generation sources. The project evacuates power to the Gujarat state grid, which forms a part of the NEWNE grid of India. Hence, combined margin emission factor of the NEWNE regional grid has been used to calculate baseline emissions of the project activity. The combined margin has been calculated based on the operating margin and build margin data provided in the CEA CO₂ baseline database version 7⁶, Central Electricity Authority, which in turn have been calculated as per the guidance provided in the “Tool to calculate emission factor of an electricity system”. The CEA database is publicly available in the CEA website and updated regularly to reflect changes in power scenario and EB guidance.

B.5. Demonstration of additionality

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According to applicable methodology ACM0002, version 13.0.0,

⁶http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip



“The additionality of the project activity shall be demonstrated and assessed using the latest version of the “Tool for the demonstration and assessment of additionality” agreed by the Board, which is available on the UNFCCC CDM website.”

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

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

The objective of this step is to identify realistic and credible alternatives to the project activity through the following sub-steps:

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

For the project, the possible alternative scenarios that provide outputs or services comparable to the project should be as follows:

Alternative 1 - *The proposed project activity is undertaken without being registered as a CDM project activity.*

Under this alternative, the promoters of the project proponent would have implemented the project to generate renewable electricity using solar energy with the objective of exporting the same to the NEWNE grid thereby displacing equivalent units of power generated by emission intensive NEWNE grid. Under this alternative, there would be no emissions of greenhouse gases. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline scenario. However, there exist barriers to the implementation of the proposed project activity as explained in step 2 and step 3 below.

Alternative 2: *Continuation of the current situation with no project activity and equivalent amount of energy produced by the grid electricity system through its currently running power plants (which are mostly thermal) and/or by new capacity addition to the grid;*

In the said alternative, a "no-project" scenario will imply that electricity output equivalent to that of the project activity power plant would be fulfilled either by the existing capacity of the fossil fuel dominated grid or by capacity enhancement of the existing grid. This alternative is in compliance with all existing laws and regulations and represents the most likely baseline scenario. Hence, suitable grid mix has been selected as baseline option to calculate baseline emissions.

Outcome of Step 1a:

As demonstrated above, the realistic and credible alternatives for the project activity are:

Alternative 1 - *The proposed project activity is undertaken without being registered as a CDM project activity.*

Alternative 2: *Continuation of the current situation with no project activity and equivalent amount of energy produced by the grid electricity system through its currently running power plants (which are mostly thermal) and/or by new capacity addition to the grid*

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

Both the above mentioned alternatives are in compliance with the applicable legal and regulatory requirements.

Outcome of Step 1b:

Alternative 1 - *The proposed project activity is undertaken without being registered as a CDM project activity.*



Alternative 2: *Continuation of the current situation with no project activity and equivalent amount of energy produced by the grid electricity system through its currently running power plants (which are mostly thermal) and/or by new capacity addition to the grid*

Step 2: Investment Analysis

Sub-step 2a. Determine appropriate analysis method

The investment analysis has been conducted in line with the “Tool for the demonstration and assessment of additionality”, version 06.1.0. As the electricity generated from the project activity will be sold to the Gujarat state grid, it will generate financial benefits in terms of revenues from the sale of electricity units. Thus simple cost analysis (option I) cannot be applied to the proposed CDM project activity.

Investment comparison analysis (option II) also cannot be used since the alternative to the project activity does not involve any investment on the part of the project proponent. Hence, benchmark analysis (option III) has been adopted for the project activity. In accordance with the guidance on the assessment of investment analysis, the Internal Rate of Return (IRR) of the project activity has been selected as an indicator which serves to assess the financial attractiveness of the project activity. Option III assesses if the project’s returns are sufficient for investors as compared to a benchmark return to justify the investment in the project activity.

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

Selection of Benchmark:

As per EB 62, Annex 5, (item 12, selection and validation of appropriate benchmarks) *“In cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. Required/expected returns on equity are appropriate benchmarks for an equity IRR”*.

Since project IRR has been chosen as the financial indicator, Weighted Average Cost of Capital (WACC) is chosen as a suitable benchmark. WACC represents the minimum rate of return which the project should earn to merit consideration, as failure to earn the minimum rate of return is indicative of the erosion in the value of shareholders investment.

