Voluntary Carbon Standard
Project Description Template

19 November 2007

~~**13 August 2009 Version 1**~~
5 Nov 2009 Version 02

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1 Description of Project:

1.1 Project title

6.2 MW Bundled Wind Project in Tamil Nadu, Rajasthan and Maharashtra by Interocean.

1.2 Type/Category of the project

As the methodologies in CDM (Clean Development Mechanism) are approved under VCS 2007.1[1], same has been applied to determine the project's category. As per the 'CDM methodologies' under Appendix B of the simplified modalities

[1] http://www.v-c-s.org/methodologies.html

and procedures for small-scale CDM project activities, the project activity falls under the following type and category:

Type	:	**I** – Renewable Energy Projects
Project Category	:	**D** – Grid connected renewable electricity 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.

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

The estimated emission reductions of the project during the first crediting period (10 years) (from 01 April 2006 to 31 March 2016) are presented in following tables. Estimated emission reductions of the project throughout the first crediting period are 99,062 tCO2e.

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
01 April 2006 to 31 March 2007	3,973
01 April 2007 to 31 March 2008	6,572
01 April 2008 to 31 March 2009	10,190
01 April 2009 to 31 March 2010	11,190
01 April 2010 to 31 March 2011	11,190
01 April 2011 to 31 March 2012	11,190
01 April 2012 to 31 March 2013	11,190
01 April 2013 to 31 March 2014	11,190
01 April 2014 to 31 March 2015	11,190
01 April 2015 to 31 March 2016	11,190
Total estimated reductions	**99,062**
Total number of crediting years	**10**
Annual average over the crediting period	**9,906**

Table 1.1 Estimation of the emission reductions during the First Crediting Period. The emission reductions calculation is provided in a separate excel sheet.

The average annual emission reductions from the proposed bundle are to the tune of 99,062 tonnes CO_2 equivalent (as illustrated in the table above). As per "Voluntary Carbon Standards 2007.1", the projects are categorised as below:

- Micro project: Less than 5,000 tonnes CO_2 equivalent emissions reductions per year
- Projects: 5,000 – 1,000,000 tCO_2e 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 tCO_2e per year, it falls under "**Project**" category.

1.4 A brief description of the project:

The WTGs included in this bundle were installed by Interocean Group Companies to entail generation of clean power by harnessing wind energy – a non-conventional renewable energy source and exporting the same to their respective regional State Electricity Grids.

The project activity is expected to evacuate approximately 12.18 GWh of renewable power annually to the power deficit Northern-Eastern-Western-North-Eastern Regional Grid (hereafter referred as NEWNE[2] Grid) and Southern Regional Grid collectively. The electricity generation from this project will contribute to annual GHG reductions estimated at 9,906 tCO_2e.

The project activity is a bundled wind energy project with total capacity of 6.2 MW, comprising of 4 No's Wind Turbine Generators (WTG's) of varying capacities and technologies, commissioned between April 2005 and September 2008. The relevant details of the individual WTGs included in the bundle along with the names of their project promoters have been tabulated below:

[2] Previously, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states. Since August 2006, all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids are now treated as a single grid and were named as NEWNE grid (Northern-Eastern-Western- North-Eastern grid).

Promoter	**Make/Model**	**Capacity Individual WTG (MW)**	**No. of WTGs**	**Total Capacity (MW)**	**Date of Commissioning**	**Location**	**Substation**
Interocean Shipping (I) Pvt. Ltd.	NEG MICON/ NM82	1.65	1	1.65	31/12/2006	Location No. – GP10 Gut (Survey) No.– 149, 150, 151 Village – Bharewadi Taluka – Shirala District – Sangli State – Maharashtra	132/33 kV (Feeder No. 2) Rile Substation.
Interocean Shipping Company	NEG MICON/ NM82	1.65	1	1.65	29/04/2005	H.T SC. No.– 787 Gut (Survey) No.– 81/2C2 Village – Gomanagalampudur Taluka – Polllachi District – Coimbatore State – Tamil Nadu	110/22 kV Anthiyur Substation. 22 kV Gomangalam feeder.
Interocean Shipping Company	NEG MICON/ NM82	1.65	1	1.65	31/12/2007	H.T SC. No.– 2503 Gut (Survey) No.– 913/5A Village – Samugarengapuram Taluka – Radhapuram District – Tirunelveli State – Tamil Nadu	110/33-11 kV Thandayarkulam Substation Feeder No. 1
Interocean Shipping (I) Private Limited	Suzlon/ S66	1.25	1	1.25	28/09/2008	WTG No. – R42 Village – Satta District – Jaisalmer State – Rajasthan	220/33 kV Mada Substation
Total			**4**	**6.2**			

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

Promoter	Capacity (MW)	Location	Unique Identification *
Interocean Shipping (I) Pvt. Ltd.	1 X 1.65	WTG No. – GP10 Gut (Survey) No.– 149, 150, 151 Village – Bharewadi Taluka – Shirala District – Sangli State – Maharashtra	N 17 07.500 E 73 59.130
Interocean Shipping Company	1 X 1.65	H.T SC. No.– 787 Gut (Survey) No.– 81/2C2 Village – Gomanagalampudur Taluka – Polllachi District – Coimbatore State – Tamil Nadu	N 10 36.906 E 77 10.217
Interocean Shipping Company	1 X 1.65	H.T SC. No.– 2503 Gut (Survey) No.– 913/5A Village – Samugarengapuram Taluka – Radhapuram District – Tirunelveli State – Tamil Nadu	N 08 19.440 E 77 40.141
Interocean Shipping (I) Private Limited	1 X 1.25	WTG No. – R42 Village – Satta District – Jaisalmer State – Rajasthan	N 29 62.835 E 67 74.970
Total			**6.2**

** Source : Technology Provider (Suzlon Energy Ltd, Vestas)*

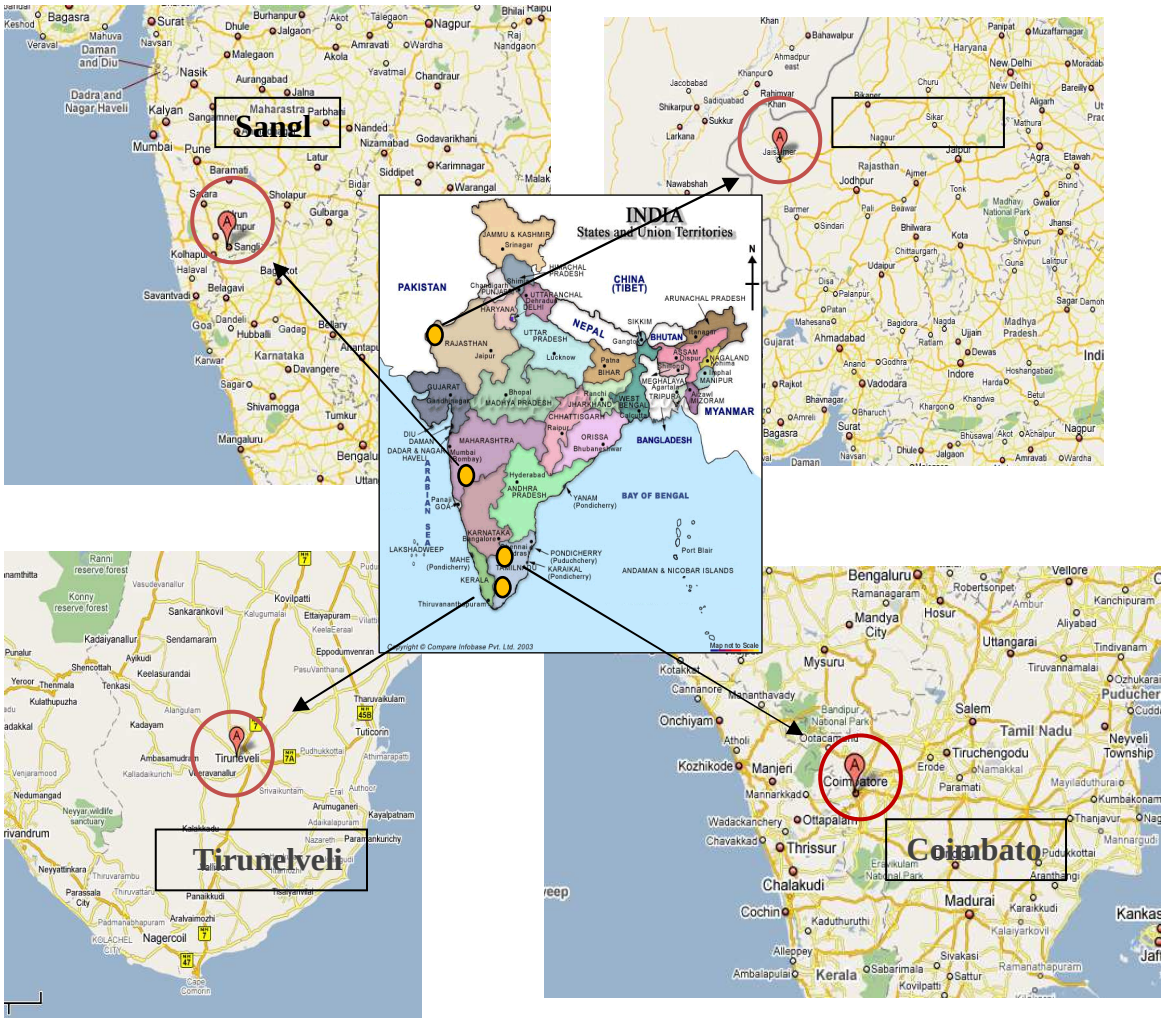


Figure 1, Location Map

1.6 Duration of the project activity/crediting period:

- **Project start date:** For the bundled project activity, the project start date is the earliest date of the commissioning of any wind mill (i.e. date on which the project actually began reducing or removing GHG emissions). As per the table in section 1.4 above, the earliest date of commissioning is 29/04/2005 which is for the wind mill installed by Interocean Shipping Company with H.T.SC. No. – 787. Hence project start date for the project activity would be 29/04/2005.

