RENEWABLE ENERGY PROJECT BY LNB GROUP

Document Prepared By: EKI Energy Services Limited

Project Title	**Renewable Energy Project by LNB Group**
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Prepared By	**EKI Energy Services Limited**
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed project activity involves the installation of Wind and Solar Power Projects. The total installed capacity of the project is 27.20 MW; which involves operation of 18 Wind Turbine Generators (WTGs) with total capacity of 22.20 MW & 1 Solar power plants with total capacity of 5.00 MW located at different states; Rajasthan and Maharashtra in India. The project is promoted by individual sub project investors, the details of which are as follows:

Wind Project Investor	Capacity (MW)	Technology	Purpose	Regional Grid	State
Manifold Agricrops Pvt. Ltd.	5 x 2.00	Wind	Sale to EB	NEWNE	Rajasthan
Parmarth Wind Energy Pvt. Ltd.	12[1] x 0.85	Wind	Sale to EB	NEWNE	Maharashtra
Sidhidata Power LLP	1 x 2.00	Wind	Sale to EB	NEWNE	Maharashtra
Total Capacity of Wind Projects	22.20 MW				

Solar Project Investor	Capacity (MW)	Technology	Purpose	Regional Grid	State
Sidhidata Solar Urja Ltd.	5.00	Solar	Sale to EB	NEWNE	Rajasthan
Total Capacity of Solar Projects	5.00 MW				

Hence, Total Capacity of Project is 27.20 MW

The purpose of the project activity is to generate energy electricity by the utilization of wind velocity/solar power and further selling the generated energy to the respective Grid. In this process there is no consumption of any fossil fuel and hence it does not lead to any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment. The estimated annual average GHG emission reductions from the project activity will be 47,055 tonnes of CO2 and total GHG emission reductions for the chosen 10 year crediting period will be 470,550 tonnes of CO2.

In the Pre- project scenario the entire 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.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

[1] Purchase order was released for 15 WTGs which was later amended to 12 WTGs

Sectoral Scope : 01 - Energy industries (renewable / non renewable sources)
Project Type : I - Renewable Energy Projects
Methodology:

ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0

http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

PP hereby confirms that the project is not a grouped project and EKI Energy Services Limited is the bundling agency and acting as project participant on behalf of all the individual project investors.

1.3 Project Proponent

Organization name	EKI Energy Services Limited
Contact person	Mr. Manish Dabkara
Title	CEO
Address	325, Block C, Prem Trade Centre, Maharani Road, Indore – 452007, Madhya Pradesh, India
Telephone	+91 731 42 89 086
Email	manish@enkingint.org

1.4 Other Entities Involved in the Project

Organization name	NA
Role in the project	NA
Contact person	NA
Title	NA
Address	NA
Telephone	NA
Email	NA

1.5 Project Start Date

Project Start Date: 31-Mar-2013;
The project start date is the earliest commissioning date amongst all the individual projects which are part of this Large Scale Project.

Wind Project Investor	Capacity (MW)	Machine ID	Location	Commissioning Date
Manifold Agricrops Pvt. Ltd.	2.00	DAN-T-12	Malusar, Dangri Area, Jaisalmer, Rajasthan	31-Mar-13
	2.00	DAN-T-59	Malusar, Dangri Area, Jaisalmer, Rajasthan	31-Mar-13
	2.00	DAN-T-60	Malusar, Dangri Area, Jaisalmer,	31-Mar-13

			Rajasthan	
	2.00	DAN-T-61	Malusar, Dangri Area, Jaisalmer, Rajasthan	31-Mar-13
	2.00	DAN-T-88	Malusar, Dangri Area, Jaisalmer, Rajasthan	31-Mar-13
Parmarth Wind Energy Pvt. Ltd.	0.85	GAL-03	Altur, Shahuwadi, Kolhapur, Maharashtra	29-Mar-14
	0.85	GAL-06	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-07	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-08	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-09	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-10	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-18	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-22	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-23	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-24	Altur, Shahuwadi, Kolhapur, Maharastra	29-Mar-14
	0.85	GAL-26	Karungale, Shahuwadi, Kolhapur, Maharashtra	29-Mar-14
	0.85	GAL-33	Kotoli, Shahuwadi, Kolhapur, Maharashtra	29-Mar-14
Sidhidata Power LLP	2.00	MVT-83	Jath, Jath, Sangli, Maharashtra	31-Mar-14
Total Capacity of Wind Projects	22.20 MW			

Solar Project Investor	Capacity (MW)	Location ID	Location	Commissioning Date
Sidhidata Solar Urja Ltd.	5.00	-	Bhadla, Phalodi, Jodhpur, Rajasthan	11-Aug-14
Total Capacity of Solar Projects	5.00 MW			

1.6 Project Crediting Period

Crediting Period Start date: 31-Mar-2013

- Estimated life time of the project:
  - 20 Years 00 Months - For Wind Projects
  - 25 Years 00 Months - For Solar Projects

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	

As the Estimated GHG emission reductions or removals per year is 47,055 (tCO_2e) which less than 300,000 tonnes of CO_2e per year, thus the project falls in the category of Project.

Year	Estimated GHG emission reductions or removals (tCO_2e)
2013-14	47,055
2014-15	47,055
2015-16	47,055
2016-17	47,055
2017-18	47,055
2018-19	47,055
2019-20	47,055
2020-21	47,055
2021-22	47,055
2022-23	47,055
Total estimated ERs	**470,550**
Total number of crediting years	10 years
Average annual ERs	47,055

1.8 Description of the Project Activity

The proposed project activity involves the installation of Wind and Solar Power Projects. The total installed capacity of the project is 22.20 MW; which involves operation of 18 Wind Turbine Generators (WTGs) with total capacity of 22.20 MW & 1 Solar power plants with total capacity of 5.00 MW located at different states; Rajasthan and Maharashtra in India. The project is promoted by individual sub project investors, the details of which are as follows:

Wind Project Investor	Capacity (MW)	Technology	Purpose	Regional Grid	State
Manifold Agricrops Pvt. Ltd.	5 x 2.00	Wind	Sale to EB	NEWNE	Rajasthan
Parmarth Wind Energy Pvt. Ltd.	12 x 0.85	Wind	Sale to EB	NEWNE	Maharastra
Sidhidata Power LLP	1 x 2.00	Wind	Sale to EB	NEWNE	Maharastra
Total Capacity of Wind Projects	22.20 MW				

Solar Project Investor	Capacity (MW)	Technology	Purpose	Regional Grid	State
Sidhidata Solar Urja Ltd.	5.00	Solar	Sale to EB	NEWNE	Rajasthan
Total Capacity of Solar	5.00 MW				

Projects					

Hence, Total Capacity of Project is 27.20 MW

The purpose of the project activity is to generate energy electricity by the utilization of wind velocity/solar power and further selling the generated energy to the respective Grid. In this process there would be no consumption of any fossil fuel, thereby any greenhouse gas emissions. Thus, electricity would be generated through sustainable means without causing any negative impact on the environment. The estimated annual average GHG emission reductions from the project activity will be 47,055 tonnes of CO2 and total GHG emission reductions for the chosen 10 year crediting period will be 470,550 tonnes of CO2.

