CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Title: Bundled Wind Power Project in Jamnagar, Gujarat
Version: 07
Date: 04/02/2013

A.2. Description of the small-scale project activity:

>>The proposed project is a bundled project activity which involves commissioning and operation of 12 Wind Energy Convertor (WECs) of 0.8 MW capacities with a total installed capacity of 9.6 MW. The machines are Enercon E-53 make. The project will generate 20.09 GWh of electricity per year which shall be supplied to the state electricity utility thereby contributing to reducing the energy demand supply gap in the state of Gujarat. The project activity will assist the sustainable growth of the region by providing clean and green electricity to the state electricity grid. The bundled project activity consists of 12 WECs:

Name	No. of WECs
Vish Wind Infrastructure LLP	8
J. N. Investment & Trading Co. Private Limited	4

Purpose of the project activity:

The purpose of the project activity is to utilize renewable wind energy for generation of electricity. The project activity replaces anthropogenic emissions of greenhouse gases (GHG's) into the atmosphere, which is estimated to be approximately 18,541 tCO_2e per year, by displacing the equivalent amount of electricity generation through the operation of existing fuel mix in the grid comprising mainly fossil fuel based power plants and future capacity expansions connected to the grid.

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the 'Northern Eastern Western North-Eastern' NEWNE grid, which are/ will be predominantly based on fossil fuels[1]. Whereas the electricity generation from operation of Wind Energy Convertors (WEC's) is emission free. As per the applicable methodology the baseline scenario for the project activity is the grid based electricity system, which is also the pre-project scenario.

Nature of Project

The Project harnesses renewable resources in the region, thereby displacing non-renewable natural resources and leading to sustainable economic and environmental benefits. Enercon (India) Limited ("Enercon") will be the equipment supplier and the operations and maintenance contractor for the Project.

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

The generated electricity will be supplied to Gujarat Urja Vikas Nigam Limited (GUVNL) under a long-term power purchase agreement (PPA).

Contribution to Sustainable Development

The National CDM Authority (NCDMA) which is the Designated National Authority (DNA) for the Government of India (GoI) in the Ministry of Environment and Forests (MoEF) has stipulated four indicators for sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India The contributions of this project activity towards these indicators are provided below:

1. **Social well being:**
   - The project activity will lead to the development of supporting infrastructure such as road network etc., in the wind park location, the access to which is also provided to the local population.
   - The project activity will lead to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
   - Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading to increased energy security.
2. **Environmental well being:**
   - The project activity employs renewable energy source for electricity generation instead of fossil fuel based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes.
   - Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment and contributes to environmental well-being.
3. **Economic well being:**
   - The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this will create additional employment opportunities in the region
   - The generated electricity will be fed into the NEWNE grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.
4. **Technological well being:**
   - Increased interest in wind energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

A.3. Project participants:

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Vish Wind Infrastructure LLP (Vish Wind) is the primary coordinator of the project activity and other promoter is separate company, who's WECs are part of the project activity. Vish Wind as the coordinator for the project activity, has entered into contractual agreements with other promoter to carry out the CDM project activity and shall be single point of contact for all communications with the CDM Executive Board and the National CDM Authority. Vish Wind shall act as a coordinator for providing all relevant information during this exercise.

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)	1.Vish Wind Infrastructure LLP 2. J. N. Investment & Trading Co. Private Limited	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

India

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

Western Region/ Gujarat State

A.4.1.3. City/Town/Community etc:

The Project is spread across villages Butavadar, Chiroda Mulji, Chiroda Sang, Bagadhra, & Mandasan in Jamnagar of Gujarat state in India.

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

Nearest airport and railway station are at Jamnagar city which is located at a distance of approximately 60 kms from the project activity site.
The project activities WECs lies between latitude 21 Degree 56 Minute 1.8 Second and 21 Degree 59 Minutes 48.6 Seconds, Longitude 70 Degree 6 Minute 17.5 Second and 70 Degree 13 Minute 19.7 Second.

The individual latitude & longitude details of the WECs are as follows:

Samana Site, Jamnagar District, Gujarat											
					Latitude			Longitude			
Loc. No.	WTG ID No.	Village	Taluka	District	Deg.	Min.	Sec.	Deg.	Min.	Sec.	Commissioning Date
3063	EIL/800/10-11/1822	Butavadar	Jamjodhpur	Jamnagar	21	59	20.8	70	13	19	27-Sep-10
3064	EIL/800/10-11/1823	Butavadar	Jamjodhpur	Jamnagar	21	59	12.7	70	13	19.7	27-Sep-10
3066	EIL/800/10-11/1824	Butavadar	Jamjodhpur	Jamnagar	21	58	42.7	70	13	11.1	27-Sep-10
3113	EIL/800/10-11/1825	Chiroda Mulji	Jamjodhpur	Jamnagar	21	56	1.8	70	11	4.1	27-Sep-10
3114	EIL/800/10-11/1887	Chiroda Mulji	Jamjodhpur	Jamnagar	21	56	13.4	70	11	11.5	29-Sep-10
3115	EIL/800/10-11/1888	Chiroda Mulji	Jamjodhpur	Jamnagar	21	56	19.1	70	11	3	29-Sep-10
3135	EIL/800/10-11/1891	Chiroda Sang	Jamjodhpur	Jamnagar	21	58	57.6	70	10	21.9	30-Sep-10
3136	EIL/800/10-11/1892	Chiroda Sang	Jamjodhpur	Jamnagar	21	59	6.3	70	10	19.9	30-Sep-10
3137	EIL/800/10-11/1893	Chiroda Sang	Jamjodhpur	Jamnagar	21	59	23.3	70	10	14.4	30-Sep-10
3139	EIL/800/10-11/1894	Bagadhra	Jamjodhpur	Jamnagar	21	59	29.8	70	10	8.6	30-Sep-10
3166	EIL/800/10-11/1889	Bagadhra	Jamjodhpur	Jamnagar	21	59	23.7	70	6	53.3	29-Sep-10
3169	EIL/800/10-11/1890	Mandasan	Jamjodhpur	Jamnagar	21	59	48.6	70	6	17.5	29-Sep-10

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

The proposed project activity is a small scale CDM project activity. According to the Appendix B[2] of the simplified modalities and procedures (M & P) for small-scale CDM project activities, the proposed project activity falls under the following type and category.

Project Type(I): '***Renewable Energy Project Activities'***,
Category I.D '**Grid Connected** ***Renewable Electricity Generation'*** and
Reference: AMS I.D, EB 54 Version 16, Sectoral Scope 01.

The project activity involves 12-wind energy converters (WECs) of Enercon make (800 kW E-53) with internal electrical lines connecting the project activity with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The project activity can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The average life time of the WEC is around 20 years as per information provided by the supplier. The other salient features of the state-of-art-technology are:

[2] http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

Turbine model	Enercon E- 53
Rated power	800 KW
Rotor diameter	53 m
Hub height	75 m
Turbine Type	Gearless horizontal axis wind turbine with variable rotor speed
Power regulation	Independent electromechanical pitch system for each blade.
Cut in wind speed	2.5 *m/s*
Rated wind speed	12 *m/s*
Cut out Wind speed	28-34 m/s
Extreme Wind Speed	59.5 *m/s*
Rated rotational speed	32 rpm
Operating range rot. speed	12-29 rpm
Orientation	Upwind
No of Blades	3
Blade Material	Fibre Glass Epoxy reinforced with integral lightning protection
Gear box type	Gear less
Generator type	Synchronous generator
Braking	Aerodynamic
Output Voltage	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor and friction bearing
Tower	74 m concrete

Enercon has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the NEWNE grid, which are/ will be predominantly based on fossil fuels[3], hence baseline scenario of the project activity is the grid based electricity system, which is also the pre-project scenario. Since the project activity involves power generation from wind, it does not involve any GHG emissions for generating electricity.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

The estimated emission reductions over the 10 year fixed crediting period would be 185,410 tCO_2e.

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

Years	Annual estimation of emission reductions in tonnes of CO_2e
*1st year	18,541
2nd year	18,541
3rd year	18,541
4th year	18,541
5th year	18,541
6th year	18,541
7th year	18,541
8th year	18,541
9th year	18,541
10th year	18,541
Total estimated reductions (tonnes of CO_2e)	185,410
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	18,541

*1st year begins from the date of registration, and each year extends for 12 months.

A.4.4. Public funding of the small-scale project activity:

There is no public funding from Annex 1 countries and no diversion of Official Development Assistance (ODA) involved in the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

As mentioned under *Appendix C of EB 54 Annex 13 of the Simplified Modalities and Procedures for Small-Scale CDM Project activities,* the following results into debundling of large CDM project:

A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The identified CDM project is being promoted by Vish Wind Infrastructure LLP. Both the project participants confirm that they have not registered any small scale CDM activity or applied for registration of another small scale CDM project activity within 1km of the respective project boundaries of this project in the same project category and technology/measure. Hence the above criteria of debundling cases are not applicable for this CDM project.

SECTION B. Application of a baseline and monitoring methodology

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

Project Type: I. Renewable energy projects
Project Category: I D. Grid connected renewable electricity generation
Title Description: AMS I.D, Version 16, Sectoral Scope 01, EB 54 Grid connected renewable electricity generation

Reference: AMS I.D. Version 16
http://cdm.unfccc.int/methodologies/DB/Q3VOK1HPBFTLSP7ZXFMY8R8Y4BEVJX

B.2 Justification of the choice of the project category:

S. No	Applicability Criteria	Project Case
1	This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to a national or a regional grid. Project activities that displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit shall apply AMS-I.F.	The project activity generates electricity using renewable energy source- wind power. Generated electricity is supplied to NEWNE Grid of India hence displaces the electricity which would have otherwise been generated from the fossil fuels based power plants connected to the grid. AMS-I.F. is applicable for the captive project. Hence not applicable for the project activity
2	This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The project activity is Greenfield project where twelve new WEC (not addition to existing system) have been installed. Total capacity of project is 9.60 MW.
3	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing	The project is wind power project so this criteria is not applicable

	reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	
4	In the case of biomass power plants, no other biomass types than renewable are to be used in the project plant	The project is wind power project so this criteria is not applicable
5	If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project has only renewable component totaling to 9.60 MW (twelve WEC of 800 kW each). This capacity is less than 15 MW.
6	Combined heat and power (co-generation) systems are not eligible under this category.	It is not a combined heat and power system.
7	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. The project activity under consideration involves installation of new 12 WECs, totaling to capacity of 9.6 MW.
8	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	The project activity under consideration does not involve any retrofit or replacement. The installed system is new.