- **Crediting period start date:** Although, the project began reducing or removing GHG emissions from the date of its first commissioning i.e. 29/04/2005 but as per VCS 2007.1 the earliest credit period start date should be 28/3/2006, hence crediting period start date for this bundled project would be 28/3/2006. The

annual estimation of emission reduction for the crediting period is given in section 1.3.

Note: The length of first crediting period for all the projects in the bundle would be maximum 10 years from the start date of crediting period. The WTGs under the ownership of Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10, HTSC No. 2503) and Inter Ocean Shipping (India) Private Limited (Location No. R42) have applied under CDM, as detailed in section 1.13. In case, said WTGs gets registered under CDM, the project proponent will claim VCUs only from the start date of project activity till the date of CDM registration. At any point of time during the 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[3].

1.7 Conditions prior to project initiation:

The proposed project activity generates approximately 12.18 Million Units (GWh) of clean electricity per year. Taking into account energy shortages and existing trend of investment in fossil fuel based energy generation in the region (as explained in section 1.8 below), in absence of the project activity, an equivalent amount of electricity would have been generated in the regional NWENE grid and Southern Regional grid collectively exploiting mostly fossil fuel based power plants (as it reflects from the present operating Margin and Build Margin of the regional 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).

Note: This is a new project activity and not a modification or retrofit of an existing unit.

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

The Project is wind based renewable energy source, zero emission power project connected to the Maharashtra and Rajasthan state grid, which forms part of the NEWNE electricity grid of India. The Project will displace fossil fuel based electricity generation that would have otherwise been provided by the operation and expansion of the fossil fuel based power plants in NEWNE regional electricity grid. The project activity is generating electricity from wind power, and therefore there are no GHG emissions produced and thereby, resulting of the reduction of anthropogenic Greenhouse Gas emission. The baseline scenario for electricity generation is the electricity supplied by the VCS project activity would have been supplied by operating power plants connected to the grid and by addition of new generation sources. These generation sources will be depicted in OM and BM calculations as part of the combined margin method for calculation of the baseline emission

[3] As per 'Further Guidance for Projects that are Registered in Two GHG Programs, dated, 19 March 2008' clause 4 " All VCS Program projects have a ten year renewable crediting period regardless of whether they move their registration from the VCS Program to another GHG Program and back".

factor. The calculation of the baseline emission factor using the combined margin methodology has been detailed in Section 4.1.

The project activity will export approximately 12.18 Million Units (GWh) of clean electricity per year. In absence of the project activity, an equivalent amount of electricity would have been generated in the regional grid exploiting mostly fossil fuel based power plants (as it reflects from the present operating Margin and Build Margin of the regional Grid). Taking into account energy shortages and current trend of investment in fossil fuel based energy generation in the region, in absence of the project activity (baseline), an equivalent amount of electricity would have been generated in the regional grids using mainly fossil fuel based power plants.

As per the combined margin carbon intensity of the 0.906 tCO2/MWh for the NEWNE grid and 0.937 tCO2/MWh Southern Grid of India, the project activity would there by result in total CO2 emission reduction of 9,906 tonnes over the crediting period of 10 years. 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:

Technology Employed:

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind has considerable amount of kinetic energy when blowing at high speeds. This kinetic energy when passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. Rotating wind blades then spins the connected main shaft to the generator, thereby producing electricity. (As depicted in the picture below).

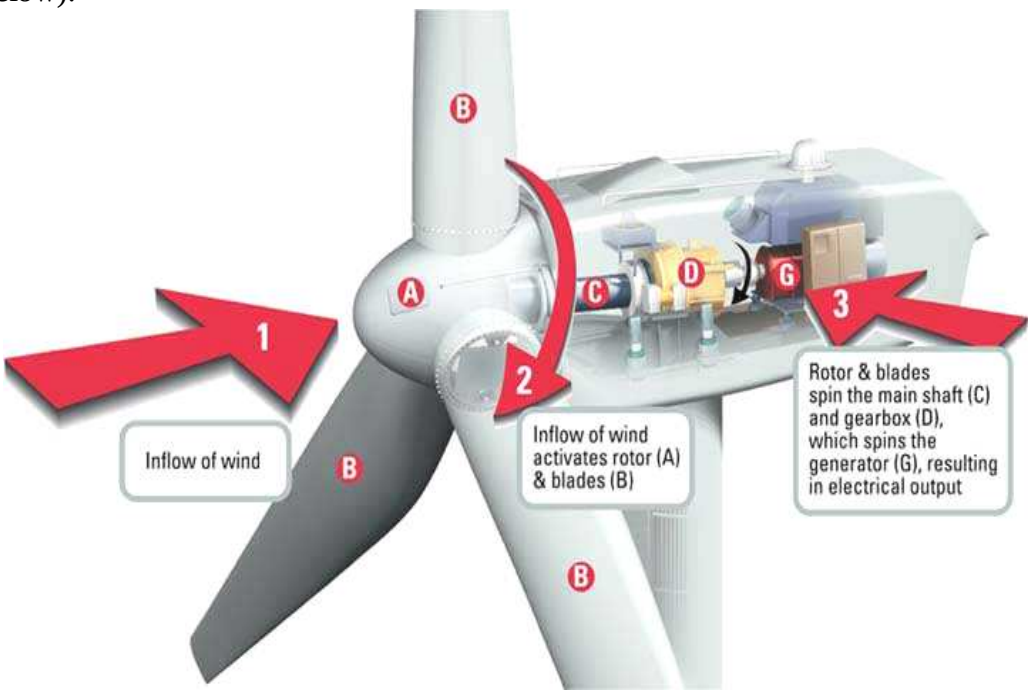


Figure 2: Working of a Wind Turbine

The technology is a clean technology since there are no GHG emissions associated with the electricity generation. The important parts of a windmill are:

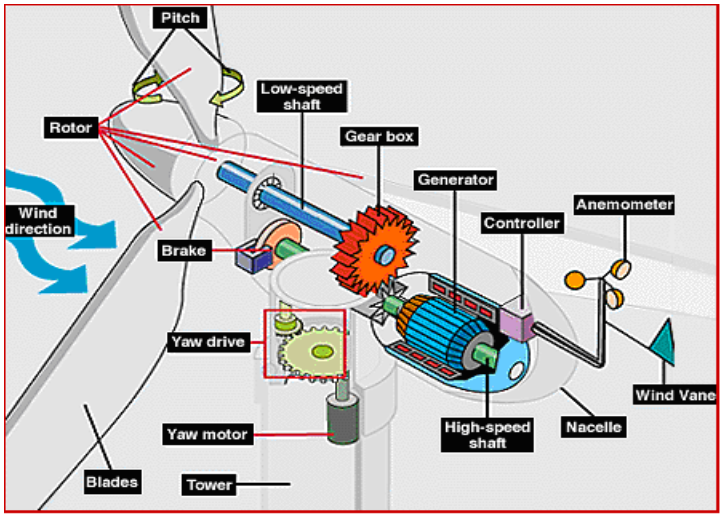


Figure 3: Major Mechanical Parts of a Wind Turbine

i. Main Tower

This is a very tall structure with a door and inside ladder at the bottom. The door is used to enter into the tower for operation and maintenance.

ii. Blades

The WTGs are provided with three blades. The blades are self supporting in nature made up of Fiber Reinforced Polyester. The blades are mounted on the hub.

iii. Nacelle

The Nacelle is the one which contains all the major parts of a WTG. The nacelle is made up of thick rugged steel and mounted on a heavy slewing ring. Under normal operating conditions, the nacelle would be facing the upstream wind direction.

iv. Hub

The Hub is an intermediate assembly between the wing and the main shaft of the wind turbine. Inside the hub, a system to actuate the aerodynamic brake is fitted. The hub is covered with nose cone.

v. Main Shaft

The shaft is to connect the gear box and the hub. Solid high carbon steel bars or cylinders are used as main shaft. The shaft is supported by two bearings.

vi. Gear Box, Bearing and Housing

The gearbox is used to increase the speed ratio so that the rotor speed is increased to the rated generator speed. Oil cooling is employed to control the heating of the gearbox. Gearboxes are mounted over dampers to minimize vibration. The main bearings are placed inside housing.

vii. Brake

Brake is employed in the WTGs to stop the wind turbine mainly for maintenance check. Brakes are also applied during over speed conditions of the wind turbine. The brakes are placed on the high speed shaft.

viii. Generator

The generator is of induction type. The generators are provided with monitoring sensors in each phase winding to prevent damage to the generators.