In the Pre- project scenario the entire 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.

Wind Power Project Technology Details –

The technology employed, converts wind energy to electrical energy. In wind power generation, energy of wind is converted into mechanical energy and subsequently into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation. There is no transfer of technology involved in the project activity.

The project activity comprises a total of 18 WTG's of Inox Wind Limited & Gamesa India Limited. The commissioning of the project activity has been completed and details are mentioned in section 1.5.

Technical details for WT 2000 DF[2], 2000 KW Machine

Particulars	Details
Model	INOX DF 93.3
Rated power	2000 kW
Cut-in wind speed	3 m/s
Cut-out wind speed	20 m/s
Rated wind speed	≤11.5 m/s
Survival wind speed	52.5 m/s
Hub height	80 m
Rotor Speed	15.9 rpm
Diameter	93.3 m
Swept area	6,795 m2
Design Lifetime	20 years

Technical details for Gamesa G-58[3], 850 KW Machine

[2] http://www.inoxwind.com/products/

Particulars	Details
Model	Gamesa G58 850kW
Rated power	850kW
Cut-in wind speed	3 m/s
Cut-out wind speed	23 m/s
Rated wind speed	From 14.6 rpm to 30,8 rpm
Diameter	58 m
Swept area	2642 m2
Design Lifetime	20 years

Solar Power Project Technology Details –

The technology being employed, converts solar energy into electrical energy. The technology is an environment friendly technology since there are no GHG emissions associated with the electricity generation.

The proposed PV project will use crystalline silicon based solar PV modules. Since the project activity is a Greenfield installation there was no electricity generation at the project site prior to its implementation. The whole installation will have a 25 years design life. Technical specifications of typical modules will be as follows:

Technical specifications of typical modules will be as follows:

1. Solar Panels: IBC PolySol 245 (Ecoline)

No. Of Panels installed of each type = 245 Wp - 22440 nos.

Kindly refer below weblink for technical specification of the module

http://karl-meyer-energie.de/files/2013/06/Datenblatt-Solarmodule-poly-IBC-PolySol-240-DS.pdf

2. Inverters: M/s Sungrow Power Supply Co. Ltd.

No. of Inverter Installed = 156 Nos.

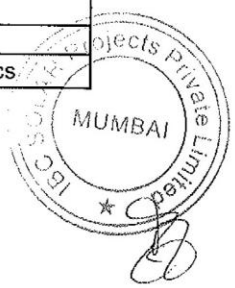
Kindly refer below weblink for technical specification of the inverters

http://www.sungrowpower.com/sungrow-english/product.php?page=2&cate=12&product=103&menu=1

Further details of equipment installed is provided below:

[3] http://www.vgenergy.co.uk/files/9913/6119/7835/Gamesa_Brochure.pdf

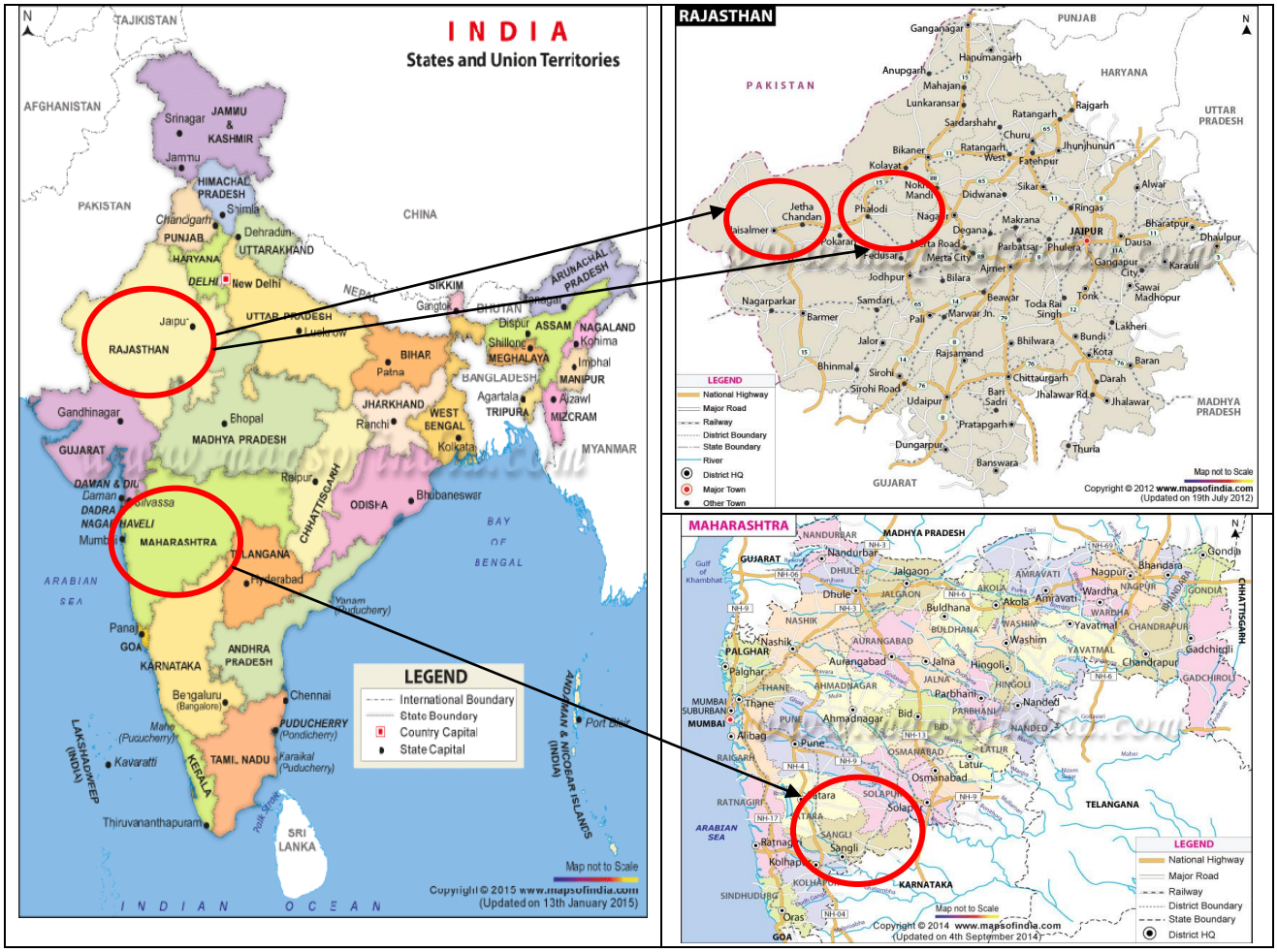
Pos.	Description – List of Equipment IMPORTED for Transportation	Quantity	Unit
	SOLAR GENERATOR AND DC-SYSTEM		
1	IBC PolySol 245 (Ecoline)	22440	Pcs
2	IBC PolySol 245 (Ecoline)	20	Pcs
3	IBC FlexiSun 1x4mm² PV1-F	139500	M
4	MC-plug KST 4/6II	1970	Pcs
5	MC-socket PV-KBT 4/6II	1970	Pcs
	INVERTERS AND AC-SYSTEM		
6	Sungrow SG 30KTL	156	Pcs
7	Sealing Cap PV-SVK4	650	Pcs
8	Sealing Cap PV-BVK4	650	Pcs
	Note: Evacuation to be provided by customer!		
	POTENTIAL EQUALIZATION AND LIGHTNING PROTECTION		
9	Passive lightning protection system	1	Pcs
	COMMUNICATION AND MONITORING		
10	Patch cable UV-resistant, 2m	156	Pcs
11	CAT 7 Outdoor cable 4x2x0,56(AWG23)	3500	M
12	Featured communication cabinet	1	Pcs
13	SolControl Pro DSL / Ethernet	7	Pcs
14	Sungrow driver for SolControl	7	Pcs
15	Meteo compact weather station	1	Pcs
16	Irradiation sensor 10V	2	Pcs
17	Module temperature sensor	3	Pcs
18	Pyranometer CMP11,10m wire	3	Pcs
19	Amplifier f. Pyranometer CMP11	3	Pcs
20	Service setup fee from 1MWp	1	Pcs
21	IBC SolPortal, from 1500KWp	5497.8	KWp
	Note: DSL telephone line to be provided by customer!		
	OTHERS		
22	International Transport fees	1	Pcs