B.3. Description of the project boundary:

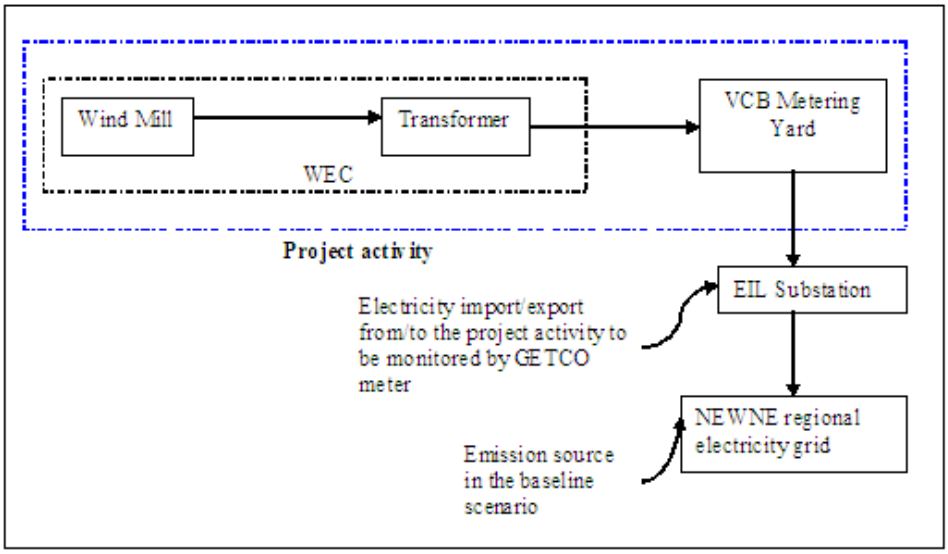
Boundary – According to the methodology "AMS-I.D Version 16, Para 9 ", the project boundary encompasses the physical, geographical site of the renewable generation source.

The project boundary encompasses the physical, geographical site of the 9.6 MW project activity at the project location as specified in Section A.4.1.4 above. It includes the wind turbine installations and pooling and the sub-stations.

According to the applicable methodology, spatial extent of this project activity includes the project site and all the power plants connected physically to the electricity system that the CDM power project is

connected to. The project activity is connected to the network of state transmission utility which falls in NEWNE grid. Thus the project boundary includes all the power plants physically connected to the NEWNE grid.

Flow diagram of the project boundary:



Represents project activity

Represents 1 unit of WEG

Represents project boundary

The baseline study of NEWNE grid shows that the main sources of GHG emissions in the baseline are CO_2 emissions from the conventional power generating systems.

Following table indicates the sources and gases included in the project boundary:

	Source	Gas	Included?	Justification/Explanation
Baseline	Grid-connected electricity generation	CO_2	Yes	In the baseline scenario the electricity would have been sourced from the NEWNE grid which in turn would be connected to fossil fuel fired power plants which emit CO_2.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.
Project Activity	Greenfield wind energy conversion system	CO_2	No	The project activity does not emit any emissions.
		CH_4	No	No methane generation is expected to be emitted.
		N_2O	No	No nitrous oxide generation is expected to be emitted.

B.4. Description of baseline and its development:

According to Para 10 of AMS-ID Version 16, the baseline scenario is the following:

If the project activity is the installation of a new grid-connected renewable power plant/unit; the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

As per para 11 of AMS I.D version 16.0,the baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \textbf{(1)}$$

Where:

BE_y	Baseline Emissions in year y (t CO2)
$EG_{BL,y}$	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2,grid,y}$	CO2 emission factor of the grid in year y (t CO2/MWh)

As per para 12 of AMS I.D, version 16.0, 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 t CO2/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

We have selected the first option to compute the emission factor. The emission reductions are estimated by multiplying the Combined Margin with net electricity delivered to the grid.

The details of India grid system is described in the table below:

S.No.	Electricity Grid (Present)	Electricity Grid (Earlier)	Geographical Areas Covered
1.	NEWNE Grid	Northern	Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand
		Western	Chhattisgarh, Gujarat, Daman & Diu, Dadar & Nagar Haveli, Madhya Pradesh, Maharashtra, Goa

		Eastern	Bihar, Jharkhand, Orissa, West Bengal, Sikkim, Andaman-Nicobar
		North-Eastern	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura
2.	Southern Grid	Southern	Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Pondicherry, Lakshadweep

Gujarat state falls under NEWNE grid. The power sector in India including the NEWNE region largely comprises thermal power stations[4]; as can be seen from the table below[5]:

Sector	Hydro	Thermal				Nuclear	Renewable	Total
		Coal	Gas	Diesel	Total			
State	27055.76	42537.5	3672.12	602.61	46812.23	0.00	2247.68	76115.67
Central	8592.00	29620.00	6638.99	0.00	36258.99	4120.00	0.00	48970.99
Private	1230.00	5491.38	4565.50	597.14	10654.02	0.00	10994.73	22878.75
All India	36877.76	77648.88	14876.61	1199.75	93725.24	4120.00	13242.41	147965.41

It is evident from the above table that the installed capacity in India is predominantly thermal power plants; thermal power generation is GHG intensive and is a major source of CO_2 emissions. In the absence of the project activity equivalent amount of electricity would have been generated from the existing grid connected power plants and planned capacity additions which are also largely fossil fuel based. Thus generation from the project displaces the electricity generated from existing and planned power plant capacities in the NEWNE grid whose emission intensities are represented by the Combined Margin Emission Factor of the NEWNE Grid.

The baseline emissions and emission reductions from the project activity are estimated by multiplying the amount of electricity exported by the project activity to the NEWNE grid with the emission factor of the NEWNE grid calculated as the combined margin (CM) of the operating margin (OM) and build margin (BM) emission factors.

Variable	**Data Source**
$EG_{BL,y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh).	Records maintained by project proponents
Parameter	**Data Source**
$EF_{OM,\ y}$ = Operating Margin Emission Factor (tCO_2/MWh)	CEA Database for CO_2 emission factor, version 5
$EF_{BM,\ y}$ = Build Margin Emission Factor (tCO_2/MWh)	CEA Database for CO_2 emission factor, version 5
$EF_{CO2,grid,y}$ – CO_2 emission factor of the grid in	Calculated as the weighted average of the operating margin and build margin

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

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

year y (t CO_2/MWh)	

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

The project activity has been conceived as a CDM project since its inception. The start date of the proposed CDM project activity is 05/04/2010, which is after the date of 02/08/2008 and hence it is a new project activity as per EB 49 annex 22. For new project activities, the PP must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status.

The PP has sent a letter dated 10/09/2010 and an email dated 14/09/2010 informing the host party DNA about the commencement of the project activity and intention to seek CDM status. The host party DNA has responded through email dated 16/09/2010 acknowledging the same. The PP has sent an email to the UNFCCC secretariat on 14/09/2010 using the standardized form F-CDM-Prior Consideration dated 10/09/2010. Thus, the PP has informed the host party DNA & the secretariat within 6 months of the project activity start date as per the requirements of paragraph 2 of EB 49 Annex 22.

Additionality:

The project activity reduces anthropogenic emissions of greenhouse gases that would have occurred in absence of the project activity. As per the decision 17/cp.7[6] Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.

Referring to attachment A to appendix B[7] document of "indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories", project participants are required to provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

a) Investment barrier

b) Technological barrier

c) Barrier due to prevailing practice

d) Other barriers

The additionality of this wind power project is proven by using the Investment barrier (option a) in accordance with Attachment A to Appendix B (Version 06: 30/09/2005) & Non-binding best practice examples to demonstrate additionality for SSC project activities as per Annex 34[8] (EB 35). The investment analysis is discussed below:

Investment Analysis:

[6] http://unfccc.int/resource/docs/cop7/13a02.pdf#page=36

[7] http://cdm.unfccc.int/Projects/pac/ssclistmeth.pdf

[8] http://cdm.unfccc.int/EB/035/eb35_repan34.pdf

The investment analysis for this project activity has done as per the Methodological Tool –"Tool for the demonstration and assessment of additionality", (Version- 05.2, Annex 10, EB- 39).

As per this tool, it is to be determined that the project activity is not:

(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

By applying sub-steps:

Sub-step 2a: Determine appropriate analysis method:

As per "Tool for the demonstration and assessment of additionality" (EB 39 Report Annex 10, version 05.2) the PP has three options for demonstration of the financial barrier:

- Option I: Simple cost analysis
- Option II: Investment comparison analysis
- Option III: Benchmark analysis

As the project generate income other than CDM income, hence option I (i.e. simple cost analysis) will not be applicable to the project, only option II (investment comparison analysis) or option III (benchmark analysis) was available with PP. .

As per para 16 of the Guidance on the assessment of investment analysis, (Annex- 58, EB- 51, version 03.1): If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach (Option III) is considered appropriate.

Hence project promoter has considered Benchmark analysis to prove the additionality of the project

Sub-step 2b: Option III. Apply benchmark analysis:

The project promoter has selected Benchmark Analysis to demonstrate additionality of the projects in the bundle. Equity IRR has been chosen as the financial indicator

The tool restricts the use of parameter to only those that are standard in the market, considering the specific characteristics of project type for financial analysis using option II & III.

Suitability of Benchmark:

As per Sub-step 2b, Paragraph (6), benchmark shall be considered 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. 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.

PP has selected option (a) to calculate the benchmark of the project. Further as per para 12 of Annex- 58, EB- 51, version 03.1 Return on Equity is a suitable benchmark for Equity IRR.

In the context of above PP has used Capital Asset Pricing Model (CAPM) to calculate the benchmark for this project activity.

The benchmark Cost of equity for the project is calculated separately for both the investors as the project start date for both investors are of different dates:

Investors	**Benchmark Cost of equity**	**Investment Decision Date**
Vish Wind Infrastructure LLP	16.40%	9-Jul-2010
J.N. Investment & Trading Co. Private Limited	16.09%	30-Mar-2010

The working of the benchmark has been attached as Appendix 1. The beta snaphot has been incorporated as Appendix 2. The detailed calculation of the benchmark has been done in benchmark calculation sheet.

Key assumptions used for calculating post-tax Equity IRR are set out below:

	Vish Wind Infrastructure LLP		J.N. Investment & Trading Co. Private Limited		
Capacity of Machines in kW	800		800		Enercon Offer VWIL- 25-Jun-2010 & JNITCPL – 18–Mar-2010
Number of Machines	8		4		Enercon Offer (VWIL- 25-Jun-2010 & JNITCPL – 18–Mar-2010)
Project Capacity in MW	6.4 MW		3.2 MW		Enercon Offer (VWIL- 25-Jun-2010 & JNITCPL – 18–Mar-2010)
Expected Commissioning date	30-Sep-10		30-Sep-10		Enercon Offer (VWIL- 25-Jun-2010 & JNITCPL

					– 18–Mar-2010)
Project Cost per MW (Rs. In Millions)	59.34		59.34		Enercon Offer (VWIL- 25-Jun-2010 & JNITCPL – 18–Mar-2010)
Operations					
Plant Load Factor Base Case	23.90.%		23.90%		Enercon Offer
Insurance Charges @ % of capital cost	0.12%		0.12%		Insurance Quote from Insurance provider dated 3-Mar-2010 to Enercon
Operation & Maintanance Cost base year @ % of capital cost	1.30%		1.30%		Enercon's offer
% of escalation per annum on O & M Charges	6.00%		6.00%		Enercon's offer
Service Tax on O&M expenses	10.30%		10.30%		Income Tax Act (Financial Year 2010-11)
Tariff					
Base year Tariff for 20 years - Rs./Kwh	3.56		3.56		GERC Tariff Order/Draft Order no. 2 of 2010
Project Cost	**Rs Million**				
Land and Infrastructure, Generator & Electrical Equipments, Mechanical Equipments, Civil Works, Instrumentation & Control, Other Project Cost, Pre operative Expenses, etc.					
Total Project Cost	**379.76**			**189.88**	Enercon Offer
Means of Finance		**Rs Million**			
Own Source	100%	379.76	100%	189.88	100% equity project
Term Loan	0%	0.00	0%	0%	100% equity project

Total Source		379.76		189.88	
Income Tax Depreciation Rate (Written Down Value basis)					
on Wind Energy Generators	80%		80%		Income Tax Act
Book Depreciation Rate (Straight Line Method basis)					
On all assets	4.50%		4.50%		Straight line Method Adopted
Book Depreciation up to (% of asset value)	90%		90%		
Income Tax					
Income Tax rate	30.09%		33.99%		Income Tax Act(Financial Year 2010-11)
Minimum Alternate Tax	Not applicable		17.00%		Income Tax Act(Financial Year 2010-11)
Working capital					
Receivables (no of days)	30		30		Billing Cycle
O & m expenses (no of days)	90		90		Enercon's Offer

During the investment analysis PP has considered the PLF value as 23.90% as per supplier offer. Later on, considering the CDM guideline EB-48 Annex 11, PP has also done the third party assessment on PLF. The PLF estimated by Third party independent source - Ravi Enteck Limited, for PLF is 24.50%. We have conducted sensitivity at a variation of 10% over the base case. The PLF provided by third party is 24.50% i.e. 2.5 % variation over the base case and falls under the sensitivity range.