Technical Specifications:

NEG MICON (VESTAS) 1650 kW (NM 82)

Particulars	Specifications
Rotor	
Rotor diameter	28 m
Rotor type	3 bladed
Swept area	5281 m^2
Rotational speed	14.4 rpm
Operational Data	
Cut-in wind speed	3.5 m/s
Cut-out wind speed	24 m/s
Calculated Life time	20 years
Generator	
Nominal Power	1650 kW
Nominal frequency	50 Hz
Nominal Voltage	690 V/50Hz
Type	Asynchronous
Gear Box	
Type	Planetary/ Helical gears
Transmission	1:70.2- 50 Hz
Cooling	Closed circuit liquid cooling
Oil lubrication	Automatic microprocessor control
Yaw Drive	
Type	Ball bearing slewing ring with gearing and yaw brakes
Yaw drive system	6 active electrical yaw motors

Yaw brakes	6 hydraulic brakes
Operating Brakes	
Mechanical brake	Hydraulic disc brake
Aerodynamic brake	Full blade pitch
Tower	
Tower	Tubular steel
Corrosion protection	PU Painted
Hub height	As per approval
Certifications	
Design standards	IEC 1024

SUZLON 1.25 MW (S 66)

Particulars	**Specifications**	
Rotor		
Rotor diameter	66 m	
Rotor Type	3 bladed, horizontal axis	
Installed electrical output	1250 kW	
Rotor swept area	3421 m^2	
Rotational speed	20.7/13.8 rpm	
Rotor material	GRP	
Regulation	Pitch	
Operational Data		
Cut-in wind speed	3 m/s	
Rated wind speed	14 m/s	
Cut-out wind speed	22 m/s	
Generator		
Type	Asynchronous Generator, 4/6 poles	
Rated output	250/1250 kW	
Rotational speed	1006/1506 rpm	1208/1810 rpm
Operating voltage	690 V	600 V
Frequency	50 Hz	60 Hz
Insulation class	H	
Cooling system	Air cooled	
Enclosure class	IP 56	
Gear Box		
Type	Integrated 3-stage gearbox, 1 planetary & 2 helical.	
Gear box manufacturer	Winergy	
Gear ratio	74.917:1(50 Hz), 89.229:1(60 Hz)	
Nominal load	1390 kW	
Type of cooling	Oil cooling system	
Yaw Drive		
Yaw drive system	4 active electrical yaw motors	
Yaw bearing	Polyamide slide bearing	
Operating Brakes		
Aerodynamic brake	3 times independent pitch regulation	
Mechanical brake	Disc brake, hydraulically released, fail safe.	

	Microprocessor controlled, indicating actual operating condition. UPS backup system.
Tower	
Tower	Tubular
Hub height	65 m
Certifications	
Design standards	GL/IEC
Quality	ISO 9001

Technology transfer: The technology is developed by M/s Suzlon Energy Limited (hereafter referred as SEL), M/s Vestas Wind Technology India Private Limited (hereafter referred as VWTIPL) and technology transfer is not involved.

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 legal and regulatory requirements for installation and operation of wind-farms in the Host country. The following statutory clearances have been obtained to comply with relevant local/regional laws and regulations.

- Power Purchase Agreement with the State Electricity Board
- Commissioning certificate issued by the State Electricity Board
- Approval from State Nodal Agencies (in some cases)

Document checklist:

	Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)	**Interocean Shipping Company (HTSC No. 787)**	**Interocean Shipping Company (HTSC No. 2503)**	**Inter Ocean Shipping (India) Private Limited (Location No. R42)**
Documents				
PPA	Signed with Maharashtra State Electricity Distribution Company Limited (MSEDCL)	Signed with Tamil Nadu Electricity Board (TNEB)	Signed with Tamil Nadu Electricity Board (TNEB)	Signed with Jaipur Vidyut Vitaran Nigam Limited (JVVNL)
Commissioning Certificate	Obtained from Maharashtra State Electricity Distribution Company Limited	Obtained from Tamil Nadu Electricity Board (TNEB)	Obtained from Tamil Nadu Electricity Board (TNEB)	Obtained from Rajasthan Rajya Vidyut Parinigam Limited (RVVPNL)

	(MSEDCL)			
Other statutory Clearances	Obtained	Obtained	Obtained	Obtained
Forest Clearance	Not applicable as the same is obtained by the site developer (in this case SUZLON Energy Limited and M/s Vestas Wind Technology India Private Limited) during the development of the site. The project promoter's have installed their WTGs subsequent to the site development.			
Environment Clearance	Not Applicable (refer section 5)			

The above mentioned documents have already been submitted to the Validator.

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:

- **Force majeure –** Natural calamities **–** The generation of electricity from wind is, of necessity, an entirely an outdoor activity which is usually located in a remote location, beyond the control of project promoter. The wind generators, the grid and the transmission lines are constantly subject to natural elements such as high winds and rain and a calamity such as a severe thunderstorm, lightning and earthquake can damage the generators and/or the grid which ultimately affect the GHG emission reductions by the project activity.

- **Wind Variation –** Substantial variation in the wind availability resulting from change in atmospheric temperature or climatic pattern might affect actual plant load factor as compared to the values predicted.

- **Right of way –** The problem of right of way is basically characterized by mass scale protests by the nearby villagers against the operation of the WTG (example in Maharashtra)[4]. This can lead to ceased operation of WTG i.e. no generation of electricity and even transferring of these WTG to other areas. Such problems have recently cropped up in some of the districts in the state of Maharshtra and Gujarat in spite of obtaining No Objection Certificates (NOC) from the village panchayats for the site development. Thus, incidences like these in the state of act as a big barrier to smooth operation of the project.

- **Sabotage:** Cable theft **–** Power generation in some of the regions in India has been affected badly due to repetitive cable thefts. It is theft of power transmission cables used to connect the generator and transformer via control panel. Repeated cable theft and non-availability of required cables results in complete stoppage of a WTG. Apart from power transmission cables earthing

[4] http://www.earthtimes.org/articles/show/56721.html

cables are also been stolen, causing stoppage of WTG during severe lightning. In addition to this other components like Control / Capacitor Panels and Power Panels were severely damaged. HT- Yard consisting of CT/PT, Transformer and VCB panels were also damaged.

- **Grid related problems** – Wind generated electricity do not form part of the base load to the grid. The infrequent nature of wind power is the main reason behind it. In case of low demand or the requirement of maintaining the grid stability, wind power is often disconnected from the grid. This leads to loss of the generated electricity and thus GHG emission reductions. There are various other grid related problems which might affect the generation by a wind power unit, for example poor grid availability, grid outages etc.

- **Technical** – Plant stoppages due to equipment or component failure, evacuation problems can also cause disruption electricity generation. However an immediate back up, fail safe measure can minimize the impact.

The factors mentioned above pose risks to the project performance and hence the GHG abatement quantum of the project. However, the average annual GHG emission reduction potential of the bundled project activity has been projected in the VCS PD based on actual retroactive electricity generation from the bundle and therefore actual GHG emission reduction per annum is least likely to vary substantially from the projected value as provided in the PD.

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 at several locations in three different states of India. The generation of power utilizing wind energy does not involve any significant fossil fuel combustion or other direct or indirect GHG emission thus removal or destruction of the same is not apparent. 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).

Some of the projects have applied for CDM, their status is as below. Projects have not applied for any other form of environmental credit, apart from CDM.

List of Promoters in bundle (Identification No.)	Applied for CDM?	Applied for any other GHG Program?	Status	Reference
Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)	Yes	No	Validation to be initiated	NA
Interocean Shipping	No	No	--	NA

Company (HTSC No. 787)				
Interocean Shipping Company (HTSC No. 2503)	Yes	No	Validation to be initiated	NA
Inter Ocean Shipping (India) Private Limited (Location No. R42)	Yes	No	Validation to be initiated	NA

Note: The length of first crediting period for all the projects in the bundle would be maximum 10 years from the start date of crediting period. The WTGs under the ownership of Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10 and Location No. R42), Interocean Shipping Company (HTSC No. 2503) has applied under CDM, as detailed in section 1.13. In case, said WTGs gets registered under CDM, the project proponent will claim VCUs only from the start date of project activity till the date of CDM registration. At any point of time during the 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[5]. The project proponent has provided a written undertaking in this regard to avoid the double counting.

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

Projects mentioned in the table in section 1.13 above have not been rejected under any GHG programs.

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

Name of Party involved ((host) indicates a host Party)	Private and/or public entity (ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Interocean Shipping (I) Pvt. Ltd.	No
	Interocean Shipping Company	

Contact information of the project proponent for teh bundled project activity is as below:

[5] As per 'Further Guidance for Projects that are Registered in Two GHG Programs, dated, 19 March 2008' clause 4 " All VCS Program projects have a ten year renewable crediting period regardless of whether they move their registration from the VCS Program to another GHG Program and back".