The project shall result in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 47,055 tCO2e per year, thereon displacing 48,164 MWh/year amount of electricity from the gird.

1.9 Project Location

Investor	Capacity (MW)	Machine ID	Location	Latitude			Longitude		
				Deg	Min	Sec	Deg	Min	Sec
Manifold Agricrops Pvt. Ltd.	2.00	DAN-T-12	Malusar, Dangri Area, Jaisalmer, Rajasthan	26	33	38.2	71	21	1.5
	2.00	DAN-T-59		26	31	23.4	71	25	55.0
	2.00	DAN-T-60		26	31	6.8	71	25	58.3
	2.00	DAN-T-61		26	31	36.2	71	25	44.3
	2.00	DAN-T-88		26	31	17.6	71	27	0.6
Parmarth Wind Energy Pvt. Ltd.	0.85	GAL-03	Bhendawade, Shahuwadi, Kolhapur, Maharashtra	17	0	13	73	55	16
	0.85	GAL-06	Altur, Shahuwadi, Kolhapur, Maharashtra	16	59	59	73	55	15
	0.85	GAL-07		16	59	51	73	55	19
	0.85	GAL-08		16	59	45	73	55	18
	0.85	GAL-09		16	59	56	73	54	59
	0.85	GAL-10		16	59	50	73	54	59
	0.85	GAL-18		17	0	12	73	55	36
	0.85	GAL-22		17	0	7	73	55	38
	0.85	GAL-23		17	0	2	73	55	45
	0.85	GAL-24		16	58	53	73	54	52
	0.85	GAL-26	Karungale, Shahuwadi, Kolhapur, Maharashtra	16	58	48	73	54	49
	0.85	GAL-33	Kotoli, Shahuwadi, Kolhapur, Maharashtra	16	58	24	73	55	55
Sidhidata Power LLP	2.00	MVT-83	Jath, Jath, Sangli, Maharashtra	17	04	8.1	75	15	17.3
Sidhidata Solar Urja Ltd.	5.00	-	Bhadla, Phalodi, Jodhpur, Rajasthan	27	30	0	71	54	0



1.10 Conditions Prior to Project Initiation

The pre project scenario is same as baseline scenario. Please refer section 2.4 for the description of baseline scenario.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project has received necessary approvals for development and commissioning for each Wind Project & Solar Project from the state Nodal agencies and is in compliance to the local laws and regulations.

1.12 Ownership and Other Programs

1.12.1 Right of Use

The Project is owned by individual project proponents and EKI Energy Services Limited is the bundling agency. The individual PPs are the sole owner of project activity, however they have authorised EKI Energy Services Limited to act as the project participant on their behalf. Further the Ownership is demonstrated through the following documents.

1) Commissioning certificates for the Wind & Solar projectin the name of individual PP

2) Power Purchase Agreement with respective State Electricity Board for sale of electricity by the individual PPs

1.12.2 Emissions Trading Programs and Other Binding Limits

Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits.

1.12.3 Other Forms of Environmental Credit

The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

1.12.4 Participation under Other GHG Programs

The Project has not participated in any other GHG programs.

1.12.5 Projects Rejected by Other GHG Programs

The Project is not rejected by other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

This is not a grouped project activity. The project activity is bundle of 4 project participants.

Leakage Management

Not applicable to the project activity.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description

Further Information

Sustainable development indicators

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment and Forests (MoEF), has mentioned four indicators for the sustainable development in the interim approval guidelines for

Clean Development Mechanism (CDM) projects from India[4].Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Economic well being:

- The project activity generates employment in the local areas.
- The project activity leads to investment to a developing regions which otherwise would not have happened in the absence of project activity. The generated electricity will be fed into grid, thereby improving the grid frequency and availability of electricity which will provide new opportunities for industries and economic activities for greater local employment and development. The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.
- Use of renewable energy source (wind energy/solar power) also helps in conservation of natural resources (like coal) in the country & thus less GHG's emissions in the atmosphere
- The project contributes to the economic sustainability around the plant sites, which is promotion of decentralization of economic power

Social well being:

- The plant sites are isolated rural areas which are the victims of unemployment, poverty and other social backwardness. The project would lead to the development of these regions.
- The proposed project would enhance availability of power to the local industries, agriculture and commercial activities in the vicinity of the project area by augmenting power supply to the Southern and NEWNE grid, thereby improving quality of power supplied to various users by stabilizing the grid.
- During civil works, a lot of construction work took place, which generated employment for local people around the plant site.
- Other than these, there are various kinds of mechanical work, which would generate employment opportunity on regular and permanent basis
- Frequency of visits by skilled, technical personnel and industrialists will increase due to installation / site visit / operation and maintenance work related to WTGs and solar projects. This directly and indirectly positively effects the social behaviour & economy of villages and nearby area.

Environmental well being:

- The Wind/Solar power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions.

[4] http://www.cdmindia.gov.in/approval_process.php

- There is no impact on land, water, air and soil due to the installation of WTGs/solar projects. Thus the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.

Technological well being:

- The project activity is step forward in harnessing the untapped wind/solar potential and further diffusion of the technology in the region.

- The project activity leads to the promotion of WTGs and demonstrates the success of wind turbines in the region which further motivate more investors to invest in wind power projects. Similarly the project helps in promoting more and more solar power projects. Hence, the project activity leads to technological well-being.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

Methodology:
ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0, Sectoral Scope: 01, EB 81, Annex 9
https://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

The project activity also takes reference from following Tools from the tools prescribed by applied methodology:
1. Tool for the demonstration and assessment of additionality --- Version 07.0.0, EB 70, Annex 8
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

2. Tool to calculate the emission factor for an electricity system --- Version 04.0, EB 75, Annex 15
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

2.2 Applicability of Methodology

The following steps will show the applicability of the project under this methodology.