The Equity IRR worked out for each sub project is furnished in the table below:

Investor Name	Equity IRR without CDM revenues
Vish Wind Infrastructure LLP	**8.79%**
J.N. Investment & Trading Co. Private Limited	**8.08%**

Sensitivity Analysis

The Guidance on the Assessment of Investment Analysis issued by the EB in its 51st Meeting in Annex 58 requires conducting sensitivity analysis, by subjecting those variables which constitute more than 20% of project cost or revenue to reasonable variations of +/- 10%.

The investment in wind power project shall be tested based on the following parameters:

- Capital Cost
- Tariff
- Plant Load Factor
- O&M cost

Capital Cost

In accordance with the investment guidance, the additionality for the project activity is demonstrated at the time of decision making. The project proponent has considered it appropriate to conduct the sensitivity at the variation of +/- 10% of the project cost.

	10% decrease in Capital Cost	Base Capital Cost	10% Increase In Capital Cost
Post tax Equity IRR for Vish Wind Infrastructure LLP	10.98%	8.79%	6.98%
Post tax Equity IRR J.N. Investment & Trading Co. Private Limited	10.09%	8.08%	6.41%

The equity IRR crosses the benchmark at capital cost decrease of 28.00% for Vish Wind Infrastructure LLP and of 30.50% for J.N. Investment & Trading Co. Pvt. Ltd. The actual project cost is INR 352 Million as per purchase order for Vish Wind Infrastructure LLP and INR 176 Million for J.N. Investment & Trading Co. Pvt. Ltd which essentially means that variation in project cost provided in offer and purchase order is less than 10%. Therefore, the variation is not realistic.

Tariff

Gujarat Electricity Regulatory Commission (GERC) has fixed the tariff for the period of 20 years (Lifetime) for the wind power projects. The tariff for the entire life of the project activity is fixed at Rs. 3.56 per KWh. Therefore it is not appropriate to conduct sensitivity on tariff.

The equity IRR crosses the benchmark at tariff of INR 5.29/KWh for Vish Wind Infrastructure LLP and INR 5.64/KWh for JN Investment and Trading Company Pvt. Ltd. which is not realistic as the PP has already executed long term power purchase agreement for the period of 20 years (full technical life of the project activity) at INR/KWh 3.56.

Plant Load Factor

Plant Load Factor is the key variable encompassing variation in wind profile, variation in off-take (including grid availability) including machine downtime.

During the investment analysis PP has considered the PLF value as 23.90% as per supplier offer. Later on, considering the CDM guideline PP has also done the third party assessment on PLF.

Third Party Data: The PLF estimated by Third party independent source for PLF is 24.50%.

We have conducted sensitivity at a variation of 10% over the base case.

	PLF @ 22.05% (10% Decrease over PLF estimated by CWET)	PLF 23.90% (PLF by CWET)	PLF @ 26.95% (10% Increase over PLF estimated by CWET)
Post tax Equity IRR for Vish Wind Infrastructure LLP	7.00%	8.79%	10.49%
Post tax Equity IRR J.N. Investment & Trading Co. Private Limited	6.49%	8.08%	9.58%

The sensitivity analysis clearly shows even with a higher PLF, the project is not able to generate sufficient returns. It can therefore be concluded that the project is financially not viable without CDM benefits.

The PLF provided by third party is 24.50% i.e. 2.5 % variation over the base case and falls under the sensitivity range.

The equity IRR crosses the benchmark at PLF of 35.49% (increase of 48.50 %) for Vish Wind infrastructure LLP & 37.88 % (increase of 58.5 %) for J.N. Investment & Trading Co. Pvt. Ltd. which is not a reasonable assumption. Therefore the increase of 48.50% & 58.50% over the base PLF is not realistic.

O&M Cost

The Sensitivity in O&M cost is conducted after taking to consideration +/-10% variation in O&M Cost.

	10% decrease in O&M cost	Base O&M Cost	10% Increase In O&M cost
Post tax Equity IRR for Vish Wind Infrastructure LLP	9.08%	8.79%	8.50%

Post tax Equity IRR J.N. Investment & Trading Co. Private Limited	8.32%	8.08%	7.83%

The equity IRR of the project activity remains well below the benchmark even under the sensitivity analysis. Therefore it can be concluded that the proposed CDM project activity is unlikely to be the most financially/economically attractive and hence additional.

The project does not cross the benchmark even at 100% reduction in O & M cost (O & M Cost = 0) .

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the approved methodology AMS I.D (Version 16) Emission Reductions are calculated as:-

$$ER_y = BE_y - PE_y - LE_y \quad \text{..... (1)}$$

Where:

ERy	Emission reductions in year y (t CO2/y)
BE_y	Baseline Emissions in year *y* (t CO2/y)
PE_y	Project Emissions in year *y* (t CO2/y)
LEy	Leakage emissions in year y (t CO2/y)

Estimation of Baseline Emissions:

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

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad \text{..... (2)}$$

Where:

BE_y = Baseline Emissions in year *y* (t $CO_{2)}$

$EG_{BL,y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh)

$EF_{CO2,grid,y}$ = CO_2 emission factor of the grid in year y (t CO_2/MWh)

The proposed project activity is in the state of Gujarat which falls under NEWNE grid, baseline emission factor is calculated as combined margin, consisting of a combination of operating margin and build margin factors according to the procedures prescribed in the latest tool "Tool to calculate the emission factor for an electricity system" version 02.1 (EB 60, Annex 8) for calculating the emission factor for an electricity system. The steps of calculation are as follows:

STEP 1: Identifying the relevant electricity systems:

The Indian electricity system is divided into two regional grids, viz. (1) Northern, Eastern, Western, North-Eastern and (2) Southern grid. Each grid covers several states. As the regional grids are interconnected, there is inter-state and inter-regional exchange. A small power exchange also takes place with neighboring countries like Bhutan and Nepal.

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 in a regional grid meets its demand with its 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. The regional grid thus represents the largest electricity grid where power plants can be dispatched without significant constraints and thus, represents the "project electricity system" for the project activity. As the project activity is connected to the western regional electricity grid, the NEWNE grid is the "project electricity system".

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

Option I is opted for the project activity i.e. only grid power plants are included in the calculation.

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

According to the tool, the calculation of the operating margin emission factor is based on one of the following methods:

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

Any of the four methods can be used for calculating OM, The simple adjusted OM and dispatch data analysis OM cannot be currently applied in India due to lack of necessary data however, the simple OM method (option a) can only be used if low cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The Share of Low Cost / Must-Run (% of Net Generation) in the generation profile of the different grids in India in the last five years is as follows:

	2004-05	**2005-06**	**2006-07**	**2007-08**	**2008-09**
NEWNE	16.84%	18.0%	18.5%	19.0%	17.3%
South	21.61%	27.0%	28.3%	27.1%	22.8%
India	18.01%	20.1%	20.9%	21.0%	18.6%

Source: CO_2 Baseline Database for the Indian Power Sector – Central Electricity Authority

The above data clearly shows that the percentage of total grid generation by low cost/must run plants (on the basis of average of five most recent years) for the NEWNE grid is less than 50 % of the total generation. Hence the Simple OM method can be used to calculate the Operating Margin Emission factor. The average operating margin method cannot be applied, as low cost/ must run resources in NEWNE grid constitute less than 50% of total grid generation.

The project proponents choose an ex ante option for calculation of the OM with a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method:

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

- Based on the net electricity generation, and a CO_2 emission factor of each power unit. (Option A), or
- Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option B)

The Central Electricity Authority, Ministry of Power, Government of India has published a database of Carbon Dioxide Emission from the power sector in India based on detailed authenticated information obtained from all operating power stations in the country. This database i.e. The CO_2 Baseline Database provides information about the Combined Margin Emission Factors of all the regional electricity grids in India. The Combined Margin in the CEA database is calculated ex ante using the guidelines provided by the UNFCCC in the "Tool to calculate the emission factor for an electricity system". We have, therefore, used the Combined Margin data published in the CEA database, for calculating the Baseline Emission Factor.

The CEA database uses the option A i.e. data on net electricity generation and CO_2 emission factor for each power unit, the average efficiency of each power unit and the fuel type(s) used in each power unit, to calculate the OM of the different regional grids.

The simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit, as follows:

$$\mathbf{EF_{grid,OMsimple,y} = \Sigma\ (EG_{m,y}\ x\ EF_{EL,m,y})\ /\ \Sigma EG_{m,y}} \quad \text{..... (a)}$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO2/MWh)
m	All power units serving the grid in year y except low-cost / must-run power units
y	The relevant year as per the data vintage chosen in step 3

The emission factor of each power unit m has been determined as follows:

$$\mathbf{EF_{EL,m,y} = (\Sigma\ FC_{i,m,y}\ x\ NCV_{i,y}\ x\ EF_{CO2,I,y})\ /\ EG_{m,y}} \quad \text{..... (b)}$$

Where:

$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$FC_{i,m,y}$	Amount of fossil fuel type i consumed by power unit m in year y (Mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,I,y}$	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
m	All power units serving the grid in year y except low-cost / must-run power units
i	All fossil fuel types combusted in power unit m in year y
y	The relevant year as per the data vintage chosen in step 3

STEP 5: Identify the group of power units to be included in the build margin:

The sample group of power units m used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or
(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation.
Accordingly, the CEA database calculates the build margin as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation.
The build margin emission factor has been calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. This option does not require monitoring the emission factor during the crediting period.

STEP 6: Calculate the build margin emission factor:

The build margin emissions factor is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$\mathbf{EF_{grid,BM,y} = (\Sigma\, EG_{m,y} \times EF_{EL,m,}) / \Sigma\, EG_{m,y}} \quad \text{..... (c)}$$

Where:

$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) is determined as per the procedures given in step 4 (a) for the simple OM, using option A1 for *y* most recent historical year for which power generation data is available, and using for *m* the power units included in the build margin.

STEP 7: Calculate the combined margin emissions factor:

The emission factor $EF_{\mathbf{grid,CM,}y}$ of the grid is represented as a combination of the Operating Margin (OM) and the Build Margin (BM). Considering the emission factors for these two margins as $EFgrid_{,OM,y}$ and $EFgrid_{,BM,y}$, then the $EF_{\mathbf{grid,CM,}y}$ is given by:

$$\mathbf{EFgrid,CM,}y = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y} \quad \text{..... (d)}$$

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 (%)
(where $w_{OM} + w_{BM} = 1$).

