Voluntary Carbon Standard
Project Description Template

19 November 2007

[Date of the VCS PD: 4th Aug 2008

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1 Description of Project:

1.1 Project title

Title : Aryan Coal 15 MW wind project in Maharashtra, India
Version: 01

1.2 Type/Category of the project

- According to the categorization of Appendix B to the simplified modalities and procedures for small scale Clean Development Mechanism (CDM) project activities[1] the project activity under consideration fits into the type and category as mentioned below:

  - Type: *Type I – Renewable Energy Projects*
  - Category: *I.D. 'Grid Connected Renewable Energy Generation'*

  For further details regarding the applicability criteria pertaining to the above-mentioned type and category in the context of the project activity, please refer to section 2.2 of the VCS PD.

- The project is not a grouped project as defined in the Clause 5.6 of Voluntary Carbon Standard 2007.1

  PDD also refers to:-

  Tool to calculate the emission factor for an electricity system (Version 01.1, EB 35)

1.3 Estimated amount of emission reductions over the crediting period including project size:

- The total capacity of power generation of the bundled project activity under consideration is 15MW and the average annual emission reductions from the bundle are to the tune of 23,816 tones CO_2 equivalent, as calculated in Section 4.4. As per "Voluntary Carbon Standard 2007.1" by the VCS Association, the projects are categorized as below:

  - *Micro project*: Less than 5,000 tonnes CO_2 equivalent emissions reductions per year
  - *Projects*: 5,000 – 1,000,000 tCO2-e per year; and
  - *Mega Project*: More than 1,000,000 tonnes CO_2 equivalent emissions reductions per year

  Since the annual GHG reduction potential for the bundled project activity is between 5,000 – 1,000,000 tCO2e per year, it falls under "**Project"** category.

1.4 A brief description of the project:

Aryan Coal Benefications Pvt. Ltd (ACBPL) – part of Aryan group, is incorporated under the Companies Act, 1956 on 14th March 1997, primarily engaged in coal beneficiations. To fulfill their commitment towards sustainable development and a cleaner environment ACBPL has invested in renewable energy based power generation by establishing a wind farm of 15MW installed capacity at Village Ghatnandra in Sangli District of Maharashtra. The project

[1] Refer to: http://cdm.unfccc.int/methodologies/SSCmethodologies

activity under consideration entails generation of clean power by harnessing wind energy – a non-conventional renewable energy resource and export of the electricity generated to the Maharashtra State Electricity Distribution Company Limited (MSEDCL) on the basis of Power Purchase Agreements. The electricity exported from the project to the grid thereby replaces an equivalent amount of power generation at the grid connected power plants which are primarily fossil fuel based. Therefore the project activity results in an equivalent amount of CO_2 emission reduction which otherwise would have resulted equivalent to the carbon intensity (Grid Emission Factor in tCO2e/MWh) of the NEWNE Grid.

The project activity involves commissioning and operation of Suzlon make 12 Wind Electric Generators (WEGs) of 1.25 MW capacities with a total installed capacity of 15 MW. The wind turbines were commissioned during 29/09/2005 and 30/09/2005. The details of the WTGs have been tabulated as below:

Sr. No.	Make of WTG	WTG No.	Capacity (MW)	Date of Commissioning
1.	Suzlon	G 13	1.25	30/09/2005
2.	Suzlon	G 14	1.25	30/09/2005
3.	Suzlon	G 15	1.25	30/09/2005
4.	Suzlon	G 17	1.25	30/09/2005
5.	Suzlon	G 18	1.25	30/09/2005
6.	Suzlon	G 19	1.25	30/09/2005
7.	Suzlon	G 21	1.25	30/09/2005
8.	Suzlon	G 22	1.25	30/09/2005
9.	Suzlon	G 27	1.25	29/09/2005
10.	Suzlon	G 28	1.25	29/09/2005
11.	Suzlon	G 29	1.25	29/09/2005
12.	Suzlon	G 30	1.25	29/09/2005

1.5 Project location including geographic and physical information allowing the unique identification and delineation of the specific extent of the project:

All the 12 WTGs were installed at Village Ghatnandare, Taluka Kavathe Mahankal, District Sangli in the state of Maharashtra and are connected to the Kundlapur Substation. The nearest railway station is located at Satara city and airport at Pune. Latitude and longitude for the area and WT`G wise location details are as follows:

Sr. No.	WTG No.	Capacity (MW)	Survey No.	Village	District	State	Site Coordinates
1	G 13	1.25	1018	Ghatnandare	Sangli	Maharastra	$17^0$10’ 10.4”N 74^0 54’ 23.8”E
2	G 14	1.25	1018/P	Ghatnandare	Sangli	Maharastra	$17^0$10’ 21.5”N 74^0 54’ 22.1”E
3	G 15	1.25	1017	Ghatnandare	Sangli	Maharastra	$17^0$10’ 34.5”N 74^0 54’ 12.7”E
4	G 17	1.25	1028	Ghatnandare	Sangli	Maharastra	$17^0$10’ 11.8”N 74^0 54’ 04.7”E
5	G 18	1.25	1035	Ghatnandare	Sangli	Maharastra	$17^0$10’ 21.8”N 74^0 54’ 59”E
6	G 19	1.25	1053	Ghatnandare	Sangli	Maharastra	$17^0$10’ 33.3”N 74^0 54’ 56.1”E
7	G 21	1.25	1010	Ghatnandare	Sangli	Maharastra	$17^0$10’ 0.1”N 74^0 54’ 49.4”E
8	G 22	1.25	1054	Ghatnandare	Sangli	Maharastra	$17^0$10’ 11.4”N 74^0 54’ 44.2”E

9	G 27	1.25	1045	Ghatnandare	Sangli	Maharastra	$17^0$10’ 22.8”N 74^0 54’ 24.3”E
10	G 28	1.25	998	Ghatnandare	Sangli	Maharastra	$17^0$10’ 34.1”N 74^0 54’ 15.0”E
11	G 29	1.25	971	Ghatnandare	Sangli	Maharastra	$17^0$10’ 46.1”N 74^0 54’ 09.6”E
12	G 30	1.25	927	Ghatnandare	Sangli	Maharastra	$17^0$10’ 57.6”N 74^0 54’ 07.3”E

Maps depicting the districts and states in which the Wind Projects are located are placed below.

1.6 Duration of the project activity/crediting period:

Project start date: (Commissioning Date)

For the project activity, the project start date is the earliest date of the commissioning of any wind mill. As mentioned under section 1.4, the earliest commissioning date for the WTG is 29/09/2005.

Therefore the start date for the project activity is 29/09/2005

Crediting period start date:

The Crediting Period start date can be considered as either the start date of project activity or 28/03/2006, whichever is later. Accordingly, the Crediting Period start date for the project

activity is 28/03/2006 and the length of first crediting period would be maximum of 10 years i.e up to 28/03/2016. The yearly estimation of emission reduction during the crediting period is depicted below:

Years	Estimation of annual emission reductions in tonnes of CO2 e
Year 2007	23,816
Year 2008	23,816
Year 2009	23,816
Year 2010	23,816
Year 2011	23,816
Year 2012	23,816
Year 2013	23,816
Year 2014	23,816
Year 2015	23,816
Year 2016	23,816
Total estimated reductions **(tones of CO_2 e)**	**2,38,160**
Total number of crediting years	**10**
Annual average of the estimated reductions over the crediting period (tCO2 e)	23,816

It may kindly be noted that all the WTGs mentioned above owned by ACBPL have applied for registration under CDM, as detailed in section 1.13. In case the WTGs are registered under CDM, the project proponent shall claim retroactive VCUs for these WTGs from the start date of crediting period till the date of CDM registration of these WTGs. At any point of time during the first crediting period, the project proponent will abide by the "Further Guidance for Projects that are Registered in Two GHG Programs" dated 19 March, 2008 issued by VCS Association and will claim credits from one GHG program to avoid double counting.