Applicability Criterion (with Para number reference)	Project Case
1. This methodology is applicable to grid-connected renewable energy power generation project activities that: a. Install a Greenfield power plant;	The project activity is installation of a new grid connected wind/solar power plant[5] at a site where no renewable power plant was operated prior to the implementation of the project activity

[5] The same can be referred to from the commissioning certificates

b. Involve a capacity addition to (an) existing plant(s); c. Involve a retrofit of (an) existing operating plants/units; d. Involve a rehabilitation of (an) existing plant(s)/unit(s);or e. Involve a replacement of (an) existing plant(s)/unit(s).	(Greenfield plant) and hence this criterion is applicable.
2. The methodology is applicable under the following conditions: a. The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; b. In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	a. The proposed project activity is an installation of a new grid connected wind power plant[6] and solar project. Hence this condition is met. b. The project does not involve any capacity additions, retrofits or replacements and therefore this condition is not applicable[6].
3. In case of hydro power plants, one of the following conditions shall apply: a. The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or b. The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m2; or c. The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2; or d. The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3),is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total	The project activity is a grid connected wind/solar power project[6] and not a hydro power plant. Therefore, these criteria are not relevant for the project activity.

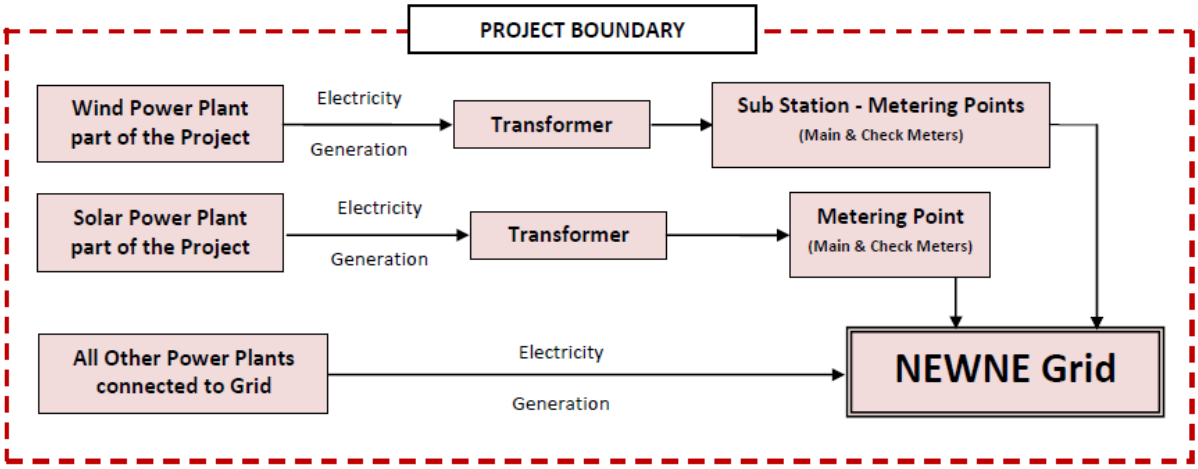
[6] The same can be referred to from the commissioning certificates

installed capacity of the integrated project, as per equation (4),is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
4. In the case of integrated hydro power projects, project proponent shall: • Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or • Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project activity is a grid connected wind/solar power project[6] and not a hydro power plant. Therefore, these criteria are not relevant for the project activity.
5. The methodology is not applicable to: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants/units.	• The project activity is installation of a new grid connected wind/solar power project[6] and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the project activity. • This is a wind/solar power plant[6] and not a biomass fired plant and hence this criterion is not applicable to the project activity.
6. In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the	The project activity is a new grid connected wind/solar power plant[6] and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.

implementation of the project activity and undertaking business as usual maintenance".	
7. In addition, the applicability conditions included in the tools referred to below apply.	The project applies the following tools and is in compliance to the same; • "Tool to calculate the emission factor for an electricity system"; • "Tool for the demonstration and assessment of additionality";

2.3 Project Boundary

As per ACM0002 version 16, the project boundary includes wind/solar PV power generation system and all other power plants connected physically to the local grid to which the proposed project supplies renewable electricity to avoid GHG emissions. The proposed project is located in NEWNE grids of the Indian Electricity system. The following diagram explains the project boundary for the proposed project activity.



Source		GHGs	Included?	Justification/Explanation
Baseline Scenario	Grid-connected electricity generation	CO_2	Yes	Major emission sources.
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
Project Scenario	Greenfield Wind / Solar energy conversion system	CO_2	No	The project activity does not emit any emissions.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.

2.4 Baseline Scenario

Since, the project activity is a Greenfield power plant and meets all the applicability criteria for the ACM0002 Version 16,

As per para 23 of ACM0002 version 16.0; If the project activity is the installation of a Greenfield power plant

"the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

2.5 Additionality

In line with VCS Standard version 3.4, the additionality of the Project activity is ascertained in line with the applicable guidance from the UNFCCC. The demonstration of additionality for the proposed Project activity is being carried out in accordance with the additionality tool provided by the UNFCCC i.e. "Tool for demonstration and assessment of Additionality" Version 07.0.0,. The tool provides a step-wise approach to demonstrate additionality which is displayed below:

The project involves setting up wind power project of 22.2 MW and solar power project of 5.00 MW.

With reference to Para 29 of ACM0002 Version 16.0

The solar project is *solar photovoltaic grid connected electricity generation project* which fall in the positive list of technologies. Hence, *simplified procedure to demonstrate additionality is applicable*

Further, with reference to Para 30 of ACM0002 Version 16.0

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

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

Total installed capacity of the specific technology (Solar) = 3002.66[7] MW

Total installed grid connected power generation capacity in the host country (India) = 258701.45[8] MW

Percentage share = 1.16%

This percentage share is less than 2% of the total installed grid connected power generation capacity in the host country

Hence, *as per condition (a) of para 30* the solar project is automatically additional and does not require demonstration of barriers.

Thus, the below additionality explanation is provided considering the wind power project only.

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

Sub-step 1a: Define alternatives to the project activity:
Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed VCS project activity.

Alternative 1: The proposed project activity not undertaken as a VCS project activity.
The PP could proceed with the implementation of the project without Carbon credit benefits. The electricity produced from the renewable energy project would have been sold to the grid. This is in compliance with all applicable legal and regulatory requirements and can be a part of the baseline. However, the Project activity is not feasible without revenues from sale of Carbon Credits. This argument has been discussed in step 2 of the Additionality section.

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

[7] http://mnre.gov.in/file-manager/UserFiles/State-wise-Installed-Capacity-of-Solar-PV-Projects-under-various-Scheme.pdf

[8] http://www.cea.nic.in/reports/monthly/inst_capacity/jan15.pdf

The PP would have continued without investment in Project activity with usual business activities. The grid would continue with the fossil fuel based power projects and this would result in GHG emissions. Hence, the new capacity add-on from a fossil fuel based power plant is appropriate, realistic & credible baseline alternative for the project activity.

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

Sub-step 1b: Consistency with mandatory laws and regulations:
The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.).

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

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

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

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

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

Step 2: Investment analysis

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

Sub-step 2a: Determine appropriate analysis method
The Project activity envisages to export the power to NEWNE grid and the revenues from the sale would be generated in accordance with the terms and tariffs established in the Power Purchase Agreement (PPA). Thus, simple cost analysis cannot be used as the analysis method as the sale

of the units of generated electricity shall result in a revenue stream during the operations of the Project activity.