Organization:	Interocean Shipping (India) Private Limited Interocean Shipping Company
Street/P.O.Box:	Devli Village
Building:	552, Bank Colony
City:	New Delhi
State/Region:	Delhi
Postfix/ZIP:	110 062
Country:	India
Telephone:	(011) 41676738
FAX:	(011) 29912881 & 80
E-Mail:	power@interoceangroup.com
URL:	www.interoceangroup.com
Represented by:	
Title:	--
Salutation:	Brigadier
Last Name:	Nanda
Middle Name:	M.
First Name:	K.
Department:	--
Mobile:	(+91) 9811379883
Direct FAX:	--
Direct tel:	--
Personal E-Mail:	--

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

- Contribution to nation's energy security. Saving in national revenue by avoiding import of fossil fuels

Contribution of the Project Activity to Sustainable Development:

Government of India has stipulated following indicators for sustainable development in the interim approval guidelines[6] for CDM projects:

Social Well Being	• The project generates clean power without negative impacts on surroundings • No human displacement due to the project activity and hence no requirement of relocation, as is evident from the documents pertaining to purchase of lands on which the wind-mills have been installed from relevant Government Authorities and /or private parties. • 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.
Economic Well being	• The project activity is responsible for creating business opportunities for many local stakeholders • It is an effort on the part of the project proponent to contribute towards grid stability and bridging the demand-supply gap in electricity in the regional grid and in turn in the national grid • The project activity contributes towards the 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 generates clean power by harnessing the potential wind energy for power generation • 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 displaces an equivalent quantum of power generated by the combustion of fossil fuels, the non-renewable energy sources at the grid connected thermal power plants, thus reducing GHG emissions and

[6] Designated National Authority (CDM India) web site: http://cdmindia.nic.in/host_approval_criteria.htm

	contributing to the overall cause of mitigation of global warming • The project activity by setting up wind-mills for power generation does not cause environmental disturbance or ecological imbalance to the surroundings • The project activity also contributes to the reduction in the emissions of SOx, NOx, and SPM associated with combustion of fossil fuels for generation of thermal power.

All other relevant information pertaining to the project activity has been provided in respective sections of the PD.

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:

As all the methodologies under CDM (Clean Development Mechanism) are approved under VCS 2007.1[7], same has been applied to determine the project's baseline scenario emission levels and the process to monitor emission reductions.

As defined under Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project activity proposes to apply following project types and categories:

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

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

The applicability of the project activity as small scale as per approved methodology AMS I.D. (Version 14: EB 48) has been demonstrated below:

Applicability criteria	Project case
This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind,	The project is wind power project hence applicable to this category

[7] http://www.v-c-s.org/methodologies.html

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.	
If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale project activity applies only to the renewable component. If the unit added co-fires fossil fuel1, the capacity of the entire unit shall not exceed the limit of 15 MW.	There is neither non-renewable component added, nor co-firing is required for the proposed project activity. The renewable project capacity is 6.2 MW, well below the limit of 15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	This is not a combined heat and power (co-generation) system.
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.	This power project is new and not a capacity expansion or an up gradation project.
Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	Not applicable. This project is not a retrofit or modification of existing facility.

Above confirms that the chosen methodology is applicable for the project activity.

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

The GHG sources and sinks included in the project boundary are given in the table below:

Emission sources excluded or included in the project boundary				
	Source	**Gas**	**Included?**	**Justification/ Explanation**
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants connected to the grid that	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source

	are displaced due to the project activity.	N_2O	No	Minor emission source
Project activity	No source	CO_2	No	Not applicable for wind projects
		CH_4	No	Not applicable for wind projects
		N_2O	No	Not applicable for wind projects

Project boundary specified is that encompasses the physical, geographical site of the renewable generation source. This includes the wind turbine installation, pooling and sub-stations. The proposed project activity evacuates the power to the NEWNE and Southern Regional Grid. Therefore, all the power plants contributing electricity to the NEWNE and Southern Regional Grid are taken in the connected (project) electricity system for the purpose of baseline estimation.

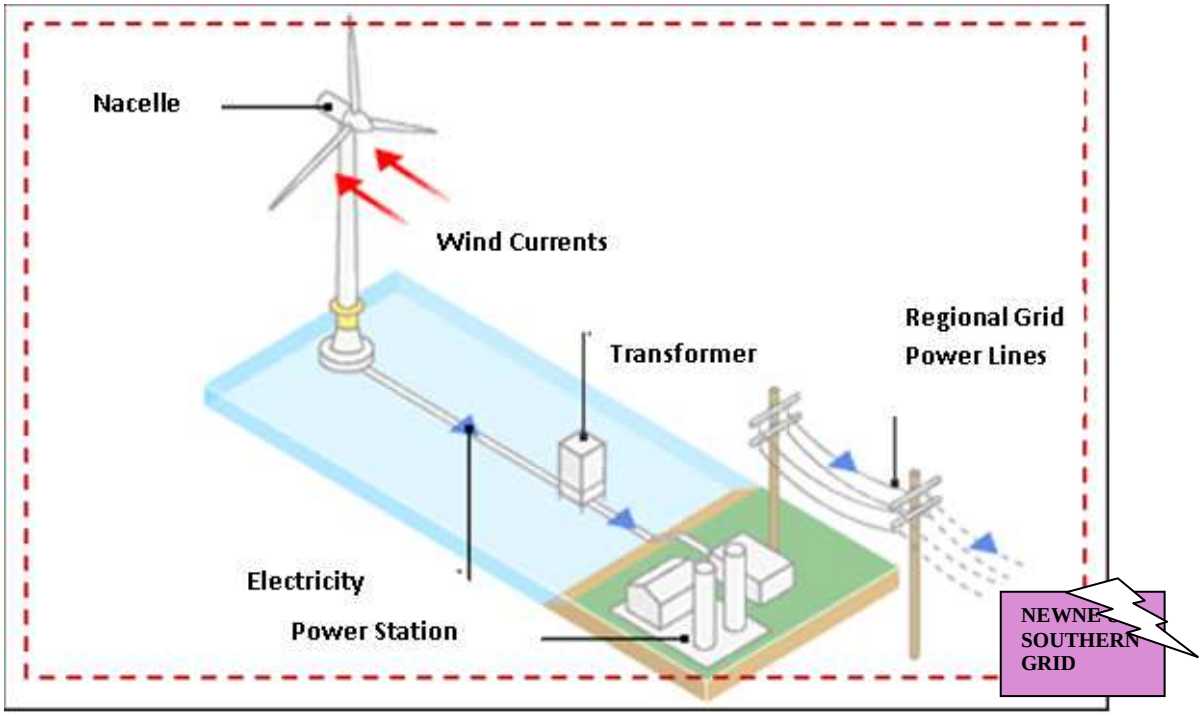


Figure 4: Project Boundary (contained by dotted line)

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

Baseline Scenario for electricity generation:

The baseline scenario for electricity generation is the electricity supplied by the VCS project activity would have been supplied by the operation of the power plants connected to the grid and by addition of new generation sources. These generation sources will be depicted in OM and BM calculations as part of the combined margin method for calculation of the baseline emission factor. The

calculation of the baseline emission factor using the combined margin methodology has been detailed in Section 4.1.

Baseline Estimation:
Baseline methodology for project category *I.D* has been detailed in paragraphs 7-12 of the approved small scale methodology *AMS I.D.* (Version 14, EB 48). Paragraph 9 of the approved methodology applies to this project activity, which states that:

For all other systems, the baseline emission is the product of electrical energy baseline $EG_{BL, y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an Emission factor.

$BE_y = EG_{BL, y} * EF_{CO2}$

Where,

BE_y = Baseline Emissions in year y; t CO_2
$EG_{BL, y}$ = Energy baseline in year y; kWh
EF_{CO2}= CO_2 Emission Factor in year y; t CO2e/kWh also referred as $EF_{grid,CM, y}$ in later sections of the PD.

As per paragraph 10 of the methodology the emission factor can be calculated in a transparent and conservative manner as follows:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'.

OR

b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

Baseline emission reductions have been estimated using combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in 'Tool to calculate the emission factor for an electricity system Version 01.1 (EB 35)'.

In the proposed baseline, NEWNE and Southern Regional Grid are used as the reference for estimating the current generation mix.

Following information is used for baseline determination:

Sr. No.	**Key information/data used for baseline**	**Source of data/information**
1.	Electricity generated	Actual electricity sale invoices.
2	Grid emission factor (NEWNE and Southern Regional Grid)	CO_2 Baseline Database –Version 4, October 2008 by Central Electricity Authority. http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Note: Emission factor ($EF_{grid,CM,\ y}$) for NEWNE Regional Grid applied for baseline estimation = 906.2 tCO_2/GWh. Emission factor ($EF_{grid,CM,\ y}$) for Southern Regional Grid applied for baseline estimation = 927.2 tCO_2/GWh Refer to section 4.2 for details.

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):

Investment Analysis:

This investment analysis was carried out using the **Additionality tool for small scale project activities** (Attachment A to Appendix B, Version 06: 30 September 2005), step (a) 'Investment Barrier' which is further explained in sub-step 1 (a) of **Non-binding best practice examples to demonstrate additionality for SSC project activities**, EB 35 as:

'Best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a **benchmark analysis** or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency). It is recommended to use national or global accounting practices and standards for such an analysis'.