According to AMS I.D the weights for OM and BM are 0.75 and 0.25 respectively.

Using the values for operating and build margin emission factor provided in the CEA database and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) is 922.52 tCO_2e/GWh.

Details of Baseline data:

Data of operating for the three financial years from 2006-07, 2007-08 and 2008-09 and Build Margin for 2008-09 has been obtained from -

The CO_2 Baseline Database for the Indian Power Sector
Ministry of Power: Central Electricity Authority (CEA)
Version 5
Key baseline information is reproduced in Annex 3.
The detailed excel sheet is available at:
http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Estimation of Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to AMS I.D Version 16, there will be no project emissions in the project activity

$PE_y = 0$ …… (4)

Estimation of Leakage Emissions

As per AMS I.D Version 16, no leakage has been considered for the calculation of emission reduction.

$LE_y = 0$ …….. (5)

The details on OM, BM and CM estimates as provided by the CEA are shown in Annex-3.

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

Data / Parameter:	***$EF_{grid,OM,y}$***
Data unit:	tCO_2e/MWh
Description:	Operating Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data used:	"CO_2 Baseline Database for Indian Power Sector", version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value applied:	1.00497
Justification of the	

choice of data or description of measurement methods and procedures actually applied:	The CEA CO2 Baseline Database (Version: 05) is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Ministry of Power, Government of India. Hence it is an appropriate source.
Any Comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2e/MWh
Description:	Build Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data used:	"CO_2 Baseline Database for Indian Power Sector" version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value applied:	0.67518
Justification of the choice of data or description of measurement methods and procedures actually applied:	The CEA CO2 Baseline Database (Version: 05) is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Ministry of Power, Government of India. Hence it is an appropriate source.
Any Comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter:	$EF_{grid,,CM,y}$
Data unit:	tCO_2e/MWh
Description:	Combined Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data used:	The "CO_2 Baseline Database for Indian Power Sector" version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value applied:	In case of wind power projects default weights of 0.75 for EF_{OM} and 0.25 for EF_{BM} are applicable as per AMS I.D. Combined Margin Emission Factor (EFy or $EF_{CM,y}$) : 0.92252 Refer Annex – 3 for comprehensive calculation of Combined Margin Emission Factor.

Justification of the choice of data or description of measurement methods and procedures actually applied:	Combined Margin Emission Factor has been calculated by the "tool to Calculate the emission Factor for an Electricity System" Version 2.1, EB 60, Annex 8. The detailed calculation of the CM has been explained in section B.6.1 & Annex 3 of the PDD.
Any Comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

B.6.3 Ex-ante calculation of emission reductions:

As per equation 2 of section B.6.1, Baseline Emission is calculated by

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Baseline emission factor (Combined Margin) ($EF_{CO2,grid,y}$)

= 0.92252 tCO_2e/MWh (The detailed calculation of baseline Emission factor are explained in Annex 3)

Annual electricity supplied to the grid by the Project ($EG_{BL,y}$)is calculated as:

= 9.6 MW (Capacity) x 23.90% (Effective PLF) x 8,760 (hours) MWh
= 20,098.94 MWh

Annual Baseline Emissions Reduction: $BE_y = EF_{CO2,grid,y} * EG_{BL,y}$

= 0.92252 tCO_2e/MWh x 20,098.94 MWh
= 18,541 tCO_2e

As per approved methodology AMS I.D (Version 16)

$$ER_y = BE_y - PE_y - LE_y$$

ER_y = 18,541 – 0 - 0

= 18,541

Emission reductions from the project activity are equal to the baseline emissions as project emissions and leakage are nil.

The detailed calculation of power generation and CERs are explained in the attached Excel sheet.

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

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
1st year*	0	18,541	0	18,541
2nd year	0	18,541	0	18,541
3rd year	0	18,541	0	18,541
4th year	0	18,541	0	18,541
5th year	0	18,541	0	18,541
6th year	0	18,541	0	18,541
7th year	0	18,541	0	18,541
8th year	0	18,541	0	18,541
9th year	0	18,541	0	18,541
10th year	0	18,541	0	18,541
Total (tonnes of CO_2e)	0	185,410	0	185,410

*1st year begins from the date of registration, and each year extends for 12 months.

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh
Description:	Net Quantity of Electricity exported to the grid
Source of data to be used:	Share certificate issued by GETCO
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20,098.94 MWh/year
Description of measurement methods and procedures to be applied:	The procedures for metering will be as per the provisions of the power purchase agreement. The WECs of a single customer (VWILLP in this case) are divided into clusters and each cluster has dedicated metering system. Different clusters are connected to different Vacuum Circuit Breaker metering yards (VCB) which ultimately lead to the shared main GETCO meter (also known as revenue meter) at the Sadodar substation maintained by Enercon (India) Limited. Data monitoring takes place at the cluster metering points and GETCO main meter at the EIL substation. The net electricity supplied to the grid by the wind farm is calculated by GEDA on the basis of GETCO main meter reading and the meter readings taken at individual cluster meters after adjusting transmission loss. For adjustment of transmission loss, the electricity metered at the GETCO meter is proportionally divided by GEDA among the customers connected to the GETCO meter/revenue

	meter on the basis of the pro rata readings taken at the cluster meters. . The meter reading is taken jointly by the representatives of Enercon and GEDA/GETCO in the form of JMR on monthly basis. The meter reading recorded at cluster meters are sent to GEDA every day. The net electricity exported by the project activity is taken directly from the share certificate issued by GETCO on monthly basis. The apportioning procedure is performed by GEDA personnel based on the data received from LCS meters & clusters meters on daily basis and the PP has no role.
QA/QC procedures to be applied:	Annual calibration of 220 kV Sadodar Substation meters will be undertaken and faulty meters will be duly replaced immediately. The Net Quantity of Electricity exported to the grid as per Share certificate issued by GETCO can be cross verified by the sale invoice.
Any comment:	The data will be archived for the entire crediting period plus two years.

B.7.2 Description of the monitoring plan:

Approved monitoring methodology AMS-I.D. Version 16 (Para 22) Sectoral Scope: 1, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

Enercon (India) Limited is the O&M contractor for the project activity. Enercon (India) Limited will be responsible for maintaining all the monitoring data on behalf of VWILLP in respect of the project activity. Enercon (India) Limited has implemented the management structure for managing the monitored data.

The project activity will have various clusters and each cluster has exclusive metering arrangement and the meter readings taken at these metering points will be provided by the representatives of Enercon to GEDA. These energy meters will be sealed by GEDA and will also be calibrated once in three year.

Enercon Substation at Sadodar has main meter(s) also known as revenue meter which is connected to wind turbines installed by the project proponent and wind turbines installed by other project owners. Gujarat Electricity Development Authority (GEDA) apportions the net electricity supplied to the grid at the Enercon substation to all the project owners after adjusting transmission loss from GETCO meters at Sadodar Substation to the meter readings taken at dedicated cluster meters of different project owners. The meter reading is taken jointly by the representatives of Enercon and GEDA/GETCO in the form of JMR. The electricity from Enercon's substation is finally supplied to the utility's substation at Moti Paneli.

The net electricity generated by the project owners is provided by GETCO in the share certificate of electricity generated. The value of the net electricity generated by the project activity will be taken directly by the project proponent from the share certificate provided by GETCO for calculation of emission reductions.

If during meter testing the main meter at the Enercon substation is found beyond the permissible limit of error, the meter reading will be taken from the main meter located at the utility (GETCO) substation at Moti Panelli after addition of average historical transmission losses.

If during meter testing the cluster meters found beyond the permissible limit of error, the sum of panel meter (LCS meter) readings located at each wind turbine of the project activity will be provided to GEDA for purpose of apportioning net electricity supplied to the grid. The LCS meters do not require calibration

as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WECs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report.

The apportioning procedure performed by GEDA personnel for the project activity is explained below:-

$EG_{GETCO, Export}$ = Electricity exported, as recorded by the main meter at Enercon substation
$EG_{GETCO, Import}$ = Electricity imported, as recorded by the main meter at Enercon substation
$EG_{Cluster, Export}$ = Electricity exported by the project activity, as measured at Cluster Meter
$EG_{Cluster, Import}$ = Electricity imported by the project activity, as measured at Cluster Meter
$EG_{Cluster, WF, Export}$ = Electricity exported by all the project owners connected to Enercon substation, as measured at Cluster Meter
$EG_{Cluster, WF, Import}$ = Electricity imported by all the project owners connected to Enercon substation, as measured at Cluster Meter
$EG_{BL,export,y}$ = Electricity exported by the project activity to the grid, calculated
$EG_{BL,import,y}$ = Electricity imported from the project activity to the grid, calculated
$EG_{BL,y}$ = Net Electricity exported by the project activity to the grid, calculated

Electricity Exported to the Grid by the project activity

$$EG_{BL,export,y} = EG_{GETCO, Export} \text{ X } EG_{Cluster, Export} / EG_{Cluster, WF, Export}$$

Electricity Imported from the Grid by the project activity

$$EG_{BL,Import,y} = EG_{GETCO, Import} \text{ X } EG_{Cluster, Import} / EG_{Cluster, WF, Import}$$

Net Electricity Exported to the grid by the project activity

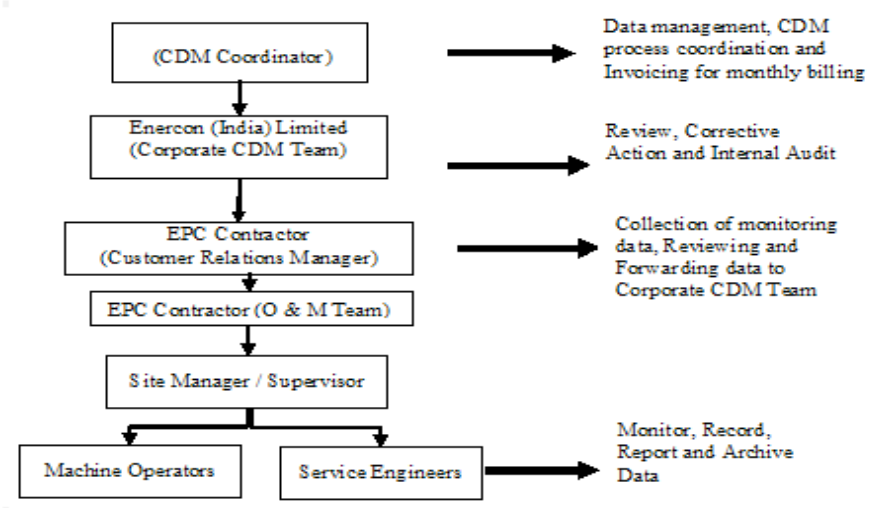
$EG_{BL,y} = EG_{BL,export,y} - EG_{BL,Import,y}$ The apportioning procedure for the project activity is done based on the meters that are connected to the cluster meter of various project owners connected to substation of Enercon based on meter reading noted at Enercon substation connecting all the machines of the project activity and other project developers. The meter reading at cluster meter and the Enercon substation are directly monitored and measured on continuous basis and hence the apportioning of the electricity is based on the meter reading that are directly measured. The meter recording at cluster meters of the project activity are done on monthly basis. The panel meter (LCS meter) reading is recorded continuously by the online monitoring system.