After eliminating Option I, the use of Benchmark analysis (Option III) is the method of analysis that has been selected as the most suitable method. This method determines the attractiveness of the project activity for the investors, as well as provides a measure of the viability of the investment to generate revenues during its operation, as compared with other avenues and investment options. Hence, the Benchmark analysis method is to be employed for analysis of the said project.

Sub-step 2b (Option III): Apply benchmark analysis
The investment analysis using Benchmark analysis approach (Option III) has been chosen. Further, this method illustrates the evaluation of the Project by the PP before the decision to undertake the project was taken and management approval granted.

Choice of Financial Indicator:

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

Determine appropriate analysis method

As per Tool for demonstration and assessment of Additionality; Sub-step 2a, Paragraph (1), as the project activity is selling the generated electricity & getting financial benefits other than CDM benefits hence, Option- I (Apply simple cost analysis) is not applicable under this situation. Also as per EB-62, Annex 05, clause no.19 "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate". Hence Option-II (Apply investment comparison analysis) is also not applicable under this situation. So the project promoter has chosen Option- III or benchmark analysis as an appropriate analysis method to demonstrate the investment barrier.

Choice of Benchmark:
As per para 15 of Guidelines on the assessment of the investment analysis (Annex 05, EB 62), the value for cost of equity is selected from Appendix A of Annex 05 of EB 62. The default value of Return on Equity for Group-1 projects in India is 11.75%.

As per paragraph 7 of Appendix A of the above mentioned document, "*In situations where an investment analysis is carried out in nominal terms, project participants can convert the real term values provided in the table below to nominal values by adding the inflation rate. The inflation rate shall be obtained from the* ***inflation forecast of the central bank of the host country for the duration of the crediting period****. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used".*

Default Value Benchmark Calculations:
As mentioned in Appendix A in EB62 Annex 5 and latest Clarification from UNFCCC in EB 73 (Applicability of the "Guidelines on the assessment of investment analysis" version 01.0), default value benchmark is presented below:

Appendix A in EB62 Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 11.75%

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

Nominal Benchmark[9] = {(1+Real Benchmark)*(1+Inflation rate)} - 1

Where:
- Default value for Real Benchmark = 11.75% (as per Appendix of Annex 5, EB 62)

- Inflation Rate forecast by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India

Default Value Benchmark:

Inflation Forecast as per RBI:

Wind Project Investor	Capacity (MW)	WPI-Mean Inflation forecast by RBI		Default value using Inflation Forecast		Default Value Benchmark (Lowest value)
		5 Yrs.	10 Yrs.	For 5 Yrs.	For 10 Yrs.	
Manifold Agricrops Pvt. Ltd.	5 x 2.00	6.50%	5.90%	19.01%	18.34%	18.34%
Parmarth Wind Energy Pvt. Ltd.	12 x 0.85	5.90%	5.60%	18.434%	18.01%	18.01%
Sidhidata Power LLP	1 x 2.00	6.00%	5.60%	18.46%	18.01%	18.01%

Key Assumptions supporting financial projections:

Input values are based on publicly available data sources which can be clearly validated by the DOE, thus it complies with guidance 13 of EB 62, Annex 5.

Kindly refer respective financial sheets for key assumptions supporting financial projections.

The result of the analysis is as follows:

Wind Project Investor	Capacity (MW)	Equity IRR without CDM	Default Value Benchmark
Manifold Agricrops Pvt. Ltd.	5 x 2.00	12.88%	18.34%
Parmarth Wind Energy Pvt. Ltd.	12 x 0.85	12.54%	18.01%
Sidhidata Power LLP	1 x 2.00	14.70%	18.01%

[9] As per Pg. 320 of Corporate Finance, Second Edition of Aswath Damodaran

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

Sub-step 2c: Sensitivity Analysis:

As per Guidance 20 and 21 of Annex 5 of EB 62 Annex 5, 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 the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. Guidance also states, "All parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude". The Annex also states, as a general point of departure, variations in the sensitivity analysis should at least cover a range of +10% and –10%, unless this is not deemed appropriate in the context of the specific project circumstances.

Since the project cost is already firmed up, the cost is not variable. The tariff is determined by PPA which is fixed for years mentioned as per the tariff order and hence it need not be subjected to variation. All other expenses are much less than 20% of the total cost. Hence, only PLF needs to be subjected to reasonable variation. Nevertheless, following factors have been subjected to sensitivity analysis:

(a) PLF
(b) O&M Cost
(c) Project Cost
(d) Tariff Rate

The results of sensitivity analysis are as follows:

Manifold Agricrops Pvt. Ltd.

Variation %	-10%	Normal	10%	Variation required to reach benchmark
PLF	10.06%	12.88%	15.82%	18.61%
O&M Cost	13.13%	12.88%	12.66%	-278.00%
Project Cost	15.90%	12.88%	10.57%	-16.63%
Tariff Rate	10.06%	12.88%	15.82%	18.61%

Parmarth Wind Energy Pvt. Ltd.

Variation %	-10%	Normal	10%	Variation required to reach benchmark
PLF	9.77%	12.54%	16.00%	15.70%
O&M Cost	12.87%	12.54%	12.30%	-181.50%
Project Cost	16.04%	12.54%	10.34%	-14.64%

Tariff Rate	9.95%	12.54%	15.76%	16.79%

Sidhidata Power LLP

Variation %	-10%	Normal	10%	Variation required to reach benchmark
PLF	12.50%	14.70%	16.81%	15.83%
O&M Cost	14.85%	14.70%	14.54%	-236.50%
Project Cost	16.92%	14.70%	12.85%	-14.25%
Tariff Rate	12.65%	14.70%	16.69%	16.73%

The break-even point (scenario when the Equity IRR crosses the benchmark) has also been calculated for all the above parameters. Since a significant increase/decrease (at least 15%) in the respective parameters demonstrated above is required for Equity IRR to cross the benchmark, the likelihood of occurrence of such a scenario is very low.

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

Step 3: Barrier analysis

Barrier analysis has not been used.

Step 4: Common practice Analysis

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

Common practice analysis has been carried out as per "Guidelines on Common Practice, version 02.0 EB69, Annex 8". In the context of the project activity, the following parameters are defined as per **Part I. Definitions** of the Guidelines on Common Practice:

1. Applicable Geographical Area (Para 1): India has been considered as the applicable geographical area for this project.

2. Measure (Para 2): The project activity reduces greenhouse gas emissions by generating electricity using renewable energy source-wind. Therefore, the project activity falls under the following measure:
   (b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies

.

3. Output (Para 3): The project activity produces electricity. Therefore, electricity is considered as output of the project activity.

4. Different Technologies (Para 4): The project activity uses wind energy for producing electricity and hence as per Para 4(a), the technologies which use energy source/ fuel other than wind will be considered as the different technologies for the project activity.