1.7 Conditions prior to project initiation:

Indian economy is highly dependent on "Coal" as fuel to generate electricity and for production processes. Thermal power plants are the major consumers of coal in India yet the basis electricity needs of a larger section of population are not being met.

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for selling it to the MSEDCL for meeting the energy shortages in the state and to contribute to climate change mitigation efforts.

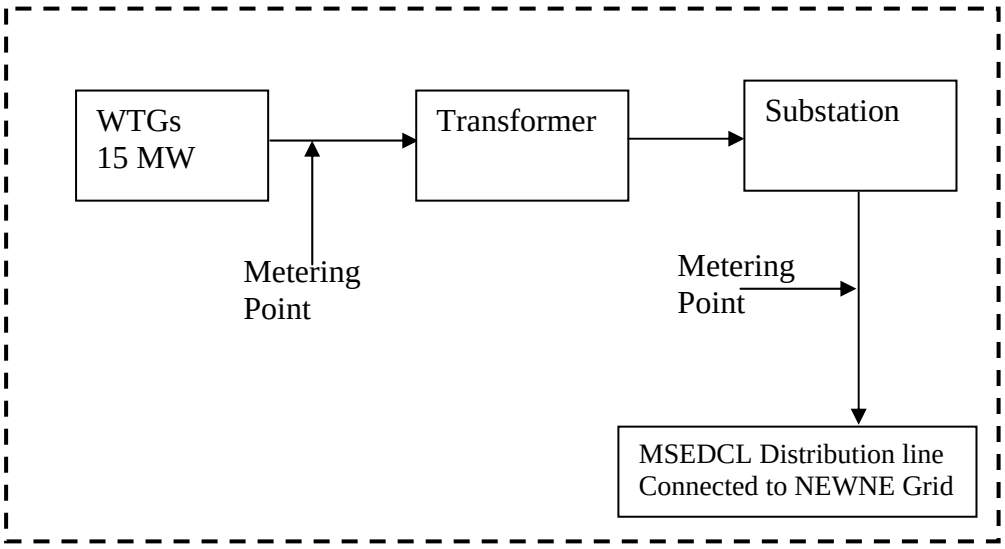
In the absence of the project activity, an equivalent quantum of electricity would have been generated by the fossil-fuel dominated Integrated North East West North-East (NEWNE)

Regional Electricity Grid of India[2] generation mix. The same would have resulted in GHG emissions at the grid end as per the carbon intensity of the NEWNE grid. This scenario has been identified as the baseline scenario for the project activity under consideration (*please refer to section 2.4 of the VCS PD for further details*).

1.8 A description of how the project will achieve GHG emission reductions and/or removal enhancements:

For the project activity, the project boundary encompassing the physical, geographical site of the renewable generation source is depicted as below.

The project activity under consideration entails the installation of wind-farms for the purpose of harnessing the wind energy, a renewable source of energy and will generate approximately 26.28 million kWh/year. The electricity generated from the project activity is exported to the Maharashtra State Electricity Distribution Company, which is the part of the Integrated NEWNE Regional Grid of India resulting in the reduction of anthropogenic Greenhouse Gas emission. In the absence of the project activity, an equivalent quantum of electricity would have been generated by the fossil-fuel dominated NEWNE Regional Electricity Grid of India as per the grid electricity generation mix. The same would in turn result in GHG emissions at the grid end as per the carbon intensity of the NEWNE Grid.



As per the combined margin carbon intensity of the 0.906 tCO2/MWh for the NEWNE Grid, project activity results in GHG emission reduction to the tune of 23,816 tonnes of CO_2 equivalent per annum at the grid end. For detailed calculation procedure and sample calculation tables of the GHG emission reduction quantum from the project activity, please refer to Sections 4.2, 4.3 and 4.4 of the VCS PD

1.9 Project technologies, products, services and the expected level of activity:

The project installs 12 Suzlon make S-70 WEGs of individual capacity 1.25 MW. In wind energy generation, kinetic energy of wind blowing at high speeds is converted into

[2] The Indian power grid system (or the National Grid) is divided into two regional grids namely NEWNE Regional Grid and Southern Region Grid. These regional grids have independent state Load Dispatch Centres (LDCs) that manage flow of power in their jurisdiction. Power generated by state owned generation units and private owned generation units is consumed by the respective states. Power generated by central sector plants is shared by all states forming part of the grid in a fixed proportion.

mechanical energy while passing through the wind-turbine. The rotation of the turbine blades results in the rotation of the generator mounted on the same shaft, thus generating electricity. As there are no GHG emissions associated with wind electricity generation, the technology is widely recognized as clean technology. The important components of a windmill are as follows:

- Main Tower
- Blades
- Nacelle
- Hub
- Main Shaft
- Gear Box, Bearing and Housing
- Brake
- Generator

Furthermore the technical specifications of the Suzlon S-70 WTGs employed by the project activity are presented below:

Technical details of Suzlon S70 1.25MW (WTG)

Item	**Description**
Make	SUZLON
Model No.	S 70
Rating in Kw	1250
Rotor Diameter (m)	70
Highest hub height	75
Type of tower (Tubular/lattice)	Tubular
Number of blades	3
Power Regulation (pitch/stall)	Pitch
Type of generator (synchronous/asynchronous)	Asynchronous
Single speed /Dual speed/variable (generator)	Dual
AC/DC/AC System (Yes/No)	No
Rated voltage (V)	690V(50M HZ), 600V(60 hz)
Geared/Gearless	Geared
Cut-in wind speed (m/s)	3m/s
Cut -out wind speed (m/s)	20 m/s
Rated wind speed (m/s)	12m/s
Survival Wind speed (m/s)	67m/s
Auxiliary Consumption (KWh)	Approx 1% of generation
Reactive energy requirement	Approx 10% of active energy
Scheduled Month/year of Commissioning	September 2005
Wind power density	289 watt/m sq. (at 30m)

The expected level of performance of the project activity is provided below:

Sl. No.	**Company**	**Installed Capacity (MW)**	**Electricity Generation per annum (MWh)**	**GHG Abatement per annum (ton CO2e)**
1	Aryan Coal Beneficiation Ltd.	15	26,280 MWh/ annum	23,186 tCO_2e/annum

1.10 Compliance with relevant local laws and regulations related to the project:

The project activity under consideration complies with the applicable regional and national level legal and regulatory requirements for installation and operation of wind-farms. The same is listed as follows:

Sl. No	Compliance/Law	Status
1	Clearance from the Maharashtra Energy Development Agency (MEDA).	Obtained
2	No objection Certificate from the Maharashtra State Electricity Grid (Commissioning certificate)	Obtained
3	Environmental Impact Assessment	Not Applicable
4	Power purchase agreement with Maharashtra State Electricity Distribution Company Limited (MSEDCL)	In Place

The documents related to relevant statutory clearances for each component of the bundled project activity would be made available during Project Validation.

1.11 Identification of risks that may substantially affect the project's GHG emission reductions or removal enhancements:

The amount of GHG emission reductions that the project activity would result in directly depends on the quantity of electricity generated by the wind-mills. The various factors that might contribute to a substantial variation in the GHG emission reduction quantum from the project as compared to that predicted in the VCS PD are summarised below:

- Substantial variation in the wind availability/ plant load factor as compared to the values predicted on the basis of the generation that has been estimated/guaranteed by the equipment supplier in the Purchase Order for the WTG.
- Plant stoppages and loss of generation due to
    - Equipment or component failure associated with the WTGs
    - Evacuation problems associated with the local grid failures
    - Physical damages to equipment and erected structures caused by natural calamities or other factors not under the control of the project promoters.