The apportioning procedure is performed by GEDA personnel based on the data received from LCS meters & clusters meters on daily basis.

The Project is operated by Enercon (O&M contractor for the project activity) and managed by the PP. The operational and maintenance contract for the project is with Enercon. Enercon is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.
The accuracy of monitoring parameter is ensured by adhering to the calibration and testing of the metering equipment once each year. Enercon is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project proponent. The project proponent also maintains the records of daily generation report and joint meter report.

Training and maintenance requirements:

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Energy Converters (WECs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that Enercon's service staff is deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The Enercon Training Academy provides need-based training to meet the training requirements of Enercon projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving. The operational and management structure implemented for data monitoring is as follows:



B.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

Date of completion: 30/12/2010

Name of responsible person/entity: Vish Wind Infrastructure LLP

The details are given in Annex-1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
5-April-2010

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

>>
20 Years

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

C.2.1. Renewable crediting period

>>

Not Applicable

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

Not Applicable

C.2.1.2. Length of the first crediting period:

>>

10 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

01/09/2011

The project activity is expected to be registered by 01/09/2011 hence crediting period will start from the date of registration with UNFCCC. It is hereby confirms that the crediting period will not commence prior to the date of registration.

C.2.2.2. Length:

>>

10 years and 0 months

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

As per the Schedule 1 of Ministry of Environment and Forests (Government of India) notification dated January 27, 1994 and EIA Notification (S.O 1533) dated 14th September 2006, a list of activities that require undertaking environmental impact assessment studies[9] has been provided. EIA is not a regulatory requirement in India for wind energy projects and PP does not expect any adverse impacts of the proposed CDM project activity on the environment.

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

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

The project activity does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. Hence, EIA is not required by the host party.

SECTION E. Stakeholders' comments

>>

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

>>

The comments from local stakeholders were invited through a local stakeholder meeting conducted at Jamnagar District in Gujarat on 28 October 2010. A local newspaper advertisement was placed in Naubat on 13 October 2010 inviting the local stakeholders for the meeting. The personal invitations were also sent to the local villagers. The meeting was presided over by Mr. Monoj Panda (EIL-Baroda), Mr. P.K. Bhatt (EIL-Admin Jamnagar), Ms. Anushree Mishra and Mr. K.P Pandit (EIL- Jamnagar).

E.2. Summary of the comments received:

>>

Mr. Manoj Panda welcomed the gathering and introduced the company. Mr. P.K Bhatt briefed the agenda initiative to the stakeholders. Mr. Brajlal Thakarshibhai village Sarpanch (Chief) of Dudhgara village & Jamanbhai Nathabhai was village Sarpanch (Chief) of Sardhara village selected as the chairperson of the meeting.

Ms Anushree Mishra briefed about project activity of Vish Wind Infrastructure LLP (Vish Wind), reasons for setting up the project, costs and benefits of setting up the project and role of project in mitigating the emissions of green house gases in the atmosphere. She gave a presentation on global warming and its impacts, Kyoto Protocol, CDM and role of wind power in mitigating the global warming. She invited Mr. Manoj Panda who explained about the project activity and discussed the benefits of wind power project in the mitigation of global warming.

The Chairperson, Mr. Jamanbhai Nathabhai appreciated the management of Vish Wind for proposing pollution free technology for power generation. Mr. P.K. Bhatt then delivered the vote of thanks and appreciated the villagers for their active participation.

The meeting was very cordial and ended on a positive note. No adverse comments were received. Villagers gave suggestion that the panchayat would be taken into loop while implementing the project activity.

The following queries were raised by the stakeholders:

1. Whether Vish shall provide any compensation for Gauchar Land (Land used for grazing)?
2. How Wind farms would help in mitigating climate change?
3. Whether the wind projects harm local property values?
4. Whether the electricity generated from this project will be directly fed to the local community?
5. The direct and indirect benefits to them from the proposed project activity?

6. Whether wind turbines move away rain clouds?
7. Whether the project will harm the farming land?

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

>>

The clarifications that were addressed by the representatives of Enercon (Enercon is authorized by the PP to execute all the activities in relation to CDM i.e. project registration and verification including local stakeholder consultation) are listed in the table below:

S.No.	Villager Name	Question	Reply by Enercon representatives
1	Mr. Vallabh Bhai	Enquired whether PP shall provide any compensation for Gauchar Land (Land used for grazing)?	There is a provision by Enercon (India) Limited to provide adequate compensation package to the panchayat for the acquisition of Gauchar land.
2	Mr. Ashif Bhai	Asked how Wind farms would help in mitigating climate change?	Wind power is a clean, renewable source of energy, which produces no greenhouse gas emissions or waste products. Fossil fuel based power stations are the largest emitters of carbon dioxide. Hence, shifting from fossil fuel based power generation to renewable sources of power will help in mitigating carbon dioxide emissions and global warming.
3	Mr. Chinabhai Katara	Asked whether the wind projects harm local property values?	There would not be any negative impact on the property values due to the presence of wind farms. In fact the development of wind farms will subsequently increase the property value owing to the overall development in the region.
4	Mr. Khimabhai Katara	Enquired whether the electricity generated from this project will be directly fed to the local community?	The electricity generated will be supplied to the state electricity grid which further distributes the electricity as per the state policy.
5	Mr. Bharat Bhai	Enquired about the direct and indirect benefits to them from the proposed project activity?	The project would generate local job opportunities, which would help in the overall socio-economic development of the region. Additionally, a number of Corporate Social

			Responsibility initiatives would be undertaken, which would be identified based on the specific needs of the local populace.
6	Mr. Vajubhai	Enquired whether wind turbines move away rain clouds?	The clouds are much higher than the height of the wind turbines and it is absolutely unlikely that it would cause the problem. This has already been established by various studies undertaken in this aspect.
7	Mr. Chinabhai Katara	Enquired whether the project will harm the farming land?	There is no harm in the installation of the wind farms near to the farming land.

The meeting was very cordial and ended on a positive note. No adverse comments were received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Vish Wind Infrastructure LLP
Street/P.O.Box:	Veera Industrial Estate, Veera Desai Road, Andheri West
Building:	Enercon Tower, A-9
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400053
Country:	India
Telephone:	+91-22- 66924848
FAX:	+91-22- 66921175
E-Mail:	yogesh.mehra@enerconindia.net
URL:	
Represented by:	
Title:	Designated Partner
Salutation:	Mr.
Last Name:	Mehra
Middle Name:	
First Name:	Yogesh
Department:	Corporate
Mobile:	+91-98200 40301
Direct FAX:	+91-22- 66921175
Direct tel:	+91-22- 66924848
Personal E-Mail:	yogesh.mehra@enerconindia.net

Organization:	J. N. Investments & Trading Co. Pvt. Ltd.
Street/P.O.Box:	L.B.S Marg, Vikhroli (West)
Building:	Kaysons No.1, Mehra Estate,
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400079
Country:	India
Telephone:	+91-22- 25770529
FAX:	+91-22- 25777122
E-Mail:	
URL:	
Represented by:	
Title:	Director
Salutation:	Mrs
Last Name:	Mehra
Middle Name:	
First Name:	Radhika

Department:	Corporate
Mobile:	+91-98200 69001
Direct FAX:	+91-22- 25777122
Direct tel:	+91-22- 25770529
Personal E-Mail:	Radhika.Mehra@enerconindia.net

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project activity does not involve any public funding from parties included in Annex I.

Annex 3

BASELINE INFORMATION

The Operating Margin data for the most recent three years and the Build Margin data for the NEWNE Grid as published in the CEA database version 5 are as follows:

Simple Operating Margin

	NEWNE Grid (tCO_2e/MWh)
Simple Operating Margin – 2006-07	1.00847
Simple Operating Margin – 2007-08	0.99990
Simple Operating Margin – 2008-09	1.00655
Average Operating Margin of last three years	1.00497

Build Margin

	NEWNE Grid (tCO_2e/MWh)
Build Margin- 2008-09	0.67518

Combined Margin Calculations

	Weights	NEWNE Grid (tCO_2e/MWh)
Operating Margin	0.75	1.00497
Build Margin	0.25	0.67518
Combined Margin		0.92252

Detailed information on calculation of Operating Margin Emission Factor and Build Margin Emission Factor is available at www.cea.nic.in.

Annex 4

MONITORING INFORMATION

Meter Reading

- The net electricity supplied to the grid will be taken directly from the share certificate for net electricity generated provided by GETCO.
    - The meter reading is taken jointly at GETCO meters by representatives of Enercon and GEDA/GETCO located at Enercon substation. The GETCO meters are connected to the wind turbines of the project activity and the wind turbines of the other project owners. Therefore GETCO provides the share certificate that apportions the net electricity generated by the project owners.
    - The Cluster meters are provided exclusively to all the project owners having installed wind turbines at the wind farm. The meter readings from these meters are used by GEDA for purpose of apportioning.

Meter Testing

- The main meter at Enercon Substation will be jointly tested & calibrated once in a year.
- If during meter testing the main meter at the Enercon substation is found beyond the permissible limit of error, the meter reading will be taken from the main meter located at the utility (GETCO) substation at Moti Panelli after addition of average historical transmission losses for last quarter (03 months).
- The main meter at utility substation will also be calibrated once in each year.
- All cluster meters which are connected to the Enercon substation will be sealed by GEDA and will also be calibrated once in three year.
- If during meter testing any cluster meter is found beyond the permissible limit of error, the sum of LCS meter reading located at each wind turbine of that cluster will be provided to GEDA for purpose of apportioning net electricity supplied to the grid.
- The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WEGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report.

Data recording

- The meter recording at the main meter at Enercon substation and the cluster meters of the project activity will be done each month.
- The panel meter (LCS meter) reading is recorded continuously by the online monitoring system.
- All the monitored data will be recorded and filed electronically and in hard format for 2 years beyond the crediting period i.e. 10+2 years.

- - - - -

Appendix 1:

Calculation on Cost of Equity

Selection of Appropriate Benchmark:

In choosing an appropriate benchmark we have based our approach on the principles of financing and investment decision making that are well found in theory and practice of corporate financing worldwide. We have derived from text book on "Corporate Finance Theory and Practice" by Dr. Aswath Damodaran of Stern School of Business, New York University. Dr. Damodaran is one of the foremost authorities in the world in the field of Investment Analysis.

The guidance to investment analysis issued in EB 51states that in cases where a benchmark approach is used the applied benchmark shall be appropriate to the type of IRR calculated. Weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR and cost of Equity is appropriate benchmark for equity IRR.

It is also worthwhile to note that the captioned project is a Greenfield wind power generation project that generates and supplies electricity to the state grid, therefore the project cannot have only one possible project developer. The tool for demonstration and assessment of additionality [para-5, sub step 2(b)] states that in such cases (where the project has more than one potential developer) the benchmark cannot be based on internal cost of equity or WACC and shall be based on parameters that are standard in the market, considering the specific characteristics of the project type. Hence, we have not used company or project specific parameters for the calculation of the benchmark.

Risk free rate:

The risk free rate is understood as the rate of return on an asset that is theoretically free of any risks, therefore the yeild rates are considered as risk free rates. Page 188 of text book on "Corporate Finance Theory and Practice" by Dr. Aswath Damodaran[10], Stern School of Business, New York University, describes that the yield rates are suitable indicators of risk free rates when the time horizon for the investment is long term.