The common practice analysis is carried out step by step as per Part II. Stepwise approach for common practice as follows:

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

Range	Capacity	Unit
+50%	33.3	MW
Capacity of the proposed project activity	22.2	MW
-50%	11.1	MW

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

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

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

a. Project is located in various states of India. Therefore, country has been chosen for analysis.
b. The project activity is a green-field wind power project and uses measure (b) *"Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies"*.
   Therefore, all projects applying same measure (b) as the proposed project activity are candidates for similar projects.
c. The energy source used by the project activity is wind. Hence, only wind energy projects have been considered for analysis.
d. The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.
e. The capacity range of the projects is within the applicable capacity range from 33.3 MW to 11.1 MW.
f. The start date of the project activity is 31/03/2013. As Kyoto Protocol was ratified by India on 26/08/2002[10], therefore projects, which had started commercial operation between 26/08/2002 to 31/03/2013, have been identified.

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

Numbers of Similar projects (CDM and non-CDM) indentified, which fulfil above-mentioned conditioned are:

Particulars	No. of Projects	Source
N_{Wind}	181	Directory - Indian Wind Power published by CECL, Bhopal

Sources: Directory - Indian Wind Power published by CECL, Bhopal and refer CPA sheet

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

All the projects identified in step-2 are either registered or project activities submitted for registration, or project activities undergoing validation.

Thus N_{all} = 32

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

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

The policies/tariff for each state is regulated by the State Electricity Regulatory Commission of the respective states. The project activity is located in the state of Maharashtra & Rajasthan of India and the policy applicable for the wind projects is regulated by Maharashtra Electricity Regulatory Commission & Rajasthan Electricity Regulatory Commission respectively. Therefore, it can be assumed that the policies and tariff are different in different states and hence projects installed in other states have been considered in Ndiff. The identified projects in Nall (step 3) located in states other than Maharashtra & Rajasthan are regulated by the respective State Electricity Regulatory Commissions (SERCs). Therefore, these projects come under different investment climate and have been considered under Ndiff.

As N_{all} = 32; thus N_{diff} = 27

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

Calculate $F=1-N_{diff}/N_{all} = 0.156$

As N_{all} =32 thus and $N_{all}-N_{diff}$ = 5;

Outcome of Step 5:

As,

i. F = 0.156 which is less than 0.2;

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

2.6 Methodology Deviations

There is no methodology deviation

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

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* (t CO_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" (t CO_2/MWh)

I. Calculation of $EG_{PJ,y}$

If the project activity is the installation of a Greenfield power plant, 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)

Project Investors	Capacity (MW)	PLF	Net Generation (MWh/year)
Manifold Agricrops Pvt. Ltd.	10.00	20.00%	17,520
Parmarth Wind Energy Pvt. Ltd.	10.20	20.15%	18,004
Sidhidata Power LLP	2.00	21.50%	3,767
Sidhidata Solar Urja Ltd.	5.00	20.26%	8,873
Total	**27.20**		**48,164**

Therefore, $EG_{PJ,y}$ **= 48,164 MWh**

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

The methodology ACM0002 (Version 16.0) requires that the combined margin for the grid be calculated in accordance with the procedure provided in the *"Tool to calculate the emission factor for an electricity system".*
As per "Tool to calculate the emission factor for an electricity system, Version 4.0.0";
The baseline emission factor ($EF_{grid,y}$) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors.

The methodology provides following approaches for emission factor calculations:

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

OR

(b) *The weighted average emissions (in t CO_2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.*

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

CO_2 Baseline Database for the Indian Power Sector, Version 10, December 2014[11], published by Central Electricity Authority (CEA), Government of India has been used for the calculation of emission reduction.

As per the "Tool to calculate the emission factor for an electricity system" Version 04.0, EB 75, Annex 15, the following steps have been followed.

STEP 1: Identify the relevant electricity systems;
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional);
STEP 3: Select a method to determine the operating margin (OM);
STEP 4: Calculate the operating margin emission factor according to the selected method;
STEP 5: Calculate the build margin (BM) emission factor;
STEP 6: Calculate the combined margin (CM) emission factor.

STEP 1: Identify the relevant electricity power systems

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

However since 2007-08 as the four regional grids except the Southern grid has been synchronized, they are now being considered as one and named as NEWNE grid. Since the project supplies electricity to the NEWNE and Southern grids, emissions generated due to the electricity generated by both the grids as per CM calculations will serve as the baseline for this project.

Table: Grid Classification

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

[11] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Uttar Pradesh				
Uttarakhand				

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

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

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

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

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

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

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

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

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

	2009-10	2010-11	2011-12	2012-13	2013-14
NEWNE	15.9%	17.6%	19.0%	17.2%	18.0%
South	20.6%	20.9%	21.5%	15.8%	21.0%
India	17.1%	18.4%	19.6%	16.9%	18.6%

Data Source: Central Electricity Authority (CEA) database Version 10, Dec'2014

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

The "Simple operating margin" has been calculated as per the weighted average emissions (in tCO_2/MWh) of all generating sources serving the system, excluding hydro, geo-thermal, wind, low-cost biomass, nuclear and solar generation;

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

- **Ex ante option:** If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. **Or**

- **Ex post option:** If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

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

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

STEP 4: Calculate the operating margin emission factor ($EF_{grid,OM,y}$) according to the selected method

The operating margin emission factor has been calculated using a 3 year data vintage:

Net Generation in Operating Margin (MWh) (incl. Imports)			
	2011-12	**2012-13**	**2013-14**
NEWNE	508,004,381	546,941,372	569,215,756

Simple Operating Margin (tCO_2/MWh) (incl. Imports)			
	2011-12	**2012-13**	**2013-14**
NEWNE	0.9699	0.9919	0.9953

Weighted Generation Operating Margin	
NEWNE	**0.9862**

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

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

Build Margin (tCO_2/MWh) (not adjusted for imports)	
	2013-14
NEWNE	**0.9495**

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

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

Combined Margin – The combined margin is the weighted average of the simple operating Margin and the build margin. In particular, for intermittent and non-dispatchable generation types such as wind and solar photovoltaic, the Tool to calculate the emission factor for an electricity system, Version 04.0.0, EB 75, Annex 15, allows to weigh the operating margin and Build margin at 75% and 25%, respectively**.**

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

Calculation of Baseline Emission Factor ($EF_{grid,y}$)

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

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

Where,

w_{OM}	75% weight of operating margin emissions factor (%)
w_{BM}	25% weight of operating margin emissions factor (%)
$EF_{grid,OM,y}$	Build margin CO_2 emission factor of a particular grid in year y; calculated as described in Steps 3&4 above (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor of a particular grid in year y; calculated as described in Steps 5 above (tCO_2/MWh)

Baseline Emission factor (NEWNE Grid)

$EF_{NEWNE,CM,y}$ = 0.75*0.9862 + 0.25*0.9495

= 0.9770 tCO_2/MW

Therefore, Baseline Emissions:

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

BE_y**= 48,164 x 0.9770 = 47,055 tCO_2**

3.2 Project Emissions

The project emission calculation as per para 35 of ACM0002 version 16,

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

Where:

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

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year *y* (t CO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (t CO_2e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year *y* (t CO_2e/yr)

$PE_{FF,y} = 0$

As per para 37 of ACM0002 version 16,

"For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected"

$PE_{GP,y} = 0$

Not applicable for the wind power projects

$PE_{HP,y} = 0$

Not applicable for the wind power projects

Therefore, PE_y=0

3.3 Leakage

As per para 60 of ACM0002 version 16, No leakage emissions need to considered for the project activity.