The factors mentioned above pose risks to the project performance and hence the GHG abatement quantum of the project.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

The project activity involves power generation by installation of WTGs in the state of Maharashtra, India. The process of wind power generation does not involve fossil fuel combustion or any other direct or indirect emission of GHGs. As mentioned above, there are no GHG emissions attributable to the project activity and thus removal or destruction of the same is not possible. This confirms that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

The Project proponent had opted for Clean Development Mechanism (CDM) under GHG abatement program by Kyoto Protocol. Below is the status for the project:

Project Promoting Company	WTG Location No	Other GHG Program(s)	Web Link
Aryan Coal Beneficiation Ltd.	G 13, G 14, G 15, G 17, G 18, G 19, G 21, G 22, G 27, G 28, G 29, G 30	CDM	Not web hosted till date

In order to avoid double counting, the project proponent shall be clamming for retroactive VCUs only from the start date of crediting period till the date of registration of the project activity under UNFCCC Registry. At any point of time during the first crediting period, the project proponent will abide by the **"Further Guidance for Projects that are Registered in Two GHG Programs"** dated 19 March, 2008 issued by VCS Association and will claim credits from one GHG program to avoid double counting. The project proponent has also provided a written us8ndertaking in this regard for avoidance of double counting.

1.14 Project rejected under other GHG programs (if applicable):

Not Applicable

1.15 Project proponents roles and responsibilities, including contact information of the project proponent, other project participants:

Aryan Coal Benefications Pvt. Ltd (ACBPL) is the sole project proponent and project participant in the project activity. The contact information on the same is given below:

Organization:	Aryan Coal Benefications Pvt. Ltd
Roles & Responsibilities:	Project Developer
Street/P.O.Box:	Rao Tula Ram Marg, 18, Vasant Enclave
Building:	
City:	New Delhi-110057
State/Region:	Delhi
Country:	India
Telephone:	+91-11-46013427
Fax:	+91-11-26151327
E-Mail:	aryancoalhq@vsnl.net
URL:	www.aryancoal.com
Represented by:	
Title:	Vice President
Salutation:	Mr.
Last Name:	Khanna
Middle Name:	
First Name:	Ramesh
Mobile:	
Direct Fax:	+91- 124- 2719185
Direct tel:	+91-124-2719020
Personal E-Mail:	rameshkhanna@aryancoal.com

1.16 Any information relevant for the eligibility of the project and quantification of emission reductions or removal enhancements, including legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and temporal information.):

Purpose:

The purpose of the wind-mills set up by the project activity is as follows:

- Generating clean power by utilising the renewable natural resource *i.e.,* wind power and exporting the electricity generated to the grid. Hence the project activity does not cause emissions of greenhouse gases (GHGs) that would have otherwise been caused by power generation by the combustion of non-renewable sources of energy.
- Harnessing the wind power potential existing in India for power generation that has not been exploited to its full potential till date
- Contribution to the industrial development of India by providing support in terms of enhanced power availability
- Increasing the share of renewable energy directly in the regional electricity grid and indirectly in the national electricity grid
- Contribution to the causes of fossil-fuel conservation and climate change mitigation
- Generating power using renewable resources will contribute to saving in national revenue by avoiding import of fossil fuels and result in energy security.

Contribution of the Project Activity to Sustainable Development:

The contribution of the project activity to the sustainable development of the host country India is evident from the following:

Social Well Being	• No human displacement due to the project activity and hence no requirement of relocation • The local population has been employed during the installation, commissioning and operation of the wind mills, thus proper training imparted to the people involved results in the skill development of the local inhabitants and also improvement in their economic condition. • Improvement in the infrastructure in the nearby areas such as development of road network, transportation facilities and other amenities
Economic Well being	• The project activity is responsible for creating business opportunities for many local stakeholders • It will help in abridging the demand-supply gap in electricity in the regional grid and the national grid • It will lead to conservation of fossil-fuels and makes these non-renewable sources of energy available for other important purposes. • It indirectly contributes towards industrial development of the region by creating a support in terms of supplying power for industries to come up in due course of time
Technological Well being	• The project activity will promote clean power generation technology. The project contributes towards the stability of grid power that is a major cause of concern in remote locations • It also helps in reducing the losses due to power transmission and distribution from the existing generating stations of the grid to remote areas
Environmental Well being	• The project activity will reduce GHG emissions and contributing to the overall cause of mitigation of global warming • The project activity by setting up wind-farms for power generation does not cause environmental disturbance or ecological imbalance to the surroundings • The project activity does also contribute to the reduction in the levels of SOx, NOx, and SPM associated with combustion of fossil fuels for generation of thermal power

1.17 List of commercially sensitive information (if applicable):

Not Applicable

2 VCS Methodology:

2.1 Title and reference of the VCS methodology applied to the project activity and explanation of methodology choices:

The following CDM approved methodology is used for the project:

Project Type	**:**	**I – Renewable** Energy Projects
Project Category	**:**	**D –** Grid connected renewable electricity Generation (Version 14: EB 48)

Reference: Appendix B of the simplified modalities and procedures for small-scale CDM project activities i.e. 'indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories' Version- 10

Following CDM tools have also been referred to:-

- *Tool to calculate the emission factor for an electricity system (Version 01.1, EB 35)*
- *Additionality tool for small scale project activities (Attachment A to Appendix B, Version 06: 30 September 2005)*

2.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The applicability criteria of the methodology AMS-I.D. and their relevance with respect to the project activity under consideration are addressed as follows:

1. "This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit."

The project activity involves the setting up of wind farms, *i.e.*, renewable generating units of cumulative generation capacity 15 MW to harness a renewable source of energy (wind power potential) and export the generated electricity to the fossil fuel dominated electricity generation and distribution system, i.e. the NEWNE Regional Electricity Grid of India[3]. In the process, an equivalent quantum of electricity that would have been generated by the grid in line with the grid electricity generation mix is displaced by the project activity. The carbon intensity of the fossil-fuel dominated generation mix of the grid is evident from the following break-up of various types of energy sources constituting the grid-mix contributing electricity to the NEWNE Grid system, as shown in Table below Mar 05.

Sl. No	Source of electricity generation	Percentage Share
1	Thermal	68.32 %
4	Hydro	26.12 %

[3] The NEWNE Regional Electricity Grid of India is primarily constituted of fossil- fuel fired thermal power plants. Refer to CO_2 Baseline Database Version 4.0 Dated October 2008 available at http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

5	Nuclear	2.34%
6	Renewable energy sources (Wind, solar, biomass etc)	3.22 %

(Source :http://www.cea.nic.in/ceaarchive/body/Reports/Executive%20Summary/2006/2006_06/8.pdf

Hence the project activity complies with this criterion.

2. "If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW".

The project activity involves only wind power generation. The gross wind power generation capacity of the project activity is 15 MW which is meets the eligibility limit of small-scale CDM project activity, as stipulated in the applicability criterion under consideration.
Hence the project activity complies with this criterion.

3. "Combined heat and power (co-generation) systems are not eligible under this category"

The project activity involves generation of electricity only through WTGs and is not a co-generation system. Hence the project activity complies with this criterion.

4. "In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units."

The project activity does not involve the addition of renewable energy generation units at an existing renewable power generation facility. Hence the project activity complies with this criterion.

5. "Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW"

The renewable energy generating wind-farms employed by the project activity are newly constructed set up and do not involve retrofitting or modification of any existing facility for renewable energy generation. Hence the project activity complies with this criterion.

Thus, the project activity fulfills all the applicability criteria of the simplified small scale methodology AMS-I.D./ Version 14.

2.3 Identifying GHG sources, sinks and reservoirs for the baseline scenario and for the project:

Emissions sources included in or excluded from the project boundary:

	Source	Gas	Included	Justification / Explanation
Baseline	Fossil fuel fired power plants in Western Region of	CO_2	Yes	Main Emission Source
		CH_4	No	Excluded for simplification. This is conservative.