Accordingly the risk free rate has been taken from yield rates available at the decision making date. This has been considered as it was in the year of investment (i.e in that year, the company had the alternative of this long term risk free investment). The data on yield rates is published by Reserve Bank of India. (RBI Web-link:

The applicable risk free rate :

Vish Wind Infrstructure LLP – 8.38%

(Source: http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx/scripts/BS_ViewBulletin.aspx?Id=11317)

J.N. Investment & Trading Co. Pvt. Ltd. – 8.27%

(Source: http://rbidocs.rbi.org.in/rdocs/Bulletin/PDFs/26CT_BCS0211.pdf)

Risk Premium:

[10] Dr. Damodaran, one of the foremost authorities in the world in the field of Investment Analysis

The most common approach for estimating the risk premium is to base it on historical data, in the CAPM, the premium is estimated by looking at the difference between average return on stocks and risk free return. It is preferred to use long term premimums, i.e over a period of 25 years, since considering shorter time periods can lead to large standard errors because volatility in stock returns [page 191, Corporate Finance Theory and Practice, Dr. Aswath Damodaran]. It is also preferred to calculate the risk premium based on geometric mean of the returns since arithmetic mean overstates the risk premium. Geometric mean is defined as the compounded annual return over the same period [page 191, Corporate Finance Theory and Practice, Dr. Aswath Damodaran].

The market return can be calculated from the following available indices: (1) BSE-Sensex, (2) BSE-200 and (3) BSE-500 (4) BSE 100. Minimum market return of the available indices is for BSE 200 and hence conservatively we have used BSE 200 market return for computation of the benchmark.

Therefore the risk premium has been calculated as the difference in compounded annual return bewteen the BSE-200 and the yield rate since the year of inception of BSE 200. The detailed calculations are presented in the attached excel sheet.

The applicable risk premium :

Vish Wind Infrstructure LLP – 7.39%

J.N. Investment & Trading Co. Pvt. Ltd. – 7.58%

Beta:

Beta (B) indicates the sensitivity of the company to market risk factors. Beta represents the market risk for an asset and is calculated as the statistical measure of volatility of a specific asset/investment relative to the movement of a market group. The conventional approach for estimating beta of an investment is a regression of returns on investment against returns on a market index. For companies that are not publicly listed, the beta is determined by referring beta values of publicly listed companies that are engaged in similar types of business. The project activity type is wind power generation; the approach therefore should be to base the beta for the project on the beta values of listed wind power generation companies in India. Therefore, in the absence of adequate data on companies which are exclusively into the exactly same type of business (i.e wind power projects), the next best option for assessing the risk of these projects is to consider the data available on companies which are involved in similar businesses.

Therefore, we have considered beta values of all major electricity generating companies in India. The group of companies considered includes renewable as well as conventional power generating companies. It is understood that risky businesses are likely to have higher cost of equity than safer businesses; projects in riskier businesses will have to cover these higher costs. Hence, investors demand a higher return from renewable energy projects than from conventional energy ones, given the higher risks in renewable, including risks of technology, risks from significantly varying and unpredictable resource availability (e.g. Wind) and a lower established support base for such projects relative to that for conventional power (e.g. grid connections, bank finance, suppliers, etc.). The use of this Beta value is therefore considered conservative, as it does not add for the higher risk of non conventional energy. The applicable Beta value has been determined on the basis of the Beta values of major power generating companies in India which were listed on the stock exchange at the time of this investment. Beta values of individual companies have been sourced from Bloomberg.

Beta values are representative of volatility of the stock over the market index. We have considered major players that are active in power sector in India. The values are directly derived from the third party data source (Bloomberg). The average of the beta returns of the power stocks is considered in order to determine the beta applicable for the project activity. The beta for the various power stocks ranges from

0.73 to 1.6 for Tata Power and Reliance respectively. Therefore we have considered the average beta that will be reflective of the volatility of the power stocks vis-à-vis market index.

Calculation of Benchmark Cost of Equity:

Cost of Equity:

The expected return on equity has been determined using the Capital Asset Pricing Model (CAPM)[11]. The CAPM economic model is used worldwide to determine the required/expected return on equity based on potential risk of an investment. The CAPM framework is the Nobel award winning work of financial economist Dr. William Sharpe.

Ke = Rf + B x (Rm - Rf)
where:
Ke = Rate of return on equity capital;
Rf = Risk-free rate of return;
B = Beta;
Rm – Rf = Market risk premium;

Vish Wind Infrstructure LLP

Cost of Equity = Risk Free Rate + Beta x Market risk premium
= 8.38% + 1.09 x 7.39%
= 16.40%

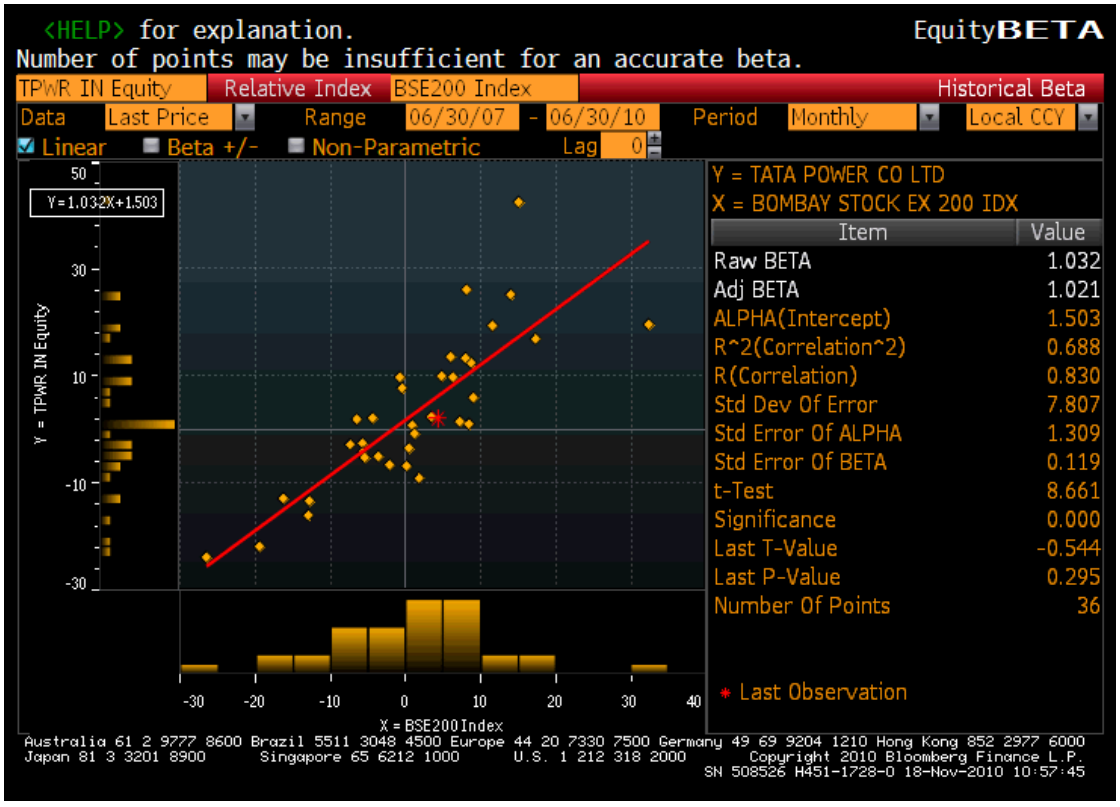
J.N. Investment & Trading Co. Pvt. Ltd

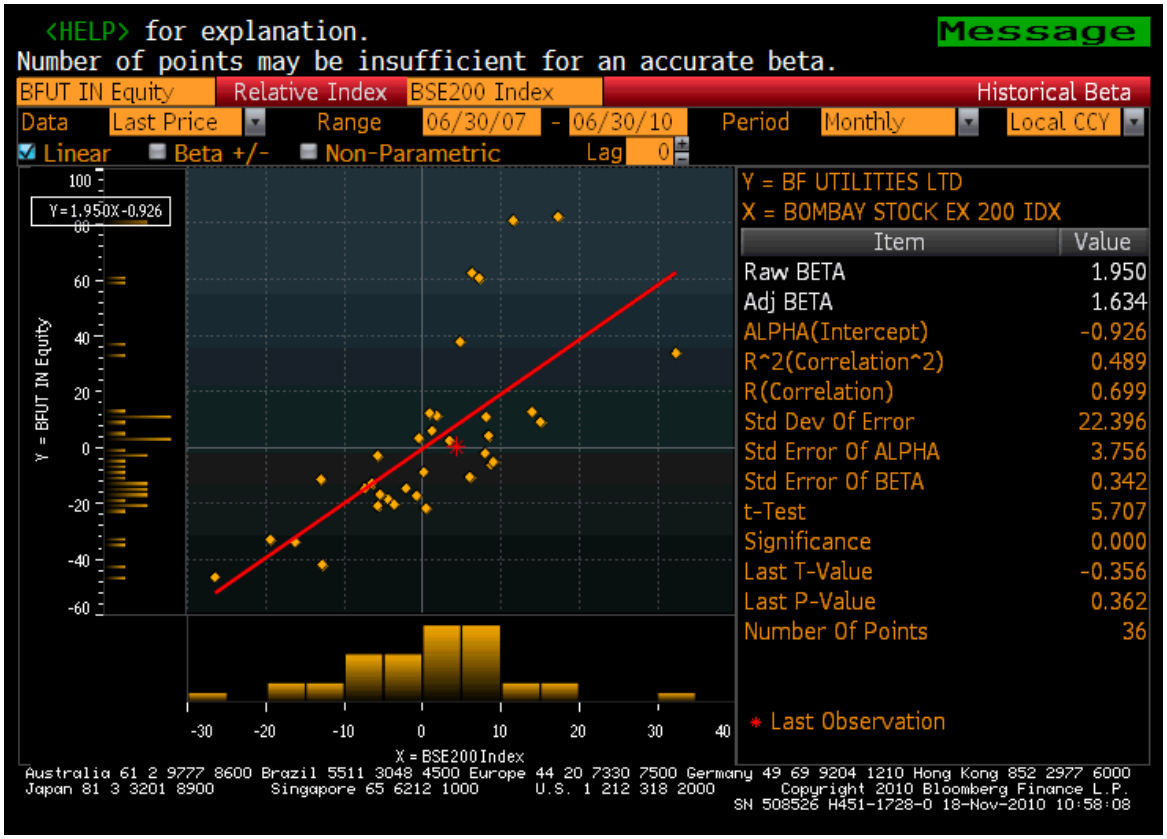
Cost of Equity = Risk Free Rate + Beta x Market risk premium
= 8.27% + 1.03 x 7.58%
= 16.05%

[11] The Capital Asset Pricing Model (CAPM) was published in 1964 by William Sharpe, for his work on CAPM Sharpe received the Nobel Prize in 1990. http://www.investopedia.com/articles/06/CAPM.asp

Appendix 2:

Beta Snapshots for Vish Wind Infrastructure LLP:

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Local CCY
Linear
Beta +/-
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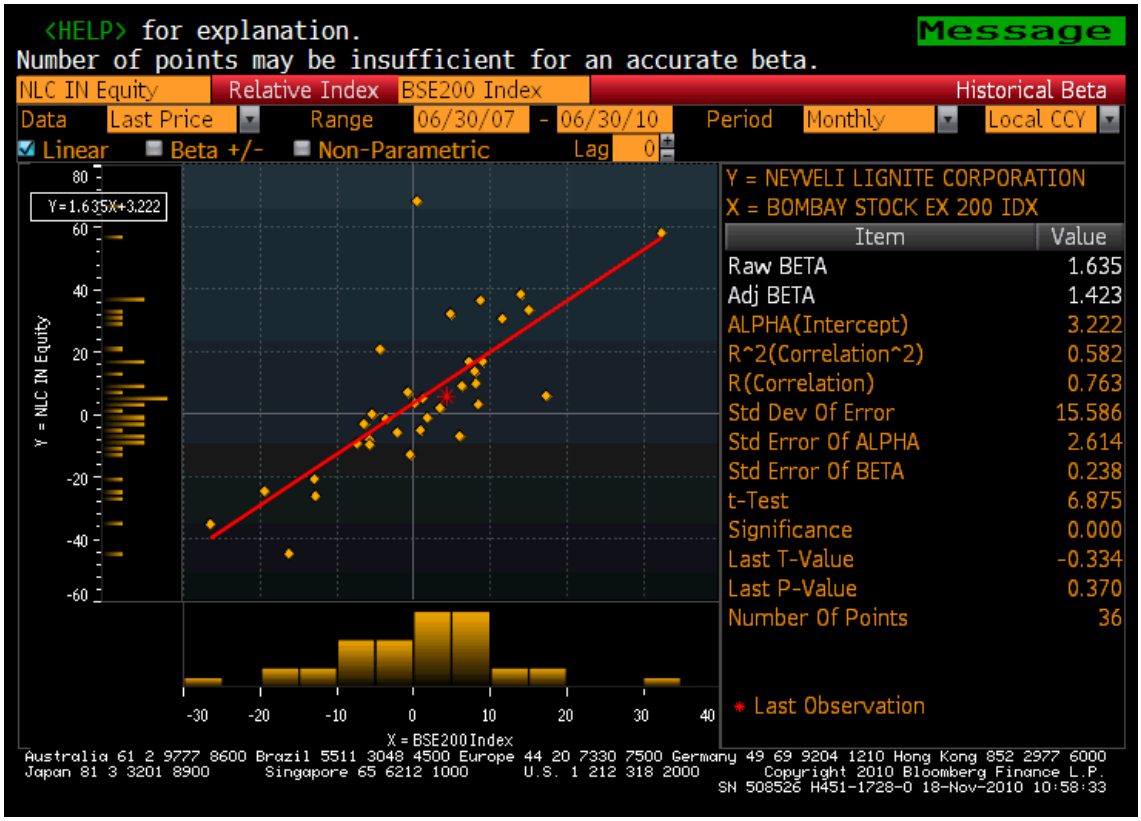
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X = BSE200Index
Y = NEYVELI LIGNITE CORPORATION
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R(Correlation) 0.763
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Std Error Of BETA 0.238
t-Test 6.875
Significance 0.000
Last T-Value -0.334
Last P-Value 0.370
Number Of Points 36
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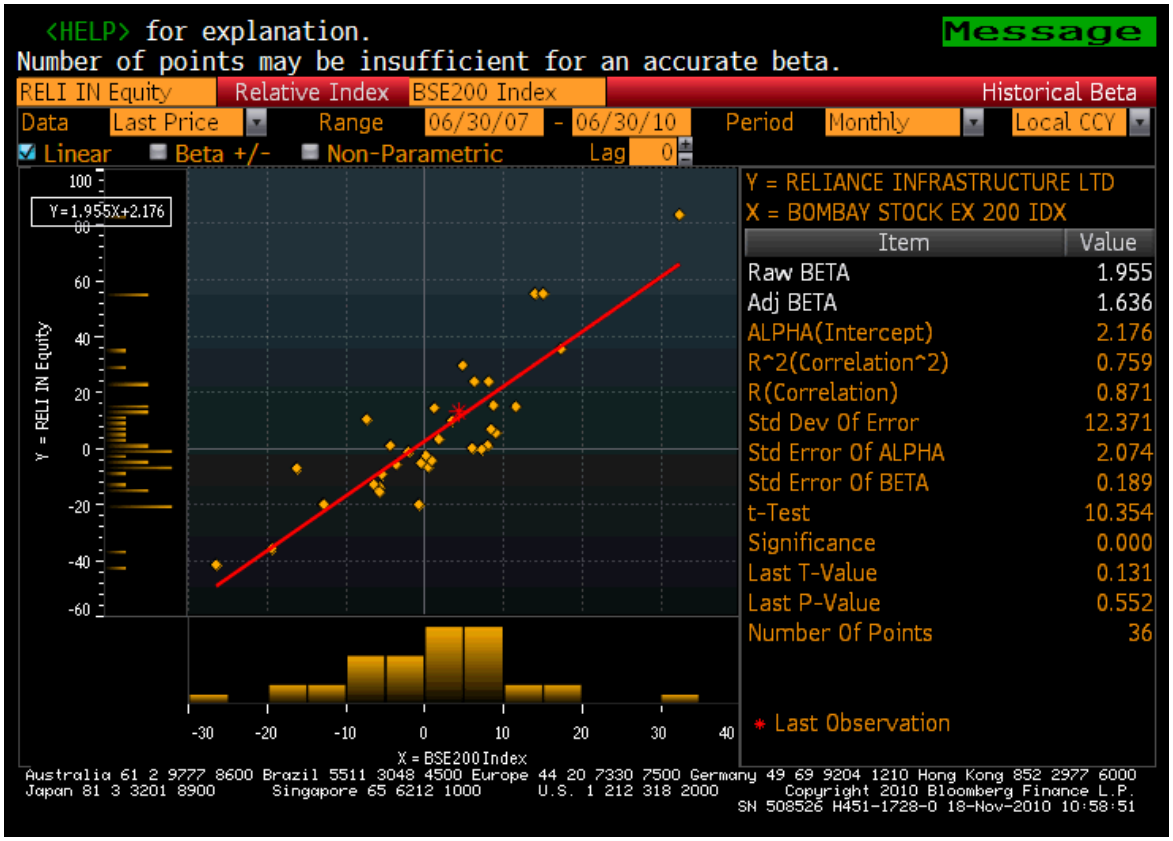
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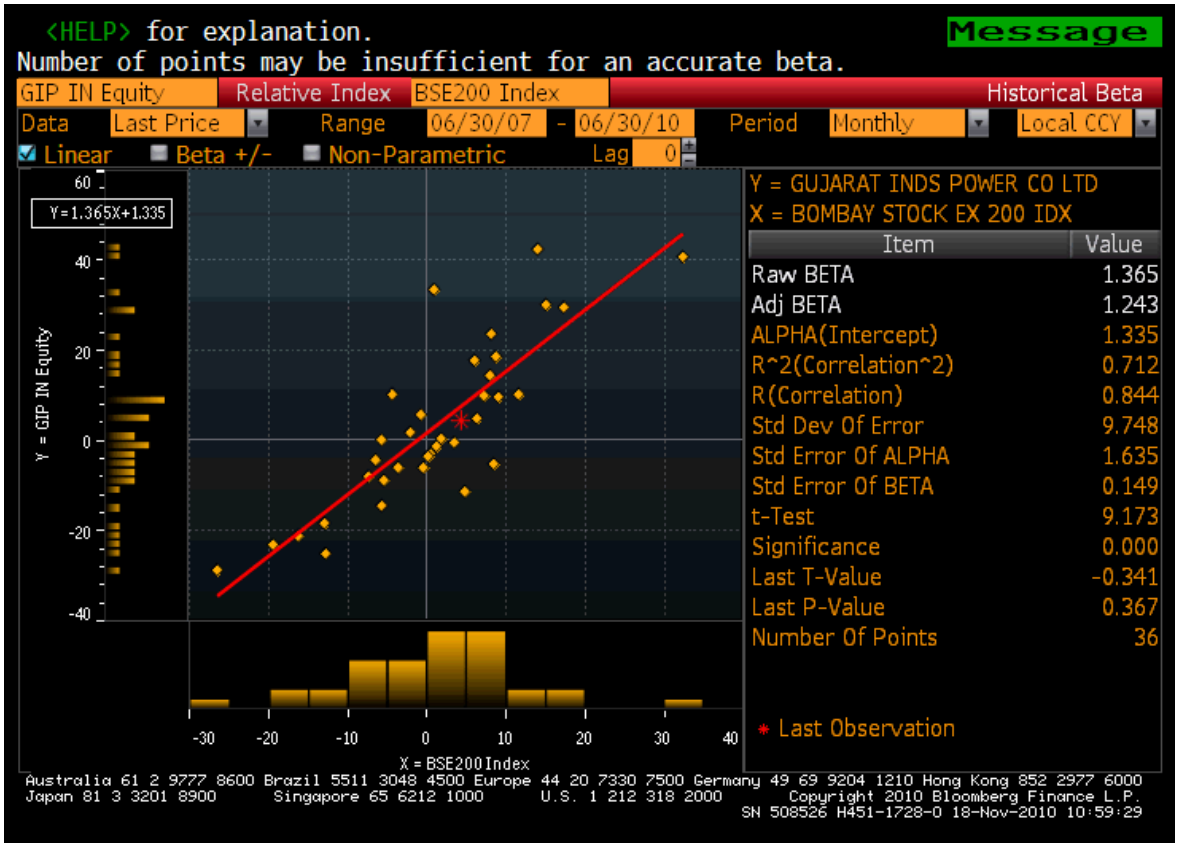
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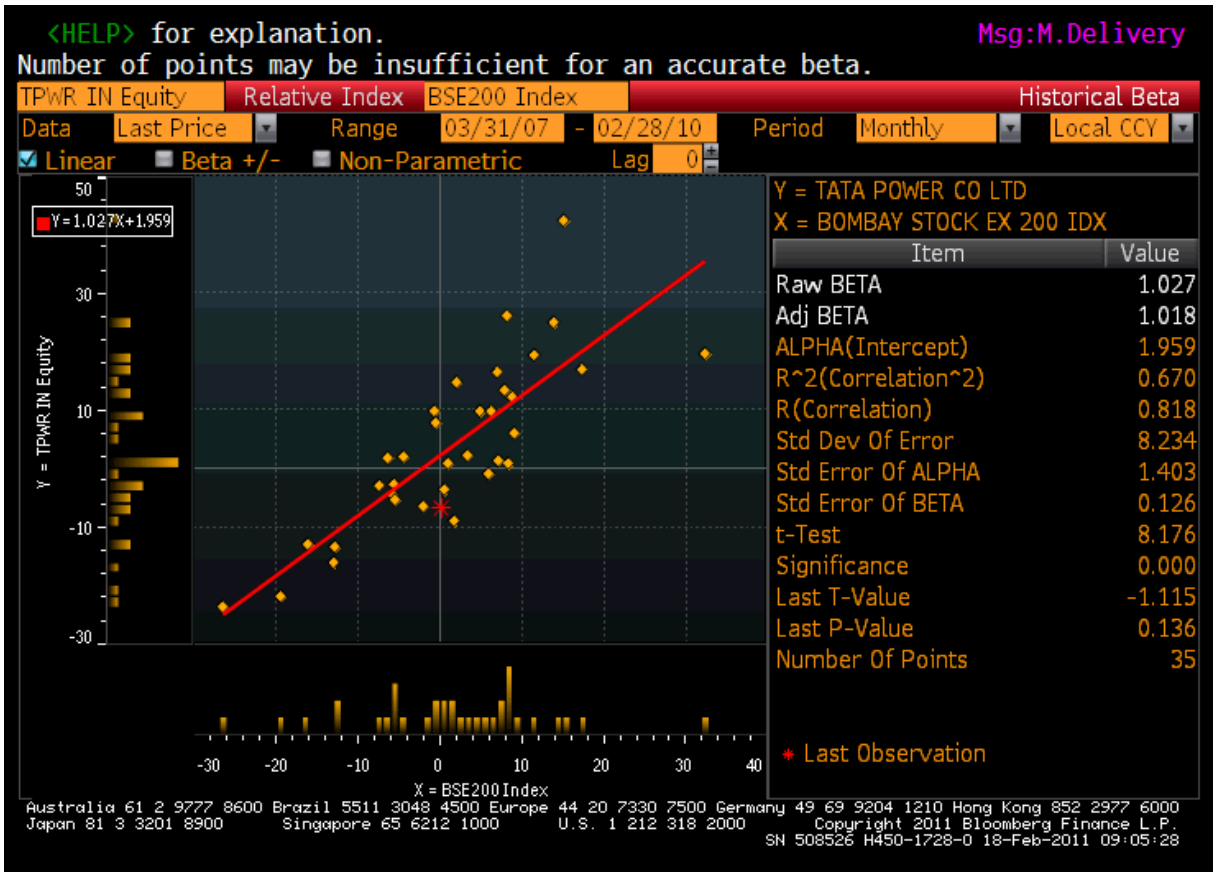
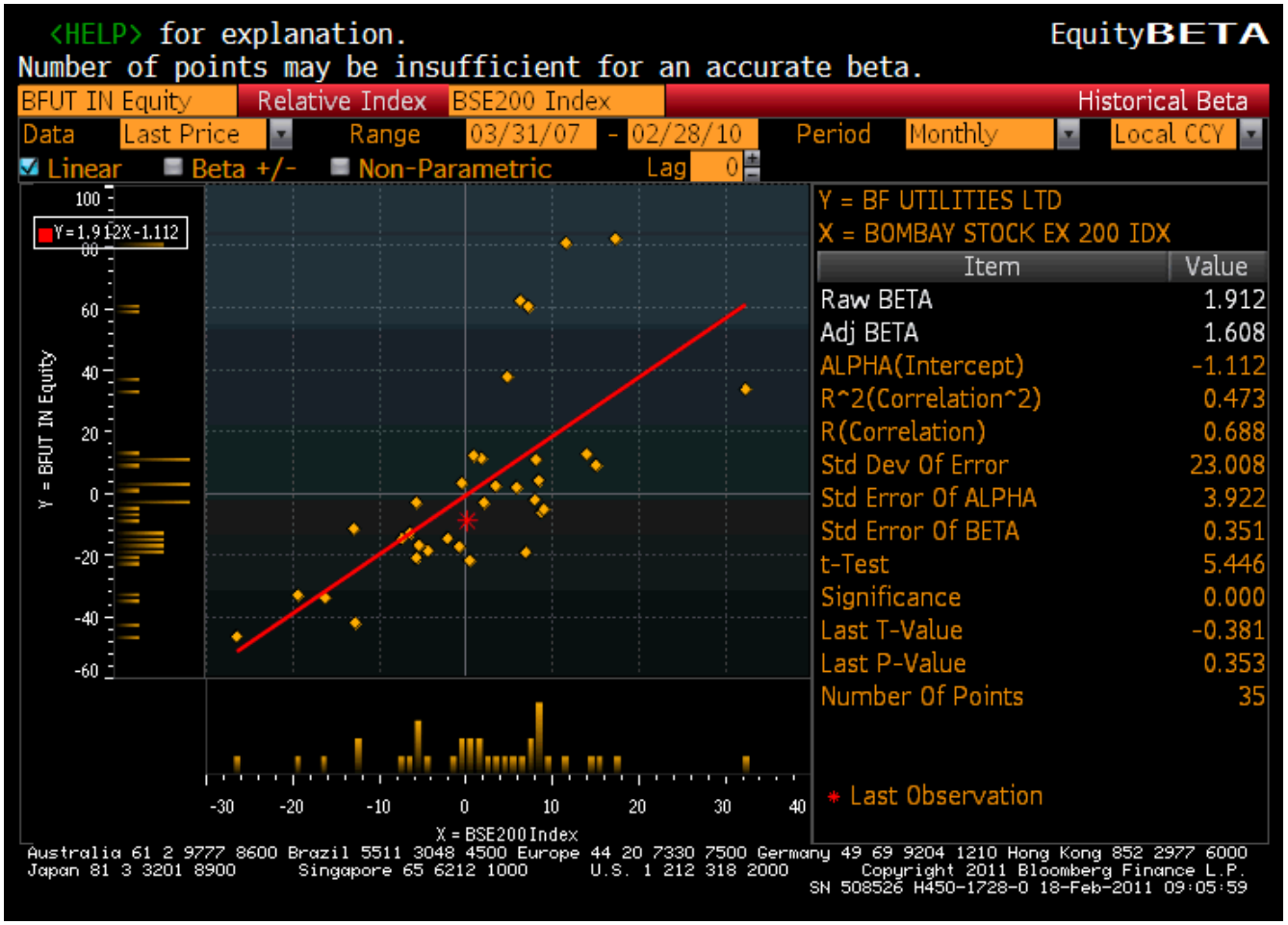
Beta Snapshots for J.N. Investment & Trading Co. Pvt. Ltd.