3.4 Net GHG Emission Reductions and Removals

As per para 61 of ACM0002 version16; 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)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$$ER_y = BE_y - PE_y$$

ER_y **= 47,055 – 0 = 47,055 tCO_2**

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2013-14	47,055	0	0	47,055
2014-15	47,055	0	0	47,055
2015-16	47,055	0	0	47,055
2016-17	47,055	0	0	47,055
2017-18	47,055	0	0	47,055
2018-19	47,055	0	0	47,055
2019-20	47,055	0	0	47,055
2020-21	47,055	0	0	47,055
2021-22	47,055	0	0	47,055
2022-23	47,055	0	0	47,055
Total	**470,550**	**0**	**0**	**470,550**

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2/MWh
Description	Operating Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014[12]
Value applied:	0.9862 (NEWNE Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 04.0.0" as 3-year generation weighted average using data for the years 2011-2012, 2012-2013 & 2013-2014. The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

[12] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014
Value applied:	0.9495 (NEWNE Grid)
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system, version 04.0.0" for the year 2013-2014. The data is obtained from "CO_2 Baseline Database for Indian Power Sector" version 10.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combines Margin CO_2 emission factor in year y
Source of data	Calculated from CEA database, Version 10, December 2014[13]
Value applied:	0.9770 (NEWNE Grid)
Justification of choice of data or description of measurement methods and procedures applied	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$ Where: $EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh) $EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

[13] http://www.cea.nic.in/reports/planning/cdm_co2/user_guide_ver10.pdf

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project (Wind or Solar) plant/unit to the grid in year y
Source of data	Monthly electricity share certificates/note or Credit Note or Joint Meter Reading Report
Description of measurement methods and procedures to be applied	The value of net electricity generation supplied to the grid as per Monthly electricity share certificates/note or Credit Note or Joint Meter Reading Report forms the basis for calculation of the emission reductions; which can be cross checked from the invoice raised to DISCOM. Net electricity supplied to grid will be calculated as the difference of the measured values of "export" and "import" of electricity through the dedicated SEB energy meter (electronic trivector bidirectional main meter & check meter which measures both export & import concurrently) installed at the delivery point (i.e. the connected substation). Net electricity generated and supplied by the project (Wind or Solar) plant/unit to the grid = Electricity Export to the grid - Electricity Import from the grid Monthly meter readings are taken from the main and check meter installed at the substation and certified by the representatives of SEB Officials and the representatives of the project proponent. for apportioning procedure refer section 4.3
Frequency of monitoring/recording	Continuous monitoring, hourly measurement and at least monthly recording
Value applied:	48,164 MWh
Monitoring equipment	Monitoring: Tri vector meter will be used Data type: Measured Type of meter: Static type meter (Main & Check). Both are Bidirectional meters. Class of meter: 0.2s
QA/QC procedures to be applied	• The energy meter reading are taken on monthly basis • Energy meters will be calibrated once in a three year and faulty meters will be duly replaced immediately. • All the energy meters are under the control of state utility and calibration/testing of energy meters is also under the jurisdiction of state utility. • The Net electricity exported to the grid will be cross checked against the invoice raised by the PP towards the DISCOM

Purpose of data	Calculation of Baseline emissions
Calculation method	-
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.

4.3 Monitoring Plan

The monitoring methodology specified in the methodology requires that the project-monitoring plan to consist of monitoring of quantity of net electricity supplied to the grid in the year y. In order to monitor the mitigation of GHG due to the project activity, the total energy exported needs to be measured. The net energy supplied to grid by the project activity multiplied by emission factor for regional grid, would form the baseline for the project activity.

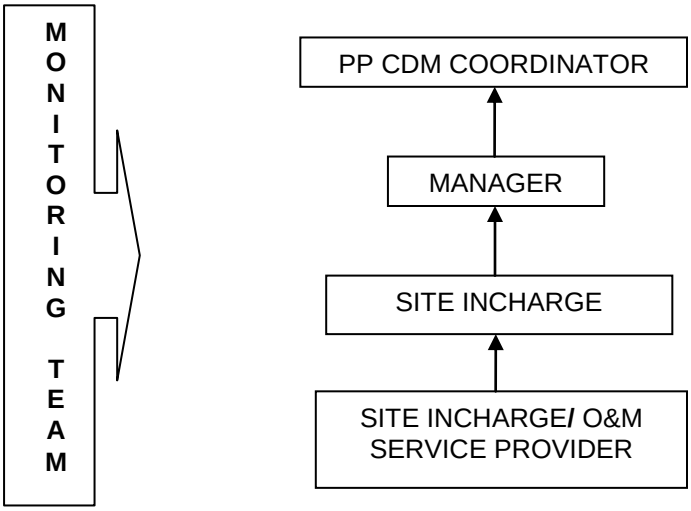
Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required. The sole parameter for monitoring is the net electricity exported to the grid.

Aim of monitoring:
The monitoring procedure will set guidelines for the project investor to monitor the parameters regularly and to ensure quality and accuracy in monitoring. It elaborates on the functions of the monitoring team and procedures to be followed in monitoring of the CDM parameters.

The monitoring shall include all the equipments that contribute towards reduction in GHG emissions. Since the project activity focuses mainly on the generation of renewable power, it is important to monitor all the equipments involved in the metering of all the necessary instruments.

The project investor has a well defined management structure for monitoring the project activity.

Organizational Structure for monitoring



Organizational Structure for monitoring (Common for all states):

Designation	Responsibilities
PP CDM COORDINATOR	Overall project monitoring including collecting and aggregating JMRs/Invoices for all WTG/solar investors
MANAGER	Holds complete control over monitoring aspects pertaining to the project
SITE INCHARGE	• Recording • Verification • Storage of Data
SITE INCHARGE/ O&M SERVICE PROVIDER	• Operation and Maintenance • Storage of data • Data Recording

Personnel Training (Common for All states):
The project personnel, including those involved in data recording, maintenance and direct data assessments will be provided with training on the application and usage of the manual.

Training and maintenance requirements (Common for All states):

O&M operator would provide training to the on-site staffs on operation and maintenance of the metering system and adherence to the Monitoring Plan of the project activity. Training for operation of both Wind and Solar projects shall be provided by the respective O&M Operators.

For WTGs, Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the WTGs, it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure that technology providers' service staff is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established.

Reading and Correction of Meters:

For the purpose of energy accounting, O&M operator will provide ABT compliant meters at the interface points. Interface metering will confirm to the Central Electricity Authority (Installation and Operation Meters) Regulation, 2006. In the event that the main meter is not in service as a result of maintenance, repairs or testing, then the check meter will be used during the period the main meter is not in service.

Calibration of Meters:

Calibration of all the meters will be undertaken at least once in 3 years and faulty meters will be duly replaced immediately. Calibration will be done by an authorized agency or reputed laboratory.

Apportioning Procedure for (Solar) Power Project connected to NEWNE grid

As individual main & check meter are installed for each Solar Plant, hence no apportioning is required for Solar Projects.