The WACC is calculated as a combination of the cost of debt and cost of equity.

Cost of debt:

The cost of debt has been calculated based on the prevailing prime lending rate during January 2011 i.e. 12.75%⁷.

Cost of equity:

As per the guidance note issued by CDM EB at its 62nd meeting (Annex 5, item 15, selection and validation of appropriate benchmarks), *“If the benchmark is based on parameters that are standard in the market, the cost of equity should be determined either by: (a) selecting the values provided in Appendix A; or by (b) calculating the cost of equity using best financial practices, based on data sources which can be clearly validated by the DOE, while properly justifying all underlying factors.”*

In line with the above guidance the cost of equity has been estimated as per the values provided in the Appendix A of the guidance document.

⁷http://www.moneycontrol.com/stocks/stock_market/corp_notices.php?autono=395666



As per the default value for expected return on equity (for group 1 project (i.e. Energy Industries) in India) provided in the Appendix A of the “Guidelines on the assessment of investment analysis” is 11.75% in real terms.

Again as per guidance note issued by CDM EB at its 62nd meeting (Annex 5, item 7 of Appendix A), “In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used.”

Since the project IRR for the project activity has been calculated below in nominal terms, the cost of equity in real terms has been converted to nominal terms by adding the forecasted inflation rate for the next five years after the start of the project activity for India published by the IMF (International Monetary Fund World Economic Outlook)⁸ i.e. 6.91%. Thus the cost of equity in nominal terms comes to around 19.48%.

$$C_{e,nominal} = (1 + C_{e,real})(1 + i) - 1$$

Where:

Abbreviation	Description	Value	Source
$C_{e,nominal}$	Cost of equity in nominal terms (%)	19.48	Calculated
$C_{e,real}$	Cost of equity in real terms (%)	11.75	http://www.moneycontrol.com/stocks/stock_market/corp_notices.php?auto_no=395666
i	Inflation rate as per long term forecast by RBI (%)	6.91	IMF (International Monetary Fund World Economic Outlook)

At 70:30 debt:equity structure, WACC for this project activity is found to be 12.99%. Hence 12.99% is considered as benchmark for project IRR.

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

The major inputs to the calculation of IRR are as follows:

Technical Data			
Particulars	Unit	Value	Remarks
Capacity of power project	MW	25	Detailed project report dated 12/01/2011
Annual Degradation of solar module (2nd year)	%	1	

⁸

<http://www.imf.org/external/pubs/ft/weo/2012/01/weodata/weorept.aspx?pr.x=57&pr.y=1&sy=2010&ey=2017&scsm=1&ssd=1&sort=country&ds=.&br=1&c=534&s=PCPI%2CPCPIPCH&grp=0&a=>



onwards)			
Hours of operation in a year	Hours	8760	
PLF	%	18.00	
Gross generation in first year	MWh	39420	
Auxiliary Consumption	%	0.25	
Project lifetime	Year	25	
Months in 1st year of operation	Month	12	Assumed
Number of financial years	Years	25	Lifetime as per PPA dated 09/12/2010

<i>Financial Data</i>			
Particulars	Unit	Value	Remarks
Project cost	INR million	3785.46	Calculated based on assumptions in Detailed Project Report dated 12/01/2011 and GERC tariff order 2010
Debt contribution	INR million	2649.82	Based on 70% debt component
Equity contribution	INR million	1135.64	
Tariff for sale of power (1st 12 years)	INR/kWh	15	PPA dated 09/12/2010
Tariff for sale of power (13-25th years)	INR/kWh	5	
O&M expenses	INR million	22.75	8.25 lacs per MWp/Annum as GERC order 2010
Annual escalation in O&M expenses	%	5	
Insurance charges (% of NAV)	%	0.35	GERC order 2010
Working capital for O&M expenses	Month	1	GERC order 2010
Receivables	Month	1	
Tenure of long term loan	Year	7	Assumed
Moratorium period	Year	0.5	
Number of quarterly repayment		26	
Interest on long term loan	%	13.25	Detailed project report dated 12/01/2011
Interest of working capital loan	%	13.25	Detailed project report dated 12/01/2011