As aforementioned tools does not give any further guidance on the benchmark analysis hence it was carried out using sub-step 2b – option III '**benchmark analysis' as referred in Additionality tool**, version 5.2 (EB 39) and the '**Guidance on the Assessment of Investment Analysis**' (Version 02) was also referred:

As per 'Option III' Discount rates and benchmarks shall be derived from:

(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;
(b) Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;
(c) A company internal benchmark (weighted average capital cost of the company), [only in the particular case referred to above in paragraph 5 of additionality tool Version 5.1.] The project developers shall demonstrate that this benchmark has been consistently used in the past i.e. that project activities under similar conditions developed by the same company used the same benchmark;
(d) Government/official approved benchmark where such benchmarks are used for investment decisions;

(e) Any other indicators, if the project participants can demonstrate that the above Options are not applicable and their indicator is appropriately justified.

Equity IRR was identified as the appropriate financial indicator and benchmark was derived by considering various sources of information relating to items (a), (d) and (e).

Method (a) could have been an option but it requires determination of risk premium involved with the project activity. Due to the unavailability of any publically available reference for the risk premium, aforesaid option was not considered.

As per method (b) the benchmark can be derived from "Estimates of cost of financing and required return on capital based on bankers views and **private equity investors/ funds required return on comparable projects**." Project promoter has not generated any fund from private equity investors. Hence this method was not used.

Method (c) is also not applicable as this is not the activity that can be implemented only by PP.

Method (d) is not applicable as there is no Government/official approved benchmark available that could be easily verified.

Thus PP preferred to use the Capital Asset Pricing Model (option 'e') to derive the benchmark.

Capital Asset Pricing Model: The required return was also calculated on the basis of Capital Asset Pricing Model. Details of calculations as explanations are provided in the spreadsheet; however promoter wise findings are given below:

Interocean Shipping Company (HTSC No. 787)	
	(a)
Return on Market (BSE Sensex)	13.84%
Risk Free Rate: Govt Securities yield for long term (20 yrs) approximated8 (for period 2004-05)	5.71%
Beta	1.10
Required Return	14.61%

Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)	
Interocean Shipping Company (HTSC No. 2503)	
Inter Ocean Shipping (India) Private Limited (Location No. R42)	
	(a)
Return on Market (BSE Sensex)	17.17%
Risk Free Rate: Govt Securities yield for long term (20 yrs) approximated9(for period 2005-06)	7.34%

[8] http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/65526.pdf (Table 6.4, Pg 155)

Beta	0.91
Required Return	16.33%

Against the aforementioned benchmark the required returns on investment obtained by project promoters are as below:

Project Promoters	**PO Date**	**Benchmark**	**Equity IRR**
Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)	15/11/2006	16.33%	10.15 %
Interocean Shipping Company (HTSC No. 787)	25/01/2005	14.61%	10.79 %
Interocean Shipping Company (HTSC No. 2503)	25/10/2007	16.33%	7.68 %
Inter Ocean Shipping (India) Private Limited (Location No. R42)	21/07/2008	16.33%	8.36%

These returns were arrived at on the assumption that estimated generation of units; operation & maintenance expenses and all other variables materialize as expected. Details of assumption and working are provided in spreadsheet working.

Sensitivity Analysis:

The main variable, which can adversely affect Equity IRR, is the 'saleable units' which depends on the PLF for the WTGs. This can be due to either non-availability of wind, machine & grid or other technical problems. Variations in the range of 10%. (i.e. + or – 10%) in quantity of units sold to distribution company was considered. *It may kindly be noted that the actual cost paid by the project proponent has been considered for the IRR calculation therefore variation in project cost has not been considered for sensitivity analysis.*

Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)			
Variation in PLF	**Projected PLF**	**Equity IRR (Without CDM)**	**Remarks**
10%	28.79%	12.98%	Very unusual scenario, even than the IRR is lower then the Benchmark
5%	27.48%	11.56%	Very unusual scenario, even than the IRR is lower than the Benchmark
0%	26.18%	10.15%	IRR Lower than The Benchmark

Interocean Shipping Company (HTSC No. 787)			
Variation in PLF	**Projected PLF**	**Equity IRR (Without**	**Remarks**

[9] http://rbidocs.rbi.org.in/rdocs/AnnualReport/PDFs/65526.pdf (Table 6.4, Pg 155)

		CDM)	
10%	34.32%	12.88%	Very unusual scenario, even than the IRR is lower then the Benchmark
5%	32.76%	11.84%	Very unusual scenario, even than the IRR is lower than the Benchmark
0%	31.20%	10.79%	IRR Lower than The Benchmark

Inter-ocean Shipping Company (HTSC No. 2503)			
Variation in PLF	**Projected PLF**	**Equity IRR (Without CDM)**	**Remarks**
10%	34.32%	10.30%	Very unusual scenario, even than the IRR is lower then the Benchmark
5%	32.76%	8.98%	Very unusual scenario, even than the IRR is lower than the Benchmark
0%	31.20%	7.68%	IRR Lower than The Benchmark

Inter Ocean Shipping (India) Private Limited (Location No. R42)			
Variation in PLF	**Projected PLF**	**Equity IRR (Without CDM)**	**Remarks**
10%	24.96%	10.19%	Very unusual scenario, even than the IRR is lower then the Benchmark
5%	23.82%	9.28%	Very unusual scenario, even than the IRR is lower than the Benchmark
0%	22.69%	8.36%	IRR Lower than The Benchmark

Based on the additionality tool for investment analysis and after comparing the Equity IRR values with the benchmark and further performing the sensitivity analysis, it is clear that the project activity is not financially viable and hence this project is additional and not the baseline scenario. Further, upon considering the benefits from VCS, the risks related to the operating of the wind project can be partially mitigated.

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:

As all the monitoring methodologies under CDM (Clean Development Mechanism) are approved under VCS 200.1[10], same has been applied to determine the project's baseline scenario emission levels and the process to monitor emission reductions.

Type : I – Renewable Energy Projects
Project Category : I.D. – Grid connected renewable electricity

[10] http://www.v-c-s.org/methodologies.html

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.

PD also refers to:-

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

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

Purpose of monitoring

The project activity essentially involves generation of electricity from wind; the employed WTG can convert wind energy into electrical energy. The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue. The purpose of monitoring is accurate and transparent 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.

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

The monitoring plan is being devised as per approved methodology AMS 1D (Version 14), Para 16 and the 'Tool to calculate the emission factor for an electricity system (Version 01.1, EB 35). The referred necessitate monitoring of the following parameters:

- Net Electricity supplied by the project activity to the grid;

- Since the simple OM emission factor and BM has been calculated on ex ante basis based on the most recent information available (refer section 4.2) its monitoring is also not required as per the guidelines. Also the project activity does not involve Leakage and Project Activity Emissions as discussed in section 4.3 hence it is not required to monitoring these as well.

Hence, under the monitoring protocol for the project it is required to monitor and record only the electricity generated and exported by the wind farm to the regional grid.

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

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:

<table>
<tr><td>Data / Parameter:</td><td colspan="2">$EG_{BL,y}$</td></tr>
<tr><td>Data unit:</td><td colspan="2">GWh</td></tr>
<tr><td>Description:</td><td colspan="2">Net electricity supplied by individual WTGs included in the project activity.</td></tr>
<tr><td>Source of data to be used:</td><td colspan="2">Metered net electricity supplied by the project activity (as it reflects in the electricity generation report), cross checked with records of sold electricity (i.e. electricity sale invoices).</td></tr>
<tr><td>Value of data applied for the purpose of calculating expected emission reductions</td><td>List of Promoters in bundle (Identification No.)</td><td>Energy Generated ($EG_{BL,y}$) in GWh</td></tr>
<tr><td></td><td>Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)</td><td>2.75</td></tr>
<tr><td></td><td>Interocean Shipping Company (HTSC No. 787)</td><td>3.61</td></tr>
<tr><td></td><td>Interocean Shipping Company (HTSC No. 2503)</td><td>3.61</td></tr>
<tr><td></td><td>Inter Ocean Shipping (India) Private Limited (Location No. R42)</td><td>2.21</td></tr>
<tr><td></td><td>Total ($EG_{BLy,\ total}$)</td><td>12.18</td></tr>
<tr><td>Description of measurement methods and procedures to be applied:</td><td colspan="2">The Energy Meters (Tri vector meter) measures import and export of electricity on a continuous basis. These meters are installed at the high voltage side of the step up transformer at the receiving station in case of WTGs located in Maharashtra and Rajasthan and high voltage side of the step up transformer in switch yard in case of WTGs installed in Tamil Nadu. These are two-way meters and can record export as well of electricity at the same time.