	Integrated NEWNE Grid of India.	N_2O	No	Excluded for simplification. This is conservative.
Project Activity	Not Applicable	CO_2	No	Excluded. The project activity is a zero-emission project activity.
		CH_4	No	
		N_2O	No	

2.4 Description of how the baseline scenario is identified and description of the identified baseline scenario:

The project promoters identified the following alternatives to the project activity under consideration:

Alternative 1 – Continuation of existing scenario: electricity generation by the grid as per the mix of power generating sources

In absence of the project activity under consideration, an equivalent amount of electricity would have been generated by the NEWNE Regional Electricity Grid of India as per the mix of power generating sources. The NEWNE Regional Electricity Grid will undergo a few capacity additions in due course of time to abridge the demand-supply gap in the long run. The most plausible choice in such a situation based on the existing grid-mix is the setting up of fossil-fuel fired thermal power plants, resulting in GHG emissions as per the carbon intensity of the above-mentioned grid. As mentioned in section 2.2 of the VCS PD, presently, the power generation at NEWNE Regional Grid is dominated by Thermal power plants (about 68.32%) where as the power generation through renewable energy sources is only 3.22 % . A list of future capacity additions based on the energy demand has been planned by Central Electricity Authority (CEA) and these plans are revised from time to time based on demand projections. Detailed projections are available for the eleventh plan period, i.e. 2007 till 2011 in the report of working group on power (11^{th} plan). Even in the future plans, more focus is on thermal power plants, as evident from table below:

Capacity Addition Target during 11th Plan

	HYDRO	**THERMAL**	**NUCLEAR**	**TOTAL**
MW	15627	59693	3380	78700
%age	19.9	75.8	4.3	100.0

This alternative is in compliance with all applicable legal and regulatory requirements and would also not entail any investment by the project promoters, as was required for the project activity under consideration.

Therefore the Alternative 1 is considered further for arriving at the baseline scenario.

Alternative 2 - The project activity undertaken without the consideration of carbon credits

The project activity involves the setting up of wind-farms and exporting the electricity generated to the NEWNE Grid at the nearest state grid sub-station(s). This alternative speaks of implementing the project but without the consideration of potential revenues accruable through carbon trading. This alternative is in compliance with all applicable legal and regulatory requirements. However, this alternative has associated barriers to its implementation which prevented the project promoters to implement the project activity (*Please refer to section 2.6 of the VCS PD for details*). The consideration of potential revenues that can be generated through carbon trading played a key role in the project

promoters' decision to proceed with the project activity. Therefore the alternative under discussion would not be a credible and realistic alternative option for the project promoters to implement.

Therefore the Alternative 2 is not considered further for arriving at the baseline scenario.

Hence, Alternative 1: "Continuation of existing scenario" has been established as the most viable option available to the project promoters in absence of the project activity. Therefore this alternative option is the baseline scenario. This is further substantiated by the fact that same scenario was prevailing even before the implementation of the GHG abatement project.

2.5 Description of how the emissions of GHG by source in baseline scenario are reduced below those that would have occurred in the absence of the project activity (assessment and demonstration of additionality):

The proposed VCS activity was taken as voluntary initiative by the project promoter. Electricity generation from wind farm is not legal and regulatory requirement or a mandatory choice. There are sectoral polices, primarily farmed to encourage wind based power projects and to attract the private investment. The Indian Electricity Act of 2003 does not restrict or authorize any authority to enforce the choice of fuel and technology for power generation. More over the coal is going to continue as the primary source of energy[4]. Moreover, Ministry of New and Renewable Energy (MNRE), Government of India is the authority which frames the policies and regulates the issues related to the renewable energy development in the country. The MNES[5] has not farmed any policy or draft any regulation under which investment in Wind energy is made mandatory by any legal enforcement or regulatory frame work.

Investment Additionality:

At the project conception stage, investment analysis was conducted by the project promoter with the Equity Internal Rate of Return (IRR) as the financial indicator. Equity IRR are used as financial indicators by banks, financial institutions and project developers for financial evaluation of project feasibility during investment making decisions. At the project conceptualisation stage, the internal rate of return (IRR) for the individual wind power plants were calculated and compared with the benchmark or hurdle rate of investment for the approval of projects of the individual project promoting entities (project promoters).

An investment analysis of the project activity was conducted by ACBPL with the **Equity Internal Rate of Return** (Project IRR) as the financial indicator. The expected Return on Equity identified as "Benchmark Equity IRR" has been arrived using the Capital Asset Pricing Model (CAPM). The Capital asset pricing model is the most practical approach for the calculation of the return on equity. As per CAPM, the required return on equity investment is the return of a risk-free security plus beta times the Market risk Premium. In estimating the expected return on equity, the PP had chosen the most conservative values and used the published data to arrive at beta value and market risk premium for the project type. The investment analysis for individual project proponent is provided in the table below:

Sl. No	Company	Wind Farm Capacity (MW)	Benchmark (Calculated as per CAPM*)	Equity IRR without GHG Benefits	Equity IRR with GHG Benefits	Assessment

[4] http://mahadiscom.in/consumer/National%20Electricity%20Policy.pdf, Page 6 (clause – 5.2.12)

[5] Refer to: http://mnes.nic.in/ or http://mnre.gov.in/booklets/Book6-e.pdf, Page 5 - 6

1	**Aryan Coal Benefications Pvt. Ltd**	15	16.04	9.32%	10.16%	Equity IRR is lesser than the Benchmark/ Hurdle Rate of investment

* The CAPM calculation are provided separately in the excel sheets

It is evident from the above tables that the project and Equity IRR for the respective wind-farm were found to be lesser than the hurdle or "Benchmark" rate of investment IRR for the project approval in above case. However, it was found that on consideration of the potential revenue obtainable through carbon trading, the returns from the project activities would improve the returns. It was only then that the project promoter undertook the decision to invest in the respective wind-farms. Hence, it can justifiably be concluded that potential revenues obtainable through sale of carbon credits was crucial for the final approval on the individual wind-farms.

Sensitivity analysis:

A sensitivity analysis was conducted on this financial indicator. Since the most variable parameter in windmill power generation is its plant load factor, it was chosen for carrying out the sensitivity analysis.

Justification of the choice of parameter for variation is provided below:

Choice of parameter for variation:
As per guideline provided by EB in meeting no. 41 annex 45; para 16, the criteria for choosing the sensitivity analysis parameter is:

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 (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets..

Since the probability of variation in PLF is more as it is dependent on many variables like grid availability, wind speed, breakdown / shutdowns etc. ±10% variation in PLF has been chosen as the parameter for variation which can directly affect the revenue.

Result of sensitivity analysis:

Accordingly, the sensitivity was conducted on Equity IRR varying the PLF within ±10%. The results are presented below:

Ownership	**Equity IRR with PLF avg. +10%**	**Equity IRR with PLF avg. +5%**	**Equity IRR with avg. PLF without carbon benefit**	**Benchmark**	**Remarks**
ACBPL	11.98%	10.65%	9.32%	16.04	IRR is less than the Benchmark value

As can be seen from above, the Project activity without the VCS revenue is not a financially attractive option and it can be considered as additional.

Common Practice Barrier

Power generation in India is primarily based on thermal power plants, which contributes ~64.2 % while wind power including other non-conventional energy contribute less than 7.5 % [6]. So far, of 45000 MW of potential, only 5% potential has been utilized (1870 MW)[7].

The State of Maharashtra, though have a large wind energy potential, it is falling far behind in harvesting the complete potential as mentioned below:

Assessed wind power potential[8] : 4584 MW

Installed wind power capacity (as on 31.03.2007)[9] : 1484.9 MW

Wind power projects under CDM pipeline[10] : 914 MW

Thus based on the above it can be inferred that the project activity is not a common practice and CDM revenues is the major contributor in promoting wind power.