<i>Depreciation & Income Tax Rates</i>			
Particulars	Unit	Value	Remarks



			http://law.incometaxindia.gov.in/DIT/File_opener.aspx?page=ITRU&schT=rul&csId=4a23cee1-1818-45d6-ab19-f155e08ed789&rNo=&sch=Appendix%201&title=Taxmann%20-%20Direct%20Tax%20Laws
Plant & Machinery - IT Act (WDV)	%	80	
Plant & Machinery - Company Act (SLM)	%	5.28	http://law.incometaxindia.gov.in/DitTaxmann/IncomeTaxActs/2001ITAct/rules2001/appIA.htm
Civil construction - Company Act (SLM)	%	3.34	
Depreciable base	%	100%	
Corporate Tax	%	33.22	<i>As per applicable tax rates in 2009-10</i>
MAT	%	19.93	

Results of financial analysis:

Financial Indicator	Without CDM revenue
IRR	8.98%

Sensitivity Analysis:

The purpose of sensitivity analysis is to establish that the result of the financial analysis is robust to reasonable variations in the critical assumptions. The “**Guidance on the Assessment of Investment Analysis, Version 05**” provides that

“Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation” and “As a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and 10%”

Accordingly, the project participant has selected the following parameters for sensitivity analysis to check the robustness of the outcome of financial computations:

1. Project cost
2. Plant load factor
3. O&M expense
4. Installed capacity output

The electricity tariff has not been included in the sensitivity analysis as the tariff for the project activity is fixed for the entire 25 year period as per the PPA signed with GUVNL.

The results of the sensitivity analysis are as shown below:

Table: Variation in IRR due to reasonable variation of sensitive parameters

Sensitive parameters	+10%	0	-10%	Benchmark
Project Cost	7.61%	8.98%	10.61%	12.99%
Plant load factor	10.57%		7.33%	
O&M expenses	8.86%		9.11%	
	+5%	0	-5%	



Installed capacity output⁹	9.78%	8.98%	8.17%	
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The sensitivity analysis establishes that for no reasonable variation in the sensitive parameters, the project IRR crosses the benchmark.

The below table present the scenarios (i.e. percentage change of the sensitive parameters) when the project IRR crosses the benchmark and their likelihood of occurrence.

Parameter	% change where IRR crosses benchmark	Likelihood of occurrence
Project Cost	-21.95 %	The actual cost of the project activity is approximately Rs. 3480 million which is around 92% of the project cost considered in the investment analysis. Hence it is not possible for the project cost to decrease by 21.95% in any case.
Plant load factor (PLF)	26.2 %	With an increment of 26.2% the PLF becomes 22.72% whereas the EPC contractor (i.e. Wipro EcoEnergy) proposed a PLF of around 18.26% in the first year and thereafter 10% degradation in the first 10 years and further 10% degradation in the next 15 years. Hence it is highly unlikely that the PLF would increase by 26.2%.
O&M cost	-	Even if the O&M cost is made zero, the project IRR remains below the benchmark.
Installed capacity output	26.5%	As per the manufacturer's specification capacity of module varies $\pm 5\%$. Hence it is highly unlikely that the installed capacity would increase by 26.5%.

Outcome of Step 2:

As demonstrated above in the sensitivity analysis it can be concluded that the proposed CDM project activity is not financially attractive.

Step 3: Barrier analysis

This step has not been selected.

Step 4: Common practice analysis

This step is to complement the credibility of the investment analysis or barrier analysis.

As per paragraph 43 of the "[Tool for the demonstration and assessment of additionality](#)", "*Unless the proposed project type has demonstrated to be first-of-its kind (according to Sub-step 3a), and for measures different from those listed in paragraph 6 the above generic additionality tests shall be complemented with an analysis of the extent to which the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region.*"

Applicable geographical area: The project involves installation of 25 MW solar photovoltaic power plant in the district of Patan in Gujarat and the entire power generated is exported to GUVNL at the tariff fixed by GERC. Since the tariff and other economic parameters vary widely between the different states of India, the applicable geographical area for the project activity is the state of Gujarat.

⁹ The variation is undertaken upto 5% as specified by the manufacturer of the PV modules.