ESCOM representatives (Electricity Supply Company viz. MSEDCL [11] , TNEB [12] , JVVNL [13]) along with a representative of project promoter takes the readings (joint meter reading) on these meters on monthly basis and the</td></tr>
</table>

[11] Maharashtra state Electricity Distribution Company Limited is referred as MSEDCL in the PD
[12] Tamil Nadu Electricity Board is referred as TNEB in the PD
[13] Jaipur Vidyut Vitaran Nigam Limited is referred as JVVNL in the PD

	same reading is used to determine the net power exported to the grid and determine the extent of mitigation of GHG over a period of time in a way described in section 3.4 of the PD. **Metering equipment:** Tri vector Energy Meter[14] **Accuracy Class:** 0.2 (MSEDCL and JVVNL meters) **Accuracy Class:** 0.5 (For TNEB meters) **Data type:** Estimated (using meter readings) **Archiving:** Electronic **Recording Frequency:** Monthly **Responsibility:** The O&M operator is responsible for the regular recording of data. **Calibration Frequency:** The meters are calibrated by the ESCOM testing division annually.
QA/QC procedures to be applied:	Refer section 3.4
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

Subsequent to the description in section 3.2:

DATA RECORDING:

The electricity delivered by the WTGs is metered with the help of Energy Meters (Tri vector meter) installed at the high voltage side of the step up transformer installed at the receiving station.

- In case of MSEDCL and JVVNL the monitoring (data recording) of the generated electricity is carried out in two fold. The primary monitoring is carried on monthly basis at the meters installed sending end of the substation (high voltage side) of the Wind firm. Whereas the secondary monitoring is carried out automatically through the local control system (LCS) installed at the base of the WTG under the observation of the Operation and Maintenance team of SUZLON/ Vestas. The Daily report is prepared by operation and maintenance team and is sent to the project proponent on a monthly basis.

- In case of WTGs installed in Tamil Nadu only primary monitoring carried out at the sending end i.e. high voltage side of step up transformer installed at individual WTG level.

[14] **Trivector Meter** - is a device that measures the amount of electrical energy supplied to the utility. It is called as tri-vector meter because it measures energy consumption of the three phase lines R, Y, B which are 120 phase difference from each other. It measures the consumption in terms of the active energy, reactive energy, apparent energy, power factor.

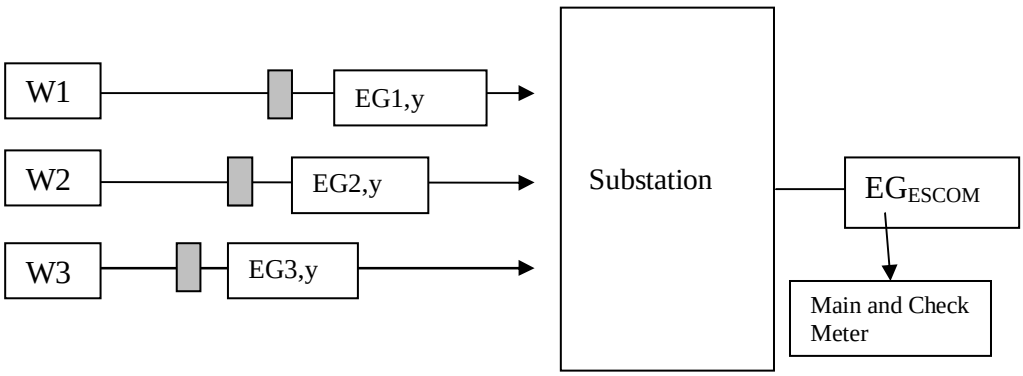
METERING AND BILLING:

For WTGs connected to MSEDCL and JVVNL substations:

The **joint meter reading** is carried out once in a month in presence of both parties i.e. the project developer's representative and officials of ESCOM (viz. MSEDCL & AVVNL) at the meters (Net meters- Main and Check meter) connected to sending end of the substation. This meter reading gives the cumulative generation reading for all WTGs connected through a number of feeder lines to the Substation. Both parties viz. promoter, developer and ESCOM authorities sign the recorded reading for authenticity. Generation from individual WTGs is then extrapolated by SEL/VWTIPL and ESCOM in a way described below in this section.

Apportioning of electricity:

Each substation is connected to a number of wind turbines (WTGs). The generation reading for all WTGs is collectively displayed by the substation meter (Net meters). The net generation of each of the wind turbines is then calculated in the following manner:



The generated electricity is measured through a two step procedure wherein the first metering is carried out at the controller (referred as LCS Controller in the following sections of this section of PD) of the WTG with on-board meter. The monitoring of all these wind turbines is done from a common monitoring station as a part of central monitoring system. The system consists of a state- of- the- art controlling and monitoring and well as trained staff personnel of O&M contractor, SEL/ VWTIPL, always present on site to monitor various parameters of power generation and deal with any problems related to generation, transmission or maintenance. $EG_{n,y}$ is the electricity generated from an individual wind turbine measured through its controller meter. The total Electricity Generated by an individual wind turbine of a project proponent in MWh is presented as

$$EG_{n,y}$$

And the summation of total Electricity Generated from all the wind turbines connected to a common feeder at the given site in MWh (measured at the individual controllers) is presented as

$$\sum_{0}^{m} EG_{m,y}$$

Where, $\sum EG_{m,y}$ = EG1,y + EG2,y+ EG3,y…. EGn,y

A ratio based on these two set of measured values is used for apportioning the net electricity supplied to the western regional grid by the project activity.

The second metering is carried out at grid interconnection point (sub- station) wherein the Joint Meter Reading (JMR) is carried out, usually in the first week of every month, in presence of the representatives of the project proponent & the ESCOM. This JMR is used for calculation of the amount of electricity supplied to the grid against which the utility makes the payment to the project proponent. The JMR gives both the "export" ($EG_{JMR,export}$) and "import" ($EG_{JMR,import}$) of the electricity to/ from the western grid. There is a single meter which gives both the export and import values, this metered reading gives the net value of line losses and auxiliary consumption. The net electricity generated is referred as EG_{ESCOM} (i.e. $EG_{JMR,export}$ - $EG_{JMR,import}$). Further, as there is a common ESCOM joint meter for multiple project proponents, the joint meter reading (JMR) taken every month by ESCOM personnel, reflects the cumulative monthly generation for all wind turbines connected to this ESCOM meter. The apportioning of electricity generated from the various wind turbines is done by the EPC contractor (SEL/ VWTIPL) based on the power generation from the individual wind turbines connected to this ESCOM meter. O&M personnel prepare a monthly report on generation and consumption. This report contains details of power exported/imported to/from the grid by each of the wind turbines connected. This apportioned value is then used by the project proponent to raise invoice against the sale of electricity to ESCOM.

$EG_{BL,y}$ the electricity supplied to the grid by the individual WTGs project activity is calculated as follows:

$$EG_{BL,y} = \frac{EG_{n,y}}{\sum_{0}^{m} EG_{m,y}} * EG_{ESCOM}$$

Where

$EG_{BL,y}$	The electricity supplied to the grid by the individual WTGs project activity.
$EG_{n,y}$	The total Electricity Generated by an individual wind turbine (WTG) of a project proponent in MWh.
EG_{ESCOM}	Total net generation at ESCOM substation feeder

	obtained by deducting ($EG_{JMR,import}$) from ($EG_{JMR,export}$)
$\sum EG_{m,y}$	Total generation of all the WTGs connected to the feeder at controller.

ESCOM carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of representative of project proponents. The frequency of meter testing is annual. All meters are tested only at the Metering Point. The meters are tested and maintained as per the Metering Code for Rajasthan. Additionally, each wind turbine is equipped with an integrated electronic meter. The electricity generated is recorded by the O & M staff of the EPC contractor on 24 hour basis. Monthly and daily generation reports are also sent to the project promoter for their reference and scrutiny through email on a regular basis.

Description of calibration of meters:

The calibration of the meters are carried out by ESCOM annually/or at least once in three years. Other than periodic calibration of the meters, the reading of both main and check meters are matched every month.

WEG Controller/LCS Controller: It is a micro-processor based intelligent controller which has been specially designed for control of wind turbines. It uses a Woodward Multi function Relay that has three current inputs from CT and three direct voltage inputs (690 Volts). The analog values of current/voltage are converted into digital signal internally using A/D Converters at very high sampling rate. A software program reads these values and displays instantaneous parameters such as voltage, current, power factor, kVAh, kVArh and kWh. These instantaneous values are then time integrated and displayed/stored. Woodward relay does not have a display and needs special protocol to view energy readings as this relay communicates digital signal through special communication protocol hence, it is not possible to calibrate. Moreover, turbine cannot run without this relay hence it cannot be removed for calibration during operation.

Emergency preparedness:

All the main and check meters are tested for accuracy every calendar quarter with reference to a portable standard meter which are of an accuracy class of 0.2%. The portable standard meter is owned by ESCOM and tested and certified at least once every year against an accepted laboratory standard meter in accordance with electricity standards. The meters are deemed to be working satisfactorily if the errors are within specifications for meters of 0.2% accuracy class. The consumption registered by the main meters alone hold good for the purpose of billing as long as the error in the main meter is within the permissible limits.

a. If during the quarterly tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing is as per the main meter as usual. The check meter is however, calibrated immediately.

b. If during the quarterly tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month up to the date and time of such test is as per the check meter. There is a revision in the bills for the period from the previous calibration test up to the current test based on the readings of the check meter. The main meter is calibrated immediately and billing for the period thereafter till the next monthly meter reading is as per the calibrated main meter.

c. If during the quarterly tests, both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the meters are immediately calibrated and the correction applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period thereafter till the next monthly meter reading is as per the calibrated main meter.

d. If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2 % accuracy class, all the meters are re-tested and calibrated immediately.