3 Monitoring:

3.1 Title and reference of the VCS methodology (which includes the monitoring requirements) applied to the project activity and explanation of methodology choices:

Title of Approved Monitoring Methodology: 'Grid Connected Renewable Electricity Generation'

Reference of the Approved Monitoring Methodology: Category I.D - Renewable Energy Projects: Approved Small Scale Methodology AMS –I.D. / Version 14

Approved monitoring methodology AMS- I.D / Version 14 Sectoral Scope: 1, "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

3.2 Monitoring, including estimation, modelling, measurement or calculation approaches:

- *Purpose of monitoring:*

The purpose of monitoring is accurate measurement of the net electricity exported to the grid from the project activity and subsequently data interpretation techniques for monitoring and verification of GHG emissions with specific focus on technical / efficiency / performance parameters. The project activity essentially involves generation of electricity from wind energy and therefore the electricity generation measurements are required by the utility and the investors to assess electricity sales revenue.

The monitoring involves two independent measurements of generated electricity from the wind turbines - Main Metering System and Check Metering System. The primary recording

[6] Ministry of power (http://powermin.nic.in/indian_electricity_scenario/power_sector_at_a_glance.htm)

[7] Ministry of New & Renewal Energy (http://mnes.nic.in/)

[8] http://www.mahaurja.com/PG_WE_Overview.html

[9] http://www.windpowerindia.com/statstate.html

[10] http://cdmpipeline.org/publications/CDMpipeline.xls

of the electricity fed to the state utility grid will be carried out jointly by Grid officials and power producer on a fix date of every month at the [11]Delivery point. The joint measurement will be carried out once in a month in presence of both parties and who will duly sign the recorded reading. Check meter will be used in case of mal-functioning of the main meter. It is connected to the Current transformers (CTs) and Potential transformers (PTs) to which the Main meter is connected and is used for energy accounting and billing in case of failure of the Main meter.

- *Types of data and information to be reported, including units of measurement:*

Please refer to "Section 3.3: Data and parameters monitored" of the VCS PD for the monitoring details pertaining to types, units and sources of data and description of the monitoring procedure.

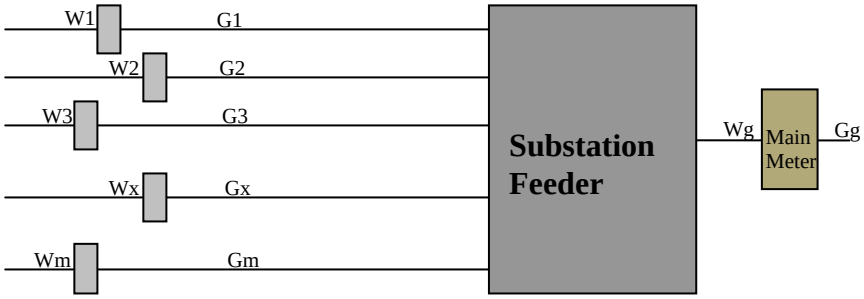
- *Origin of the data*

Please refer to the "Section 3.3: Data and parameters monitored" of the VCS PD.

- *Monitoring, including estimation, modelling, measurement or calculation approaches*

The mechanism of billing calculation from net meter to individual meters attached to the individual wind mill is mentioned as below:

Each substation is connected to numbers of wind turbines. The generation reading is collectively displayed by the substation meter. The net electricity generation of each of the wind turbines is then calculated in the following manner:



In the figure G1, G2, G3, Gx ….Gm are the generation from individual machines (WTGs) and W1,W2,W3, Wx …. Wm are the WTGs installed at the site connected to one substation feeder.

The sum of generation of all the wind turbines connected to a particular substation feeder is Gg

$$\text{i.e. } (G1+G2+G3+Gx+\ldots+Gm) = Gn$$

The reading at the substation will be considered as net generation exported to Grid, i.e. Gg

Gn > Gg as some transmission loss takes place on the way to the substation.

[11] Delivery Point : is the physical point at which the wind energy is delivered to the MSEDCL's system through the State Grid EHV Sub-Station on HV side and at which the electrical interconnection is made between the facility and the MSEDCL's System.

Thus difference is, Gn-Gg >0

The total proportional transmission loss for all the turbines is

$$\frac{Gn - Gg}{Gn} = X \text{ (say)}$$

This transmission loss is distributed amongst the entire wind turbine in proportion to their generation as shown below:

$$G1 \times (1-X) = B1 \text{ (say)}$$

Here B1 is the actual bill amount raised by WEG 1 after consideration of the transmission losses.

Similarly the bill amount generation is calculated for all the WEG attached to the single substation.

The bill (invoice) amount electricity is the most conservative of the net electricity generated by a wind mill and therefore this value has been considered for the calculation of Baseline Emissions for each WTG.

For detailed GHG emission reduction procedures and sample calculation tables, please refer to the sections 4.2, 4.3 and 4.4 of the VCS PD.

- *Monitoring times and periods, considering the needs of intended users*

Monitoring will be done on yearly basis for entire crediting period. Please refer to the "Section 3.3: Data and parameters monitored" of the VCS PD.

- *Monitoring roles and responsibilities*

The project participant ACBPL has signed an operation and maintenance agreement with the supplier of the wind turbines i.e. Suzlon. The agreement is for a period of 10 years. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is responsibility of Suzlon and are organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor. ISO 9001:2000 standard has been adopted by Suzlon, who is responsible for monitoring, calibration and O & M of the project.

Various activities carried out by the Operations and Maintenance team is as follows:

Management Services:

a) Data logging for power generation, grid availability, machine availability.
b) Preparation and submission of monthly performance report in agreed format.
c) Taking monthly meter reading jointly with utility of power generated at Wind Farm and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Routine & Breakdown Maintenance:

The contractor is responsible for periodic preventive maintenance and upkeeping the equipment including periodic replacement of consumables. The repairs and maintenance of the Equipment to be performed in the event of any breakdown or suspected breakdown due to

operational reasons in the Equipment or any part thereof. The breakdown shall be attended as soon as practically possible to put the Equipment back into operation.

Technical Services:

- Visual inspection of the WTG and all parts thereof.
- Technical Assistance including checking of various technical, safety and operational parameters of the Equipment, trouble shooting and relevant technical services.
- Calibration of Meters on regular basis.

Security Services:

This service includes watch and ward and Security of the Wind Farm and the Equipment.

A detailed organizational structure is presented in Annex-I. The Joint Managing Director, will take care of the overall supervision of the project performance including the following:

- Performance review of the WEG installations
- Monitoring & liaison with the state electricity utility
- Arranging for annual verification of the installations for issuance of CERs

- *Managing data quality*

Measures to insure the Accuracy of Results

To ensure accuracy of readings & the calculations based there on, calibration and testing of Meters will be done annually. The Main meter and Check Meter will be tested for accuracy by MSEDCL's testing division. The MSEDCL will carry out Calibration, periodical testing, sealing and maintenance of meters in the presence of authorized representative(s) of the seller and the representative(s) of the seller shall sign on the results thereof. The frequency of meter testing will be done annually.

Please refer to the "Section 3.4: Description of the Monitoring Plan" of the VCS PD.

3.3 Data and parameters monitored / Selecting relevant GHG sources, sinks and reservoirs for monitoring or estimating GHG emissions and removals:

The following parameters would be monitored as mentioned in the tables presented below. For details of calculation procedures and sample calculation tables, please refer to the Sections 4.2 and 4.3 of the VCS PD.