Measure: The project activity involves installation of 25 MW solar photovoltaic power plant. Thus the measure for the project activity is (b) Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies)

.Output: Electricity generation

Since the measure for the project activity falls under the list of measures mentioned in paragraph 6 of the [“Tool for the demonstration and assessment of additionality”, version 06.1.0, the common practice analysis has been conducted as per paragraph 47 of the tool.](#)

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

The output range of the project activity is between 12.5 MW and 37.5 MW i.e. +/-50% of the design output.

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} . Registered CDM project activities and projects activities undergoing validation shall not be included in this step.

There was no commissioned solar power project having capacity between 12.5 MW and 37.5 MW in the state of Gujarat before the start date of the project activity (i.e. 28/02/2011)¹⁰.

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff} .

Considering that there are no operational grid solar PV projects before the project activity start date in the applicable geographical area of the output range considered as per Step 2 and Step 3 above, $N_{all} = N_{diff}$.

Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

Since $N_{all} = N_{diff}$, therefore $N_{all} - N_{diff} = 0$.

As per the [“Tool for the demonstration and assessment of additionality”, version 06.1.0,](#) *The proposed project activity is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:*

- (a) *the factor F is greater than 0.2, and*
- (b) *$N_{all}-N_{diff}$ is greater than 3.*

Since $N_{all} - N_{diff} = 0$, the project activity is not a common practice in the region.

Outcome of Step 4:

As demonstrated above it can be concluded that the proposed project activity is additional.

Prior CDM consideration:

¹⁰ GETCO annual report 2010-11



As per the “Guidelines on the demonstration and assessment of prior consideration of the CDM”, Version 04, EB 62,

“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”

The start date for the project activity is 28th February 2011 (Date of signing of supplies contract with EPC contractor). The project proponent intimated the UNFCCC and NCDMA of their intention to seek CDM status on 04/08/2011, which is within six months of the project start date. This is in line with the guidance quoted above. The important dates are presented here as follows:

Date	CDM related Milestone
28/02/2011	Project start date
04/08/2011	Notification to UNFCCC about the CDM project activity
04/08/2011	Notification to MOEF about the CDM project activity

B.6. Emission reductions

B.6.1. Explanation of methodological choices

>>

According to the applicable methodology ACM0002 Version 13.0.0,

“Baseline emissions include only CO₂ 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:”

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

Where:

BE _y	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)
EF _{grid,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}

For greenfield renewable energy power plants, which is the case for the proposed project activity under consideration, the methodology provides that:

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)
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$EG_{\text{facility},y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)
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The Tool to calculate emission factor of an electricity system, version 02.2.1 provides for the following steps to calculate the parameter $EF_{\text{grid},\text{CM},y}$

Step 1: Identify the relevant system:

The Central Electricity Authority, Ministry of Power, Government of India (Host Country) has given the delineations of the project electricity system and the connected electricity system in India. As per CEA, the Indian power system is divided into two regional grids, viz. NEWNE Grid & Southern Grid¹¹. As the state of Gujarat comes under the NEWNE Grid, the relevant electricity grid for baseline emission calculations would be the NEWNE grid.

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

The calculation of operating margin and build margin emission factor is based on one of the two options:

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

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

Option I (Only grid power plants are included in the calculation) is applicable since as per the CEA database user guide version 7¹² the grid system in India is stable enough and off grid generation is not significant.

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

The calculation of the operating margin emission factor ($EF_{\text{grid},\text{OM},y}$) 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.

Out of the above options, the simple OM method (option a) is used in India. The Dispatch data analysis OM is not used as off-grid generation is not significant in India as per step 2 above and other methods cannot currently be applied in India due to lack of necessary data.

As per emission factor 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.

In India as per available data (most recent five years) with CEA, the low-cost/must-run resources constitute on an average 17.7% of the Northern Grid which is less than 50% of total grid generation.

Share of low cost / must run (% of net generation) ¹³					
Year	2006-07	2007-08	2008-09	2009-10	2010-11
Northern grid	18.5%	19.0%	17.4%	15.9%	17.6%

¹¹ Table 2 of http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver7.pdf

¹² http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver7.pdf

¹³ http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver7.pdf



Average of last five years (Northern grid)	17.7%
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Step 4: Calculate the operating margin emission factor according to the selected method:

Simple Operating Margin:

In the project activity, Simple Operating Margin (OM) has been calculated *ex ante*.