For WTGs connected to TNEB grid:

Vestas WTGs installs only one main meter (a two way Trivector meter) at the sending end of the WTG transformer. There are no meters installed at the substation. As the in substations in most of the cases are installed within 2-5 kms the transmission losses are almost negligible, hence ignored while estimating the net export. As metering in done at individual WTG level the net export from individual WTGs can directly be obtained from the meters installed. Monitoring (JMR) is carried out by ESCOM in presence of project promoter's representative on monthly basis at the sending end (high voltage side) of the individual WTG transformer. ESCOM carries out the calibration, periodical testing, sealing and maintenance of meters in the presence of representative of project proponents. The frequency of meter testing is annual. All meters are tested only at the Metering Point. The meters are tested and maintained as per the Metering Code for Tamil Nadu and Maharashtra.

Description of calibration of meters:

Main meter: The calibration of the meters are carried out by ESCOM annually/or at least once in three years.

Emergency preparedness:

All the main meters are tested for accuracy every calendar quarter with reference to a portable standard meter. The portable standard meter is owned by ESCOM. The meters are deemed to be working satisfactorily if the errors are within specifications for meters.

a. If during any of the monthly meter readings, the error in the main meter is more than that permissible for meters all the meters are re-tested and calibrated immediately or replaced by an already calibrated meter.

b. If during the quarterly tests main meter is found to be beyond the permissible limits of error, it is immediately calibrated or replaced by a calibrated meter and a correction factor is applied to the reading registered by the main meter to arrive at the correct reading of energy supplied for billing purposes for the period from the last month's meter reading up to the current test. Billing for the period thereafter till the next monthly meter reading is as per the calibrated main meter.

ROUTINE MAINTENANCE SERVICES:

The project proponents have signed an "Operation and Maintenance" agreement with the supplier of the wind turbines for the operation of the wind farm. The O & M management structure is as follows:

Routine Maintenance Labour Work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep of the equipment including –

a) Tower Torquing
b) Blade Cleaning
c) Nacelle Torquing and Cleaning
d) Transformer Oil Filtration
e) Control Panel & LT Panel Maintenance
f) Site and Transformer Yard Maintenance

Security Services: This service includes watch & ward and security of the wind farm and the equipment.

Management Services:

a) Data logging in 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.

Technical Services:

a) Visual inspection of the WTG and all parts thereof.
b) Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.
c) Annual and monthly training schedules are organized by SEL/ VWTIPL.

INTERNAL AUDIT AND GHG COMPLIANCE AT THE SUPPLIERS END:

The project participant has signed an operation and maintenance agreement with the supplier of the wind turbines i.e. SEL and VWTIPL. The performance of the turbines, safety in operation and scheduled /breakdown maintenances is

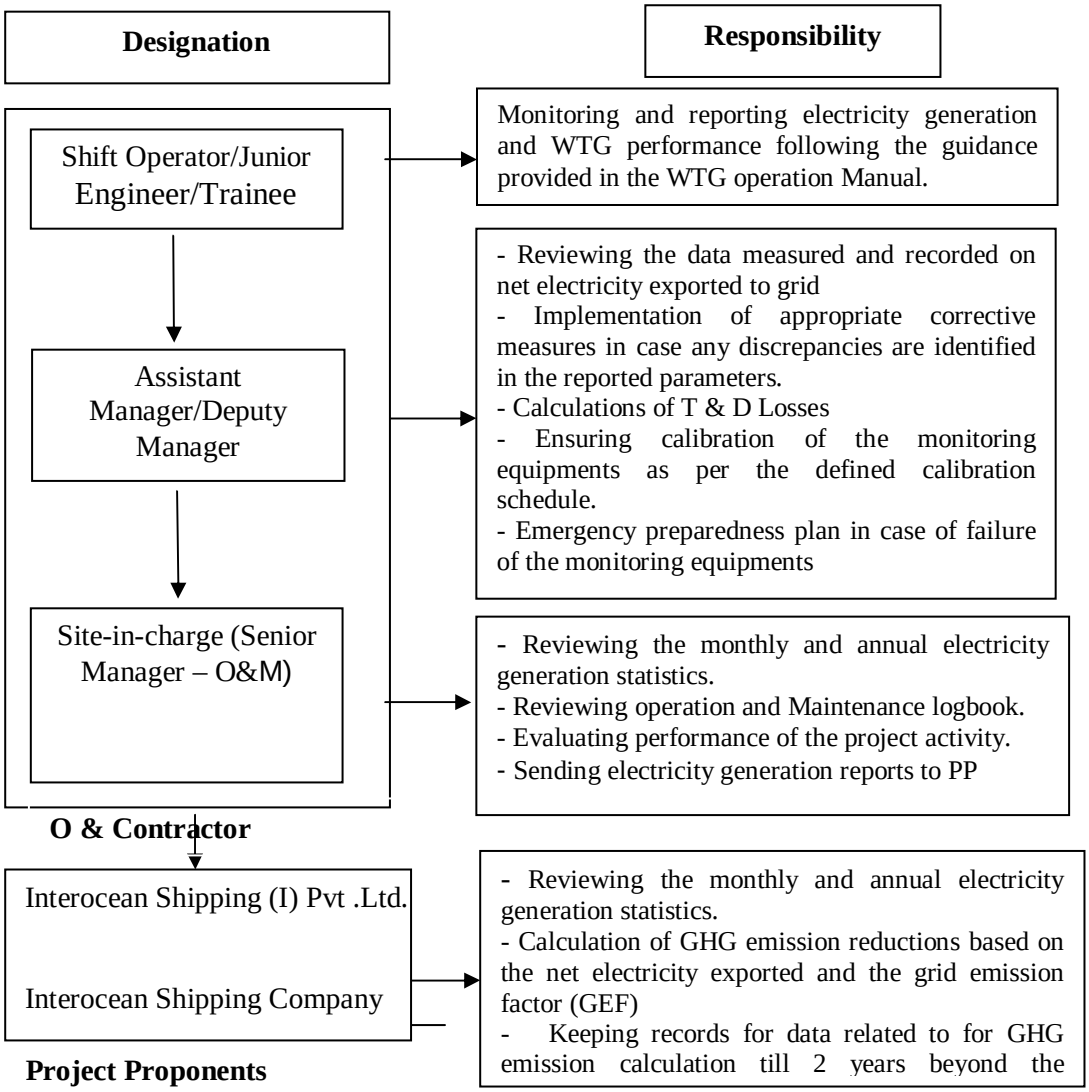
responsibility of SEL and is organized and monitored by them. So the authority and responsibility of project management lies with the O & M contractor.

ISO 9001:2000 standard has been adopted by SEL and VWTIPL [15], which is responsible for monitoring, calibration and O & M of the project. Training is an essential part of the ISO system. To comply with the ISO standard, training has to be provided to personnel according to their responsibility with in organization.

Project promoter IN Maharashtra and Rajasthan are also provided with a unique logion ID and password with the help of which they can access the generation and performance status of each WTG online in real-time. The same report is used for internal assessment of the project activity by the project promoters. Representative of project promoter carries out site visit and checks from time to time to check the validity of the monitored data.

The responsibilities of project team are presented below:

[15] As Suzlon and Vestas are a ISO 9001:2000 certified company, training their employees for day to day recording and handling and maintenance is an integral part of their Quality Management System procedure.



4 GHG Emission Reductions:

4.1 Explanation of methodological choice:

As all the methodologies under CDM (Clean Development Mechanism) are approved under VCS 2007.1[16], same has been applied to determine the project's baseline scenario emission levels and the process to monitor emission reductions.

As defined under Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project activity proposes to apply following project types and categories:

Type	:	I – Renewable Energy Projects
Project Category	:	I.D. – Grid connected renewable electricity

[16] http://www.v-c-s.org/methodologies.html

generation
(Version 14: EB 48)

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

As discussed in section 2.4 of the PD, Grid Emission Coefficient (or CO_2 Emission factor) have been estimated using combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in 'Tool to calculate the emission factor for an electricity system (Version 1.1, EB 35)' .

✓ **Calculation of emission coefficient for the grid electricity (or CO_2 Emission factor):**

Emission coefficient for the grid electricity source is determined as follows:

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:

Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states (see Table below). Since August 2006, however, all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids are now treated as a single grid and named as NEWNE grid.

Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state meets their demand with their own generation facilities and also with allocation from power plants owned by the central sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the central sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. Moreover, there are also electricity transfers between regional grids, and small exchanges in the form of cross-border imports and exports (e.g. from Bhutan).