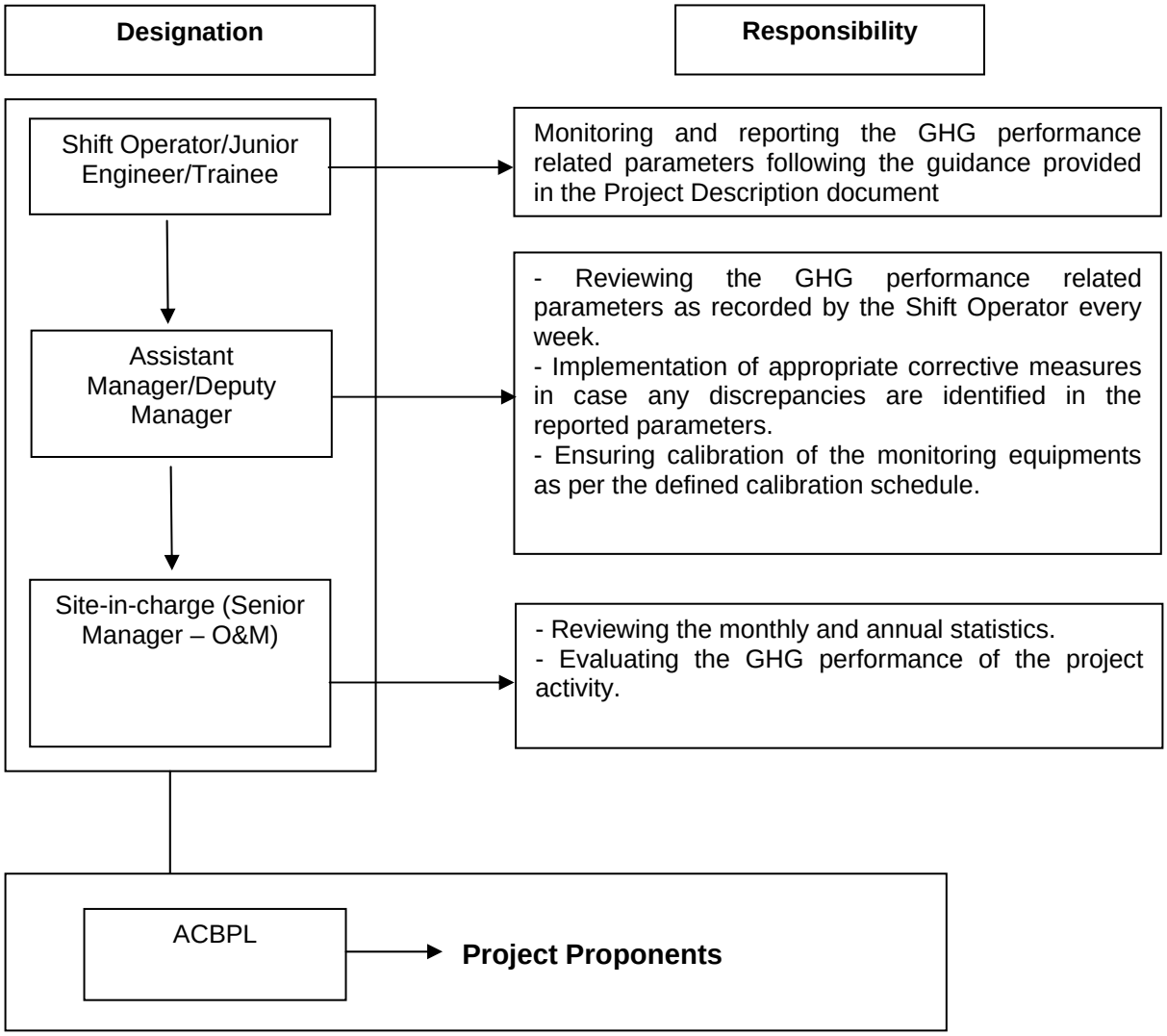
Data / Parameter:	EG_y
Data unit:	KWh /Year
Description:	Net Electricity Exported by the all the WTGs to grid in the year y
Source of data to be used:	Monthly Electricity Export Invoices raised to regional electricity utility company for all the WTGs
Value of data applied for the purpose of calculating expected emission reductions	26,280,000
Description of measurement methods	- Monthly joint meter is carried out at the Metering point by the MSEDCL official and the representative

and procedures to be applied:	of project proponent or the Operation and Maintenance contractor employed by the project proponent. - Net electricity supplied to the NEWNE grid will be calculated based on the difference between values of "export" and "import" on the MSEDCL meter. - The invoices raised by project proponent contain the net electricity exported to the Grid. - The data is archived electronically
QA/QC procedures to be applied:	The main meter as well as the check meter will be maintained and calibrated by the MSEDCL on a regular basis as per their internal calibration schedule as specified in the power purchase agreement. The manager in charge of the power plant will be responsible for verifying the quantum of electricity exported to the grid *vis-à-vis* the net electricity generated from the wind power generating unit within the same time period.
Any comment:	The relevant data will be recorded in electronic form and the same along with the electricity bills will be archived for two years beyond the crediting period.

3.4 Description of the monitoring plan

- Suzlon Windfarms Services Ltd. is responsible monitoring of the electricity generation at the wind mill. Suzlon has qualified site personnel to ensure constant and reliable monitoring of the installed wind turbines.
- The gross electricity generated by the wind mill is measured instantaneously at the control panel installed below the wind mill. The reading from the control panel is recorded continuously and is maintained through MIS system.
- The electricity from the wind mill is transmitted to the substation maintained by Suzlon. Monthly joint metering of the main meter is carried out by MSEDCL and the project developer and the Joint Monthly Report (JMR) is generated. The electricity as recorded by this meter is measured as gross electricity produced by the wind mill.
- The combined electricity generated by different wind mill including, the project proponent wind mills, is collectively received at the substation. The collective electricity is again metered at the substation before it is exported to the grid maintained by MSEDCL.
- The difference in the net electricity exported to the grid and total of gross electricity generated by all the wind mills is measured as transmission loss which is estimated by Suzlon. This transmission loss is equally distributed to each of the wind mill associated to the grid based on the gross power generated by the each wind mill.
- Based on the above data, the net electricity exported to the grid by each of the wind mill is calculated and accordingly invoices are raised by the project proponent against the net electricity generated and exported by individual machines.
- The entire monitoring is done in very transparent manner. As an emergency preparedness plan, check meters are installed along with the main meters prepared so that data can be continuously monitored in case of malfunctioning of the main meter.
- To ensure the reliability & accuracy of the data, the energy meters are calibrated at least once in a year and the accuracy class of the energy meters is maintained.

The roles and responsibilities of the relevant personnel involved in monitoring, reporting and verification of various GHG performance related parameters in the project activity are explained in the following schematic diagram:



4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

The following Approved Small Scale Methodology has been followed for the project activity under consideration:

Title of Approved Methodology: **'**Grid Connected Renewable Electricity Generation'
Reference of the Approved Methodology: Category I.D - Renewable Energy Projects: Approved Small Scale Methodology AMS –I.D. / Version 14

For further details regarding the applicability criteria pertaining to the above-Methodology in the context of the project activity, please refer to section 2.2 of the VCS PD.

For the project activity under consideration, the baseline is given by paragraph 9 of the methodology AMS-I.D. / Version 14 as follows:

"the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2e/kWh) calculated in a transparent and conservative manner as:
(a) A combined margin (CM) [12], consisting of the combination of operating margin (OM) [13] and build margin (BM)[14] according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered. OR
(b) The weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.
Calculations must be based on data from an official source (where available) and made publicly available."

Accordingly, referring the "Tool to calculate the emission factor for an electricity system (Ver 01.1)" the calculation of the GHG emission reductions by the project activity is calculated as per the steps below. The grid emission factors[15] calculated by the Central Energy Authority of India (Ver 04, Sep 2008) and prepared as determined in "Tool to calculate the emission factor for an electricity system (Version 01.1)" are used to calculate the baseline emissions from grid electricity generation.

Emission coefficient for the grid electricity is calculated as Combined Margin (CM) which is the combination of Operation Margin (OM) and Build Margin (BM) factors according to the following six steps:

Step 1: Identification of the relevant electric power system:

Central Electricity Authority (CEA), 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 shown in table below). As per CEA (Ver 04, Sep 2008) the Indian power system is divided two Grid systems i.e. Integrated NEWNE (Northern, Eastern, Western and North Eastern) Grid and Southern Grid.