As per the “Tool to calculate the emission factor for an electricity system”: *If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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.*

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 for the last three years. The values of OM have been taken from CEA Database¹⁴ which has been calculated based on “Tool to calculate the emission factor for an electricity system”, version 2.2.1.

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

In terms of vintage of data, project participants have a choice to pick one of the two options provided.

Option 1 has been chosen wherein, for the first crediting period, the build margin emission factor is to be calculated *ex-ante* based on the most recent information available on units already built for sample group mat the time of CDM-PDD submission to the DOE for validation.

The CEA has calculated 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 has been taken from the latest available data in CEA database version 7.

Step 6: Calculate the combined margin emission factor:

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

Where:

EF _{grid,CM,y}	Combined Margin of the NEWNE electricity grid (tCO ₂ /MWh)
EF _{grid,OM,y}	Simple operating margin for NEWNE electricity grid (tCO ₂ /MWh)
w _{OM}	Weighting of operating margin emissions factor (%)
EF _{grid,BM,y}	Build margin for NEWNE electricity grid (tCO ₂ /MWh)
w _{BM}	Weighting of build margin emissions factor (%)

In the project activity baseline emission co-efficient has been determined using option (a) which is use of 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”, version 2.2.1¹⁵. Central Electricity Authority of India (CEA) has already determined the operating margin and build margin for the regional grids (i.e. NEWNE & Southern) in India as per the

¹⁴http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver7.pdf

¹⁵<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf>



procedures prescribed in the “Tool to calculate the emission factor for an electricity system”, version 2.2.1¹⁶. The relevant electricity system for the project activity is NEWNE grid. Hence combined margin for the NEWNE grid has been determined based on the operating margin and build margin values provided by the CEA.

Project Emissions:

Since the project activity is a solar power generation project there are no emissions due to the project activity.

Leakage emissions:

The methodology explicitly states that:

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, for the project activity, no leakage emissions are considered.

Emission reductions:

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y	Emission reductions in year y (t CO ₂ e/yr)
BE_y	Baseline emissions in year y (t CO ₂ /yr)
PE_y	Project emissions in year y (t CO ₂ e/yr)

Since PE_y is zero as explained above, $ER_y = BE_y$

¹⁶<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf>



B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO ₂ /MWh
Description	Simple Operating margin for NEWNE grid
Source of data	Central Electricity Authority: Baseline CO ₂ Emission Database Version 07 http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip
Value(s) applied	0.984 (based on most recent 3 years data i.e 2008~2009, 2009-10, 2010-11)
Choice of data or Measurement methods and procedures	The CO ₂ database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the Central Electricity Authority and hence considered authentic.
Purpose of data	Calculation of baseline emissions
Additional comment	The operating margin is fixed ex-ante

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO ₂ /MWh
Description	Build margin for NEWNE electricity grid
Source of data	Central Electricity Authority: Baseline CO ₂ Emission Database Version 07 http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip
Value(s) applied	0.859 (based on data for the most recent year i.e. 2010~2011)
Choice of data or Measurement methods and procedures	The CO ₂ database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the Central Electricity Authority and hence considered authentic.
Purpose of data	Calculation of baseline emissions
Additional comment	The build margin is fixed <i>ex-ante</i> .

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system in year y
Source of data	Central Electricity Authority: Baseline CO ₂ Emission Database Version 07 http://www.cea.nic.in/reports/planning/cdm_co2/database_7.zip
Value(s) applied	0.953
Choice of data or Measurement methods and procedures	Calculated based on the values of operating margin and build margin and the corresponding weighting
Purpose of data	Calculation of baseline emissions
Additional comment	The combined margin is fixed <i>ex-ante</i> .

B.6.3. Ex ante calculation of emission reductions

>>

Calculation of grid emission factor:

As mentioned in step 4 in section B.6.1 the simple OM has been obtained by calculating 3-year generation-weighted average for the most recent three years data from CEA database.