Geographical Scope of regional grids:

NEWNE Grid				**Southern Grid**
Northern	**Eastern**	**Western**	**North-Eastern**	
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman &	Manipur	Kerala

		Diu		
Himachal Pradesh	West Bengal	Dadar & Nagar Haveli	Meghalaya	Tamil Nadu
Jammu &Kashmir	Sikkim	Madhya Pradesh	Mizoram	Pondicherry
Punjab	Andaman-Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa		Tripura
Utter Pradesh				
Uttaranchal				

For the purpose of calculating the emission reductions achieved by any CDM project, the 'Tool to calculate the emission factor for an electricity system' requires that the "project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints". As per the delineation given by CEA, Maharashtra and Rajasthan States fall into NEWNE Regional Grid and Tamil Nadu State falls into Southern Regional Grid. Therefore NEWNE and Southern Regional Grid have been used for calculating emission factors.

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 five most recent years, or 2) based on long term averages for hydroelectricity production.

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)			
	2005-2006	**2006-07**	**2007-08**
NEWNE	18.0%	18.5%	19.0%
South	27.0%	28.3%	27.1%
India	20.1%	20.9%	21.0%
Average of five years for NEWNE			**18.5 %**
Average of five years for Southern Region			**27.46 %**

Table reference CEA Baseline Database, Version 4

In NEWNE and Southern region the low-cost/must run resources constitute only 18.5 % and 27.46 % respectively (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 1.1, EB 35) has been used in the CEA Baseline Database for the calculation of operating margin.

Simple Operating Margin emission factor (NEWNE Region) in tCO_2/GWh (incl. imports)		
Year	**Simple OM (NWENE)**	**Simple OM (SR)**
2005-2006	1019	1017
2006-2007	1008	1006
2007-2008	999	997
Average of 3 years	**1009**	**998**

Table reference- CEA Baseline Database, Version 4

As per the *"Tool to calculate the emission factor for an electricity system"* (Version 1.1, 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.

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 3. Power plant registered as CDM project activities have been excluded from the sample group *m*. Capacity additions from retrofits of power plants have not been included in the calculation of the build margin emission factor.

Note: In line with the "Tool to calculate the emission factor for an electricity system" (Version 01.1, EB 35), power plant registered as CDM project activities should be excluded from the sample group m. However, If group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power units that are built more than 10 years ago then: (i) power units that are built more than 10 years ago from the group must be excluded; and (ii) grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system should be included. However, in NWENE Region group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor are not older than 10 years. Hence grid connected power projects registered as CDM project activities have not been included in the sample group m (NWENE Region group of power units).

20% of Net Generation (GWh)

	2003-04	2004-05	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

Table reference – CEA Baseline Database, Version 4

Net Generation in Built Margin (GWh)

	2003-04	2004-05	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

Table reference- 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 1.1, 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.

Build Margin emission factor (NWENE Region) in tCO_2/GWh

Year	BM (NWENE)	BM (SR)
2007-2008	598	713

Table reference- CEA Baseline Database, Version 4

Note: Details of power plants considered for BM calculation has been given in Annex- 3

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

The combined margin emissions factor is calculated as follows:

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

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,

NWENE Regional Grid:

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

$= 1009 \text{ X } 0.75 + 598 \text{ X } 0.25$

$= 906.2 \text{ tCO}_2\text{/GWh}$ **……..** Refer excel sheet

Southern Regional Grid:

$\mathbf{EF_{grid,CM,y}} = EF_{grid,OM,y} \text{ X } 0.75 + EF_{grid,BM,y} \text{ X } 0.25$ **.....Equation II**

$= 998 \text{ X } 0.75 + 713 \text{ X } 0.25$

$= 927.2 \text{ tCO}_2\text{/GWh}$ **……..** Refer excel sheet

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 per the methodology AMS-I.D./ Version 14 for wind power projects,
$PE_y = 0$.

Leakage Emissions:

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

"If the energy generating equipment is transferred from another activity leakage is to be considered".

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.

Thus the GHG emissions attributable to the project activity (project emissions and Leakage) in the year y are as below:

$\mathbf{PE_y = 0}$
$\mathbf{L_y = 0}$

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

Emission Reduction Calculation:

Paragraph 9 of the approved methodology states that:

'For all other systems, the baseline emissions is the product of electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor'.

Hence baseline emissions or CERs generated by the project are estimated as under:

$$\mathbf{BE_y = EG_{BL,y} X EF_{grid,CM,y}}$$

……..Equation III

Where,

$EG_{BL,y}$ = Net quantity of electricity supplied to the manufacturing facility by the project during the year y in kWh (or MWh/GWh), and
$EF_{grid,CM,y}$ (or EF_{CO2}) = Grid emission factor (emission factor) for the electricity displaced due to the project activity during the year y (tCO_2/kWh (or MWh/GWh)).

Note: Grid emission factor (or emission factor) is represented in Tool to calculate the emission factor for an electricity system" -Version 1.1, EB 35 as '$EF_{grid,CM,y}$' and in approved methodology AMS I.D, Version 14, EB 48 it is represented as 'EF_{CO2}'. Here '$EF_{grid,CM,y}$' has been used .to represent Grid emission factor (or emission factor).

- **Emission Reduction (ER_y):**

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions through substitution of electricity generation with fossil fuels (BE_y) and project emissions (PE_y)

$$\mathbf{ER_y = BE_y - PE_y - L_y}$$

……..Equation IV

Where:

ER_y = the emission reductions of the project activity during the year y in tons of CO_2.

BE_y = the baseline emissions due to the displacement of electricity during the year y in tons of CO_2
PE_y = the project activity emissions during the year y in tons of CO_2
L_y = Estimation of leakage (tons CO_2e / yr)

Since, the project activity emissions (PE_y) and Leakage (L_y) for this project is zero (refer section 4.2),

$ER_y = BE_y$ **……..Equation V**

Years	Estimation of project activity Emissions (tones of CO_2 e)	Estimation of baseline Emissions (tones of CO_2 e) **(BE_y)**	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions in tonnes of CO_2 e **(ER_y)**
Year 1	0	3,973	0	3,973
Year 2	0	6,572	0	6,572
Year 3	0	10,190	0	10,190
Year 4	0	11,190	0	11,190
Year 5	0	11,190	0	11,190
Year 6	0	11,190	0	11,190
Year 7	0	11,190	0	11,190
Year 8	0	11,190	0	11,190
Year 9	0	11,190	0	11,190
Year 10	0	11,190	0	11,190
Total (tones of CO2 e)	0	99,062	0	99,062

Note: The detailed calculation would be provided separately in an excel sheet.

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 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. Wind farms are not included in this list and thus an EIA is not required.

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 State Electricity Board by setting up HT transmission lines and installation of 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:

Promoters involved in the bundled project activity identified local communities, farmers, and villagers, as the stakeholders with an interest in the wind power project. The meeting was independently conducted at the all sites as per following schedule. Accordingly, three weeks prior to the scheduled meeting date the promoters had sent requests (through Public Notice and Advertisement in local news paper) to all the respective stakeholders to attend meeting or depute representatives at respective venues (in table below):

Promoter	MW	Venue for stakeholder meeting	Meeting Date
Interocean Shipping (I) Pvt. Ltd.	1.65	Village-Gudepanchagani	25/11/2006
Interocean Shipping Company	1.65	Village-Pethappampatti	20/03/2008
Interocean Shipping Company	1.65	Village-Thandyarkulam	25/11/2007
Interocean Shipping (I) Private Limited	1.25	Village-Gorera and Satta	19/09/2008

The agenda of the meeting was fixed as follows:

- Welcome
- Description of the project details.
- Queries and responses from the proponent and the stakeholders.
- Vote of thanks.

Summary of comments received:

No negative comments were received in context of the project. The stakeholders support the project as they believe the project is environmentally sound and it has lead to an overall development of the area by:

- Generation of additional revenue generated thro' land / lease to outsiders like contractors & their employees.

- Generation of job opportunities for day -to - day maintenance and security of WTGs
- Development of roads, etc.

The stakeholder documents as invitation letters, Minutes of meeting, Meeting photographs, comments from stakeholders, attendance sheet etc. has been submitted to the validator.

7 Schedule:

Sl. No.	Activity	Date
1	VCS Project Start Date	29/04/2005
2	Stakeholder Consultation	Refer section 6 above
3	Appointment of Validation Agency for Validation/Verification	ISIPL- 17/11/2009 ISC – 15/11/2008
4	Life time of WTGs	20 years
5	Crediting period under VCS	Start Date: 28/03/2006 End Date 27/03/2016
6	Frequency of monitoring	Continuous (meter readings aggregated monthly)

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 the project promoters of the wind-farms and 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

Documents	POs	PPA	CC
Promoter	Availability Checklist		
Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)	Yes	Yes	Yes
Interocean Shipping Company (HTSC No. 787)	Yes	Yes	Yes
Interocean Shipping Company (HTSC No. 2503)	Yes	Yes	Yes
Inter Ocean Shipping (India) Private Limited (Location No. R42)	Yes	Yes	Yes
Interocean Shipping (I) Pvt. Ltd. (Location No. GP 10)	Yes	Yes	Yes

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

All other project promoters have authorized Interocean Shipping (India) Private Limited to undertake the responsibility of accruing and handling the GHG emission reductions on their behalf by means of an agreement.

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;*

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.*

Refer Section 1.13 (Also see the note below)

Note: 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.