Therefore the Indian power system is divided into two grids, namely NEWNE and Southern Grid. The geographical scope of each grid is as follows:

Geographical Scope of five regional grids:

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

[12] The project activity will have an effect on the both the operating margin and build margin.
[13] Present power generation sources of the grid, weighted according to their actual participation in the grid mix (all generating sources participating in the grid except hydro, geothermal, wind, low cost biomass, nuclear, and solar power)
[14] Weighted average emissions of recent capacity additions (most recent 20% or the 5 most recent plants)

[15] Ref:- http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

			Nicobar	
Rajasthan	Goa	Tripura		
Utter Pradesh				
Uttaranchal				

As per the delineation given by CEA, Maharashtra State falls into the New North Eastern Regional Grid.

Step 2: Selection of an Operating Margin (OM) method

For calculation of operating margin four options are available:
(a) Simple operating margin;
(b) Simple adjusted operating margin;
(c) Dispatch data analysis operating margin;
(d) Average operating margin

CO_2 Baseline Database Version 4, Date – October 2008, published by Central Electricity Authority (hereafter CEA Database) has been referred for the values of OM. As per the *"Tool to calculate the emission factor for an electricity system"* (Version 01.1, EB 35), any of the four methods can be used, however, the simple OM method can be used only if the low-cost/must run resources constitute less than 50% of the total grid generation in: 1) average of the three most recent years, or 2) based on long term averages for hydroelectricity production.

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

	2005-06	**2006-07**	**2007-08**
NEW NE	**18.0%**	**18.5%**	**19.0%**
South	**27.0%**	**28.3%**	**27.1%**
India	**20.1%**	**20.9%**	**21.0%**
Average for 3 years for NEWNE region			**18.5%**

(Source :CEA Baseline Database, Version 4)

In NEWNE region the low-cost/must run resources constitute only 18.5 % (as demonstrated above) of the total grid generation in average of the three most recent years, hence simple OM has been opted for.

Step 3: Calculation of operating margin emission factor ($EF_{grid,OM,y}$) for the region based on simple OM

OM (Simple OM) values have been taken from CEA Database as discussed above. The *"Tool to calculate the emission factor for an electricity system"* (Version 01.1, EB 35) has been used in the CEA Baseline Database for the calculation of operating margin. As per the *"Tool to calculate the emission factor for an electricity system"* (Version 01.1, EB 35), the calculation of OM has been done *ex ante* based on the most recent 3 years for which data is available at the time of PD submission, as below.

Simple Operating Margin emission factor (NEWNE Region) in tCO_2/GWh (incl. imports)	
Year	**Simple OM (WR)**
2005-2006	1019 (~1019.4)

2006-2007	1008 (~1008.3)
2007-2008	999 (~999.51)
Average of 3 years	**1009 (~1009.003)**

(Source- CEA Baseline Database, Version 4)

Step 4: Identification of the cohort of power units to be included in Build Margin (BM)

BM calculation is based on 20% most recent capacity additions in the grid based on net generation. 20% of the most recent capacity additions have been shown in Annex II.

20% of Net Generation (GWh)

	2005-06	**2006-07**	**2007-08**
NEWNE	87,575	93,072	99,224
South	27,666	30,441	31,463
India	115,241	123,513	130,687

Reference – CEA Baseline Database, Version 4

Net Generation in Built Margin (GWh)

	2005-06	**2006-07**	**2007-08**
NEWNE	87,764	93,524	100,707
South	28,228	30,442	31,613
India	115,991	123,965	132,320

(*Source- CEA Baseline Database, Version 4)*

Vintage of data is based on option 1 of step 4. (Refer *"Tool to calculate the emission factor for an electricity system"* -Version 01.1, EB 35). BM calculation has been done *ex-ante* and hence BM value will remain fixed and need not be monitored during the crediting period.

Step 5: Calculation of build margin ($EF_{grid,BM,y}$) emission factor for the region (ex ante)

BM values have been taken from CO_2 Baseline Database for the Indian Power Sector, Version 4, October 2008. CO_2 Baseline Database for the Indian Power Sector is published by Central Electricity Authority, Ministry of Power, Govt. of India.

Build Margin emission factor (NEWNE Region) in tCO_2/GWh	
Year	**BM (WR)**
2007-2008	598

(Source- CEA Baseline Database, Version 4

Step 6: Calculation of combined margin (CM) emissions factor or the Grid Emission Factor for the grid electricity ($EF_{grid,CM,y}$):

The combined margin emissions factor is calculated as follows:

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

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 (%)
w_{BM}	=	Weighting of build margin emissions factor (%)

For wind 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.

Hence,

$\mathbf{EF_{grid,CM,y}} = EF_{grid,OM,y} \times 0.75 + EF_{grid,BM,y} \times 0.25$ **……..Equation I**

= 1009 X 0.75 + 598 X 0.25

= **906 tCO_2/GWh ……..** (Refer Baseline calculation Excel Sheet)

The emission reduction factor ($EF_{grid,CM,y}$)has been calculated Ex ante and therefore need not to be monitored during the crediting period.

4.2 Quantifying GHG emissions and/or removals for the baseline scenario:

Baseline Emissions Reduction (BE_y)

The baseline emissions is calculated as the MWh produced by the renewable generating unit multiplied by an emission factor (measured in tCO_2/MWh) calculated in a transparent and conservative manner.

$\mathbf{BE_y = EG_y * EF_{GRID}}$

Where
BE_y = Baseline emissions in year *y* (tCO2).
EG_y = Electricity generation by the project in year *y* (MWh).
EF_{GRID} = Combined margin emissions factor (Baseline emission factor) for the year *y* (tCO2/MWh).

The Project will provide a gross power output of 26,280 MWh/year, estimated as below:

Site	Sangli, Maharashtra	
Installed capacity of turbine – MW	1.25 MW	As Per Purchase Orders
Total no. of turbines	12	As per Purchase Order
Total Capacity	15 MW	
PLF - %	20	As per order by MERC dated: November 24, 2003; para: 3.3.2
Machine Availability - %	95	As per the O&M Contract, Losses

		included in the 20% Net PLF
Grid Availability - %	95	As per the O&M Contract, Losses included in the 20% Net PLF
Net electricity generation – MWh / yr	26,280	

EG_y = 26,280 MWh / year

BE_y = 26,280 MWh / year x 0.906 tCO_2 / MWh

Baseline Emissions Reduction (BE_y) = 23,816 tCO_2 / year

4.3 Quantifying GHG emissions and/or removals for the project:

The Methodology is applied in the context of the project activity in order to calculate the project emissions and leakages as follows:

Project Emissions:

As the project activity is a wind power project, there are no anthropogenic emissions by sources of GHGs within the project boundary as a result of the project activity. Hence there are no project emissions to be considered.

The main emissions in the context of renewable energy projects (including wind-mills) of the power sector are emissions arising due to activities such as power plant construction and fuel handling (extraction, processing, and transport). The GHG emissions due to the above mentioned sources of emission are negligible with respect to the lifetime of the project activity under consideration.

PE_y = 0

Leakage Emissions:

As per the methodology AMS-I.D./ Version 14,

"*If the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered*".

There are no anthropogenic emissions identified by sources outside the project boundary due to the project activity. Furthermore, the equipments (WTGs) used by the project activity are newly procured and hence not transferred from another project. Thus, there are no leakage emissions attributable to the project activity.

L_y = 0

4.4 Quantifying GHG emission reductions and removal enhancements for the GHG project:

Emission Reductions:

The emission reductions by the project activity during a given year y is the difference between Baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly).