Simple Operating Margin for NEWNE grid:

Year	Simple Operating Margin (OM) (tCO ₂ /MWh)	Net Generation in Operating Margin including net imports (GWh)	Source of data
2008-09	1.007	421,802.63	CEA data base version 7.0 http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver7.pdf
2009-10	0.978	458,043.08	
2010-11	0.971	476,986.72	
Weighted Average Operating Margin (OM)			
0.984 tCO ₂ /MWh			

Build Margin:

As per the CEA CO₂ database, version 7 the latest available data is for the year 2010-11 is

Build Margin	Values	Source
2010-11	0.859 tCO ₂ e/MWh	CEA CO ₂ Data base, Version 7

As per the methodological tool “Tool to calculate the emission factor for an electricity system”, version 2.2.1

“The following default values should be used for w_{OM} and w_{BM} :

- Wind and solar power generation project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.
- All other projects: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ for the first crediting period, and $w_{OM} = 0.25$ and $w_{BM} = 0.75$ for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.”



$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$			
Abbreviation	Description	Value	Source
$EF_{grid,CM,y}$	Combined Margin of the NEWNE electricity grid in t CO ₂ /MWh	0.953	Estimated as per formula explained in section B.6.1
$EF_{grid,OM,y}$	Simple operating margin for NEWNE grid (simple average of recent 3 years) in t CO ₂ /MWh	0.984	CEA data base version 7.0
w_{OM}	Weighting of operating margin emissions factor	0.75	Default value provided in the ‘Tool to calculate the emission factor for an electricity system’
$EF_{grid,BM,y}$	Build margin for NEWNE grid (last year’s data) in t CO ₂ /MWh	0.859	CEA database version 7.0
w_{BM}	Weighting of build margin emissions factor	0.25	Default value provided in the ‘Tool to calculate the emission factor for an electricity system’

Baseline emission from generation of electricity			
$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$			
Abbreviation	Description	Value	Source
BE _y	Baseline emissions in year y (tCO ₂)	37473	Estimated for the first year as per formula explained in section B.6.1
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)	39321	Estimated based on generation capacity @ 25 MW, annual operation @ 8760 hours, plant load factor @ 18% and auxiliary consumption @0.25%
EF _{grid,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)	0.953	Calculated

Project Emission:

As discussed under section B.6.1 of the PDD, there will be no project emission as a result of the project activity. Accordingly, project emission is taken as 0.

Leakage Emission:



As discussed under section B.6.1 of the PDD, there are no relevant sources of leakage emission.

Emission Reduction:

Parameter	Unit	Description	Value	Justification
$ER_y = BE_y - PE_y - LE_y$				
ER_y	tCO ₂ /y	Emission reduction in year y	37473	Calculated using equation no. 10 under section B.6.1 of the PDD. Rounded off to lower integer value.
BE_y	tCO ₂ /y	Baseline emission in year y	37473	Calculated previously
PE_y	tCO ₂ /y	Project emissions in year y	0	Assumed ex-ante
LE_y	tCO ₂ /y	Leakage emissions in year y	0	Assumed ex-ante

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO ₂ e)	Project emissions (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions (t CO ₂ e)
Year 1	37473	0	0	37473
Year 2	37098	0	0	37098
Year 3	36727	0	0	36727
Year 4	36360	0	0	36360
Year 5	35996	0	0	35996
Year 6	35636	0	0	35636
Year 7	35280	0	0	35280
Total	254570	0	0	254570
Total number of crediting years	7			
Annual average over the crediting period	36367	0	0	36367

**B.7. Monitoring plan****B.7.1. Data and parameters to be monitored***(Copy this table for each piece of data and parameter.)*

Data/Parameter	$EG_{\text{facility},y}$
Unit	MWh/year
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Statement of net export of power to the grid at the plant site
Value(s) applied	39321 (based on installed capacity of 25 MW, annual operating hours @8760, PLF@ 18%% and auxiliary consumption @0.25%)
Measurement methods and procedures	<p>The net energy exported to the grid is measured every month using calibrated energy meter by the State Electricity Board authorities in the presence of the project implementer. The meter/s shall be jointly inspected, and sealed by authorised representatives of the company and the state utility.</p> <p><u>Measuring procedure:</u> Will be measured by an export-import energy meter. The net electricity exported by the project plant would be calculated by deducting the amount of imported electricity from the total amount of exported electricity.</p> <p><u>Accuracy class of energy meter:</u> 0.2S</p> <p><u>Entity responsible:</u> RDPL</p>
Monitoring frequency	<p><u>Recording Frequency:</u> Half hourly</p> <p><u>Reporting Frequency:</u> Monthly</p>
QA/QC procedures	The meters will be calibrated once in every 3 years by an independent testing laboratory. Calibration records will be maintained at the plant. Data would be cross-verified against sold electricity figure in the joint meter reading statement issued by the Gujarat Urja Vikas Nigam Limited (GUVNL). It is to be noted that the meter in question shall be in control and supervision of GUVNL and shall be calibrated only as and when GUVNL so desires. The metering system comprises of main and backup meter. In the event that the main metering system is not in service due to maintenance, repair or testing, the reading shall be obtained from the backup meter.
Purpose of data	To calculate baseline emissions
Additional comment	The data will be archived for crediting period+2 years