Apportioning Procedure for (Wind) Power Project connected to NEWNE grid

The net electricity supplied to the grid would be reported as the difference between the net export and import from the WTG. The electricity export and import data will be monitored via main and check meters connected to feeders at the respective sub-station.

In case of NEWNE grid, multiple WTGs would be connected to the feeder, one of which would be part of the project activity and rest of which would not be part of the project activity (WTGs owned by other entities). The import and export of electricity is continuously monitored by the export/ import meter and the data is recorded on a monthly basis jointly by the proponent and the electricity board. The meter is located at the delivery point of wind power in the grid. This accounts for the import of electricity that is used by the Project proponent. Hence the net electricity generated is calculated from the joint meter reading and recorded /archived in paper/electronic.
SEB/O&M Contractor follows an apportioning procedure to account for electricity generation from individual WTGs based on data from individual WTG controllers.
Following the joint meter readings, apportioning of net electricity supplied to grid by each WTG is done by the SEB/O&M Contractor based on the individual meter readings recorded from the controller panel meter of each WTG and based on the meter reading recorded from the meters situated at the connected substations.
In case of Maharashtra only, based on the monthly export and import data as per main/check meters and the WTG controller readings, SEB provides a break-up of the electricity exported and imported for each WTG.

Rajasthan

A monthly joint meter reading of the energy meters is taken by State Electricity Board officials and O&M contractors (representatives of the project investor). Apportioning of net electricity generation from each WTG connected to NEWNE grid is then determined as follows:

1.	Apportioning Ratio	=	$\frac{\text{Generation at WTG Controller}}{\text{Total Generation of All WTG Controller for the feeder}}$
2.	Electricity Export to the grid by WTG (EGexport)	=	Export from Main/Check Meter * Apportioning Ratio
3.	Electricity Import from the grid by WTG (EGimport)	=	Import from Main/Check Meter * Apportioning Ratio
4.	Net electricity generated by WTG	=	Electricity Export to the grid by WTG – Electricity Import from the grid by WTG

Above steps for calculation of EG_{export} and EG_{import} are carried out by O&M Contractor & energy break-up sheet is issued by the O&M Contractor which is certified by the representatives of SEB Officials. Based on the break-up sheets Project investor raises invoice to DISCOM which forms the cross-check for the net electricity generated. The Project investor has no role in the entire procedure of apportioning

Maharashtra

A monthly joint meter reading of the energy meters is taken by MSEDCL officials and O&M contractors (representatives of the project investor). Apportioning of net electricity generation from each WTG connected to NEWNE grid is then determined as follows:

1.	Apportioning Ratio	=	$\frac{\text{Generation at WTG Controller}}{\text{Total Generation of All WTG Controller for the feeder}}$
2.	Electricity Import from WTG by the grid (EG_{import})	=	Import from Main/Check Meter * Apportioning Ratio
3.	Electricity Export to the WTGs by the grid (EG_{export})	=	Export from Main/Check Meter * Apportioning Ratio
4.	Net electricity generated by WTG	=	Electricity Import from WTG by the grid – Electricity Export to the WTGs by the grid

Above steps for calculation of EG_{import} and EG_{export} are carried out by MSEDCL Officials & energy break-up sheet is issued by the MSEDCL Officials. Based on the break-up sheets Project investor raises invoice to DISCOM which forms the cross-check for the net electricity generated. The Project investor has no role in the entire procedure of apportioning

Emergency Preparedness and Uncertainty Procedure:

In case Main meter or check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it will be repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the check meter will be used. In case both the main and check meter are found to be outside the acceptable limits of accuracy or faulty or not functioning properly, both the meters shall be calibrated immediately and the error percentage found in the main mater during its calibration shall be applied to its metered energy data for the entire period since its last calibration to obtain the corrected value of net electricity exported to the grid.

Data Recording and Archiving:

O&M operator will keep complete and accurate records of operating log at the Power Plant. The data will be archived electronically as well as in log books at the power plant and will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

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

- Apportioning the net electricity exported to grid, as recorded in the consolidated Share Certificate / JMR Report / Credit Notes certified by the respective state discom, based on the number of days in the monitoring period and the number of days for which Share Certificate / JMR Report / Credit Notes was prepared.

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

5 ENVIRONMENTAL IMPACT

As per the Schedule 1 of the EIA notification dated 1/12/2009[14] and latest notification dated 24/12/2013[15], given by the Ministry of Environment and Forests under the Environment (Protection) Act 1986, the proposed Project activity does not fall under the list of activities requiring EIA as the environmental impacts for such project are not considered as significant by the host Party or PP.

6 STAKEHOLDER COMMENTS

PP decided the date and venue for local stakeholder consultation and informed local stakeholder regarding the meeting. The followings are the local stakeholders for the project activity:

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

All the stakeholders have been invited through submission of the invitation letter and Public Notice to attend the stakeholders meeting.

In the introductory speech, the representatives of EKI Energy Services Ltd. welcomed the gathering and informed the stakeholders about the project activity; project's associated benefits with respect to CO2 emission reductions and explained the purpose of conducting the stakeholder meeting in order to gather the views and comments of the local stakeholders on the project activity. Subsequent to the introductory speech, comments were received from the stakeholders.

Project Promoters' Name	**Invitation Date**	**Meeting Date**	**Location of the LSM**
Manifold Agricrops Pvt. Ltd.	11-Feb-2015	25-Feb-2015	Jaisalmer, Rajasthan
Parmarth Wind Energy Pvt. Ltd.	11-Feb-2015	28-Feb-2015	Kolhapur, Maharastra
Sidhidata Power LLP	11-Feb-2015	27-Feb-2015	Sangli. Maharastra
Sidhidata Solar Urja Ltd.	11-Feb-2015	26-Feb-2015	Bhadhla, Bap, Jodhpur, Rajasthan

No negative feedback was received from any of the stakeholders. All of them supported the initiative and appreciated the project proponent for carrying out such an activity in the region. Hence no comments warranting action from the project proponent were received.

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

[15] http://envfor.nic.in/sites/default/files/ia-24122013.pdf

APPENDIX X: CO_2 DATABASE OF CEA

From CO2 database of CEA, Version 10 published by Government of India, Ministry of Power Central Electricity Authority, Government of India

CENTRAL ELECTRICITY AUTHORITY: CO_2 BASELINE DATABASE	
VERSION	10
DATE	6-Dec-14
BASELINE METHODOLOGY	ACM0002 / Ver 16.0 and "Tool to Calculate the Emission Factor for an Electricity System", Version 4.0

Net Generation in Operating Margin (MWh) (incl. Imports)			
	2011-12	**2012-13**	**2013-14**
NEWNE	508,004,381	546,941,372	569,215,756

Simple Operating Margin (tCO_2/MWh) (incl. Imports) (1) (2)			
	2011-12	**2012-13**	**2013-14**
NEWNE	0.9699	0.9919	0.9953

Weighted Generation Operating Margin	
NEWNE	0.9862

Build Margin (tCO_2/MWh) (not adjusted for imports)			
	2011-12	**2012-13**	**2013-14**
NEWNE	0.9331	0.9813	0.9495

Combined Margin Emission Factor	
NEWNE	**0.9770**