$ER_y = BE_y – PE_y - L_y$

Where
ER_y = Emission reductin in year y (tCO_2)
BE_y = Baseline emissions in year *y* (tCO2)
PE_y.= Project emissions from the Project activity in year *y* (tCO2).
L_y = Leakages from the Project activity in year *y* (tCO2).

Accordingly, the year-wise emission reduction is given in the table below:

Years	**Estimation of project activity Emissions (tones of CO_2 e)**	**Estimation of baseline Emissions (tones of CO_2 e)**	**Estimation of leakage (tonnes of CO_2 e)**	**Estimation of overall emission reductions in tonnes of CO2 e**
Year 1	0	23,816	0	23,816
Year 2	0	23,816	0	23,816
Year 3	0	23,816	0	23,816
Year 4	0	23,816	0	23,816
Year 5	0	23,816	0	23,816
Year 6	0	23,816	0	23,816
Year 7	0	23,816	0	23,816
Year 8	0	23,816	0	23,816
Year 9	0	23,816	0	23,816
Year 10	0	23,816	0	23,816
Total (tones of CO_2 e)	**0**	**238,160**	**0**	**238,160**

5 Environmental Impact:

As per Ministry of Environment and Forest Notification dated 27th January 1994 (Para 3) followed by its amendment dated 13th June 2002 (clause ii), the implementation of the wind farm does not require an environmental impact assessment. Also, as per Ministry of Environment and Forests (MoEF), Government of India notification dated September 14, 2006[16] regarding the requirement of Environment Impact Assessment (EIA) studies as per the Environment Protection Rule, 1986 (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of Environment and Forests) states that any project developer in India needs to file an application to MoEF (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. The wind farms are not included in this list. Therefore the project activity does not require an EIA study to be carried out.

Further, the project activity does not involve any major construction activity. It primarily requires the installation of the Wind Electric Generators, interfacing the generators with the Maharashtra State Electricity Board by setting up HT transmission lines and installation of

[16] http://envfor.nic.in/divisions/iass/notif/eia.htm

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

6 Stakeholders comments:

The stakeholders' views have formed a valuable input to justify the Project Proponent's initiatives of harnessing renewable sources of energy for clean power generation and simultaneous sustainable development of the region. The following were the stakeholders identified for the project activity:

- Elected body of representatives administering the local area (village Panchayat) and the local residents
- Maharashtra Energy Development Agency (MEDA)
- Maharashtra State Electricity Distribution Company Limited (MSEDCL)
- Facility developer and operators

Stakeholder Involvement:

The project has been executed after receiving the necessary consent of the involved state government agencies. MEDA is responsible for executing the state electricity policy as per MERC (Maharashtra Electricity Regulatory Commission) for implementation of wind electric generators, whereas the MSEDCL is responsible for entering into power purchase, wheeling & banking agreements with the individual project proponents for evacuation of electricity. As both of these agencies are under the domain of the state government, the standard application procedure followed by meeting the stipulated requirements of the state government was carried out. The final outcome of the procedure resulted in the following licences & permissions:

- Permission to commission / implement the project
- Power Purchase Agreements between the electricity utility & project proponents and No Objection Certificate
- Commissioning & Grid Synchronization Certificates

For local community, a stakeholder consultation meeting was held by the project proponent. The public forum was used for inviting the villagers. The villagers were informed about the wind CDM project. All queries raised by the villagers were answered.

Stakeholder Comments received:

No adverse comments were received from the government agencies / stakeholders. Rather, the Project Proponent has received positive comments from the local stakeholders on the project activity as they acknowledged the contribution of the project towards the environment, social and economic well being of the region and appreciated the initiative undertaken by the Project Proponent for the well-being of the environment. Moreover they also expressed their thankfulness to the Project Proponents for generation of employment in the region.

7 Schedule:

Sl. No.	Activity		Date
1	**Project Conception:**		
	A	Project Approval	
	B	Purchase Order	13th June 2005
2	**Project Implementation**		
	A	Commencement of construction	

	B.1	Project Commissioning for (Gut No. 1035, 1010, 1054, 1053)	30th Sep 2005
	B.2	Project Commissioning for (Gut No. 1045, 98, 971, 927)	14th Sep 2005
	B.3	Project Commissioning for (Gut No. 1017, 1018, 1028)	19th Sep 2005
3	**Application for availing GHG Abatement Benefits:**		
	A	Appointment of Consultant	
	B	Stakeholder Consultation	
	C	Appointment of DOE for Validation/Verification	
	D	Commencement of the Validation Process	
4	**Accrual of GHG Abatement Benefits:**		
	A	Crediting period start date for VCS Verification	
	B	Verification of GHG Abatement Benefits under VCS	

8 Ownership:

8.1 Proof of Title:

The requirements of the VCS Project Document pertaining to this section have been addressed as follows:

- *A legislative right*

Not Applicable

- *A right under local common law*

Not Applicable

- *Ownership of the plant, equipment and/or process generating the reductions/removals*

The ownership of Aryan Coal Benefication Ltd. as project promoter of the WTGs can be established by means of the following documents:

- Purchase Orders for the WTGs and other auxiliary equipments
- Power Purchase Agreements with the respective State Electricity Boards for sale of electricity generated by each of the components of the bundled project activity
- Commissioning certificates for each of the WTGs

- *A contractual arrangement with the owner of the plant, equipment or process that grants all reductions/removals to the proponent*

The project promoter has undertaken the responsibility of accruing and handling the GHG emission reductions for the WTGs therefore the contractual agreement is not applicable..

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

The requirements of the VCS Project Document pertaining to this section have been addressed as follows:

Project proponents of projects that reduce GHG emissions from activities that:

- *are included in an emissions trading Program; or*
- *take place in a jurisdiction or sector in which binding limits are established on GHG emissions;*

The host country of the project activity under consideration, *i.e.*, India is a non Annex-I, or, a developing nation as recognised by the Kyoto Protocol. Hence, there are no GHG emission reduction targets or commitments for India and it does not fall under the purview of any compliance driven Emission Trading Programs. Furthermore, there are also no such voluntary emission trading programs similar to the VCS existent in the country. This confirms there are no emissions trading programs prevalent in the host country of the project activity under consideration, *i.e.*, India at the time of preparation of the VCS PD. Therefore, it is not applicable for the project activity

Shall provide evidence that the reductions or removals generated by the project have or will not be used in the Program or jurisdiction for the purpose of demonstrating compliance. The evidence could include:

- *a letter from the Program operator or designated national authority that emissions allowances (or other GHG credits used in the Program) equivalent to the reductions/removals generated by the project have been cancelled from the Program; or national cap as applicable or;*
- *purchase and cancellation of GHG allowances equivalent to the reductions/removals generated by the project related to the Program or national cap.*

The host country of the project activity, India being a non Annex-I nation under the Kyoto Protocol, there are no GHG emission reduction targets or commitments for India. This confirms there are no national caps on GHG emissions prevalent in India at the time of preparation of the VCS PD. Therefore, it is not applicable for the project activity

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ANNEX – I
MONITORING INFORMATION

As per paragraph 13 of “Type AMS. I-D Grid connected renewable electricity generation (Version 12: Valid from 10 Aug 07 onwards)”, KWh generated by windmills is to be recorded.

The data monitoring will involve measurement of KWh generated by windmills The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state electricity utility. The electricity generation measurements are required by the utility and the investors to assess electricity sales

revenue and / or wheeling charges. The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.

1. The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state electricity utility. Machines for sale to utility will be connected to the feeder.

2. There are two energy meters installed at the site. One acts as a back up meter if the other one fails. Due to any unforeseen events if both the meters fail, the generation can be monitored at the controller end as explained below in point no.4.

3. The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.

4. The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WEGs. Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm. The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

For measurement of all the parameters and maintenance of records due care has been taken and to prepare elaborated formats for data collection; methodology has been described for measurement and collection of each of the parameter; proper training is being provided to concerned personnel.