B.7.2. Sampling plan

>>

Data and parameters in section B.7.1 is not measured through sampling. Hence, sampling plan is not relevant for the project activity.

B.7.3. Other elements of monitoring plan

>>

The data monitoring will involve the parameters mentioned in the section B.7.1. Due care will be taken for the measurement of all these parameters and maintenance of records. Proper training will be imparted to concerned personnel for accurate measurement and collection of data for each parameter.

1. The CDM monitoring team will composed the following staff:



<u>Position</u>	<u>Report to:</u>
Operators	Technical Engineer
Technical Engineer	Technical Manager
Technical Manager	Project Owner
CDM monitoring project manager	Project Owner

2. The allocation of responsibility to ensure compliance with the monitoring requirement of the methodology is given here below:

#	Tasks description	Operator(s)	Technical Engineer	Technical manager	CDM monitoring project manager
<u>Monitoring activity</u>					
1	Recording of monitored data	✓	✓		
<u>Quality Assurance & Quality Control</u>					
2	Verification of data monitored (consistency and completeness)		✓	✓	
3	Ensuring adequate training of staff			✓	✓
4	Ensuring adequate maintenance		✓	✓	
	Ensuring calibration of monitoring instruments		✓	✓	✓
5	Data archiving: ensuring adequate storage of data monitored (integrity and backup)			✓	✓
6.	Identification of non-conformance and corrective/preventive actions and monitoring plan improvement			✓	✓
7	Emergency procedures		✓	✓	
<u>Calculation of GHG emission reductions and reporting</u>					
9	Processing of data and calculation of emission reductions				✓
10	Monitoring report: management review of monitoring report (internal audit)			✓	✓

Data archiving policy: All monitored data will be archived electronically for a period of two years after the end of the crediting period or the last issuance of CERs, whichever occurs later.

Data Uncertainty: Any loss of data in between due to non availability of metering system would not be considered in the calculation of emission reduction.

**SECTION C. Duration and crediting period****C.1. Duration of project activity****C.1.1. Start date of project activity**

>>

Date of signing of supplies contract: 28/02/2011

C.1.2. Expected operational lifetime of project activity

>>

25 years 0 months¹⁷**C.2. Crediting period of project activity****C.2.1. Type of crediting period**

>>

Renewable

C.2.2. Start date of crediting period

>>

30/12/2012 or the date of registration of the project with UNFCCC

C.2.3. Length of crediting period

7 years 0 months renewable twice

SECTION D. Environmental impacts**D.1. Analysis of environmental impacts**

>>

Solar PV power is a clean source of energy, with no associated emissions and waste products. In India, Environmental Impact Assessment (EIA) of solar PV power project is not an essential regulatory requirement. The Schedule 1 of Environment Impact Assessment (EIA) Notification 1994 and 2006¹⁸, subsequently amended vide notification 3067¹⁹ of MoEF, have covered the sectors which are required to conduct EIA. However, solar PV power projects are not covered under the Schedule 1 of S.O. 1533 amended by notification 3067. Thus, EIA is not required for solar power projects.

D.2. Environmental impact assessment

>>

There is no negative impact of the project activity on the environment.

SECTION E. Local stakeholder consultation**E.1. Solicitation of comments from local stakeholders**

>>

RDPL has organised stakeholder consultation with the objective to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns regarding the project activity.

The project proponent has invited comments and feedbacks of the local stakeholders by posting an advertisement in one local and one national newspaper: Business Standard (English) and Gujarat Today (Gujarati) on 21/06/2012. The stakeholders have been invited to share their feedback in person (in a meeting held at project site at Charanka Village, Santalpur, Patan, Gujarat on 30/06/2012 at 2:30 PM).

¹⁷Obtained from O&M contract signed between RDPL and Wipro EcoEnergy.

¹⁸<http://www.moef.nic.in/legis/eia/so1533.pdf>

¹⁹<http://moef.nic.in/downloads/rules-and-regulations/3067.pdf>



The stakeholders identified for the project activity are as under:

1. Own employees
2. Local Population
3. Equipment suppliers

E.2. Summary of comments received

>>

As discussed above, the project proponent invited stakeholders for a meeting held at project site at Charanka village, Santalpur, Patan, Gujarat on 30/06/2012 at 2:30 PM. The highlights of the meeting are described below:

- The meeting commenced with a welcome address by Mr. Shrikisan Bhutada (Representative of Roha Dyechem Pvt. Ltd.)
- Mr. Neeraj Modi (Representative of Roha Dyechem Pvt. Ltd.) informed about the organization and gave a description about its vision.
- Mr. Neeraj Modi explained the purpose of the project activity and how the proposed project activity involving solar energy can help in the reduction of green house gas emissions from conventional fossil fuel based power generation and turn in reduction of global warming.
- Mr. Viral Dudhrejiya (Representative of Roha Dyechem Pvt. Ltd.) apprised the stakeholders about global warming and its consequences. He explained how global warming is affecting the day to day life of human in form of flood, draught, food security, crop pattern changing and energy security etc. and how developing countries like India is facing these problems and how this can be reduced. In this regard Roha Dyechem Pvt. Ltd. has come forward to sustainable future.
- Participants were invited to express their views towards the end of the meeting. Some participants raised queries towards the project operation and those were answered satisfactorily.
- Mr. Shrikisan Bhutada concluded the meeting and thanked the participants for attending the meeting and for their valuable feedback and support for the project activity.

Questions raised by the stakeholders

Q1: The project will use solar light for energy generation, would there be pollution from the plant?

A1: Mr. Neeraj Modi answered:

For the project, the solar energy is renewable source of energy for pollution free electricity generation. Without the use of solar energy for electricity generation, that equal amount of electricity would have been generated by the fossil fuel based power plants in the regional grid.

Q2: I know for power plants, water is required. Is there water requirement for this project?

A2: Mr. Neeraj Modi answered:

No, water is not required in this technology based power projects. This shows the water saving opportunity for the region, which would be used during electricity generation by conventional power plants.

Q3: I'm not sure whether the project will have noise problem. Would you please have some introduction of the problem?

A3: Mr. Viral Dudhrejiya answered:

There are no such moving parts in this type of technology based power plants, thus there is no noise problem from this power project, at all.

Q4: Will this project fetch the employment opportunities to the local residents?



A4: Mr. Neeraj Modi answered:

Yes, this project would generate employment opportunities in the region. Moreover this may attract more companies, to invest in such kind of clean energy generation projects, in this region along with employment opportunities.

No comments in writing have been received from any stakeholder as on date.

E.3. Report on consideration of comments received

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No negative comments have been received. Therefore no action has been taken.

SECTION F. Approval and authorization

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The letter of approval from India, the only Party involved in the project activity, has been currently applied for. This will be provided to the DOE when available.

**Appendix 1: Contact information of project participants**

Organization name	Roha Dyechem Private Limited
Street/P.O. Box	Road No. 2, Andheri East
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Contact person	
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Last name	Bhutada
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Website	www.firstclimate.com
Contact person	
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Salutation	Mr.
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Middle name	
First name	Subhendu
Department	Carbon Asset Development
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Appendix 2: Affirmation regarding public funding

No public funding is involved in the project activity. The entire project investment has been sourced from equity contribution from project proponent and debt from bank

Appendix 3: Applicability of selected methodology

Please refer to section B.2 of the PDD

Appendix 4: Further background information on ex ante calculation of emission reductions

Please refer to section B.6.3 of the PDD

Appendix 5: Further background information on monitoring plan

Please refer to section B.7 of the PDD

Appendix 6: Summary of post registration changes



History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Registration		