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EquityBETA
Number of points may be insufficient for an accurate beta.
BFUT IN Equity
Relative Index
BSE200 Index
Historical Beta
Data
Last Price
Range
03/31/07
-
02/28/10
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Lag
0
Y = 1.912X-1.112
Y = BFUT IN Equity
X = BSE200 Index
Y = BF UTILITIES LTD
X = BOMBAY STOCK EX 200 IDX
Item
Value
Raw BETA 1.912
Adj BETA 1.608
ALPHA(Intercept) -1.112
R^2(Correlation^2) 0.473
R(Correlation) 0.688
Std Dev Of Error 23.008
Std Error Of ALPHA 3.922
Std Error Of BETA 0.351
t-Test 5.446
Significance 0.000
Last T-Value -0.381
Last P-Value 0.353
Number Of Points 35
* Last Observation
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000
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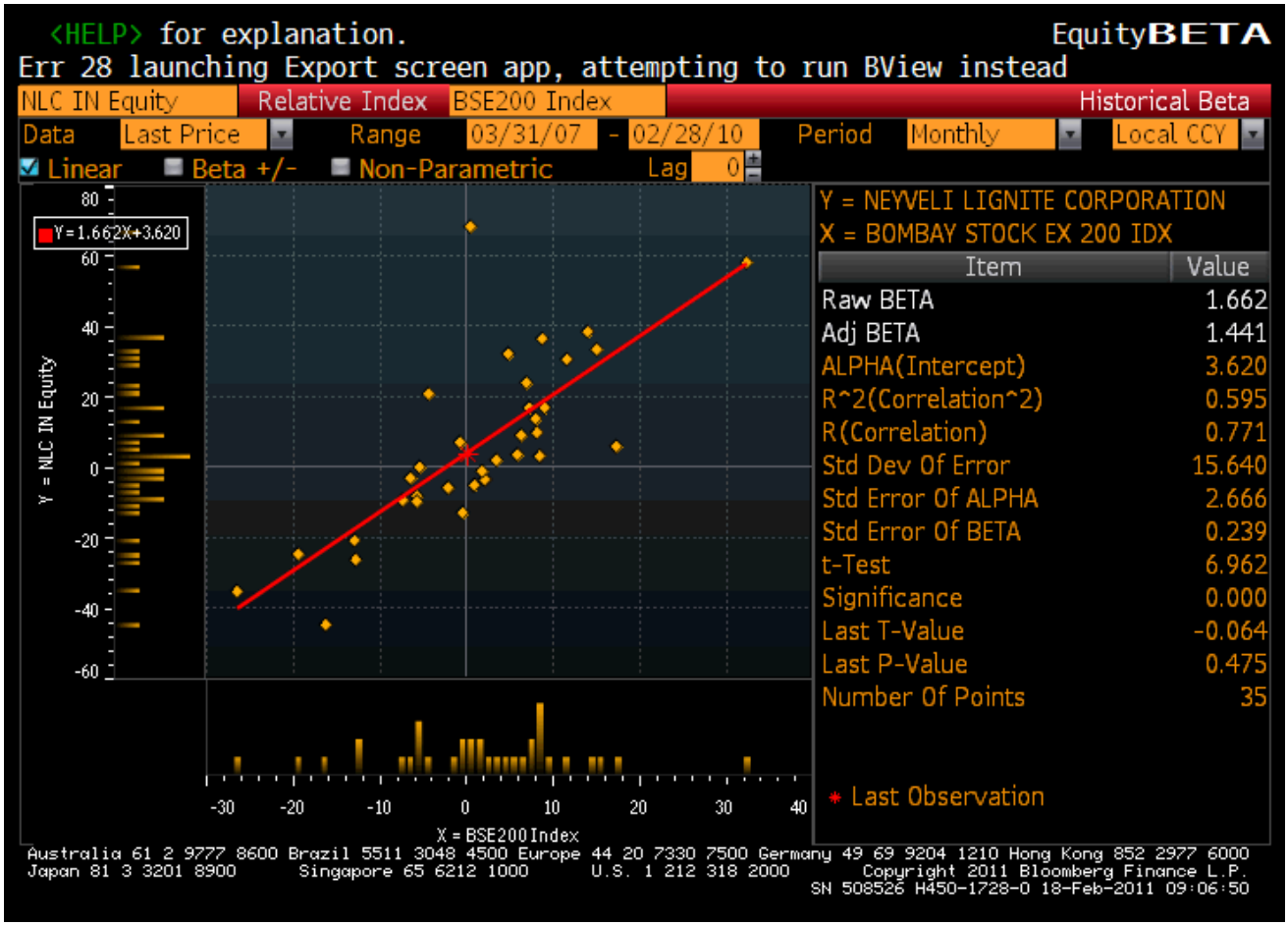
SN 508526 H450-1728-0 18-Feb-2011 09:05:59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EquityBETA
Err 28 launching Export screen app, attempting to run BView instead
NLC IN Equity
Relative Index
BSE200 Index
Historical Beta
Data
Last Price
Range
03/31/07
02/28/10
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Lag
0
Y=1.662X+3.620
Y = NLC IN Equity
X = BSE200Index
Y = NEYVELI LIGNITE CORPORATION
X = BOMBAY STOCK EX 200 IDX
Item
Value
Raw BETA 1.662
Adj BETA 1.441
ALPHA(Intercept) 3.620
R^2(Correlation^2) 0.595
R(Correlation) 0.771
Std Dev Of Error 15.640
Std Error Of ALPHA 2.666
Std Error Of BETA 0.239
t-Test 6.962
Significance 0.000
Last T-Value -0.064
Last P-Value 0.475
Number Of Points 35
* Last Observation
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000
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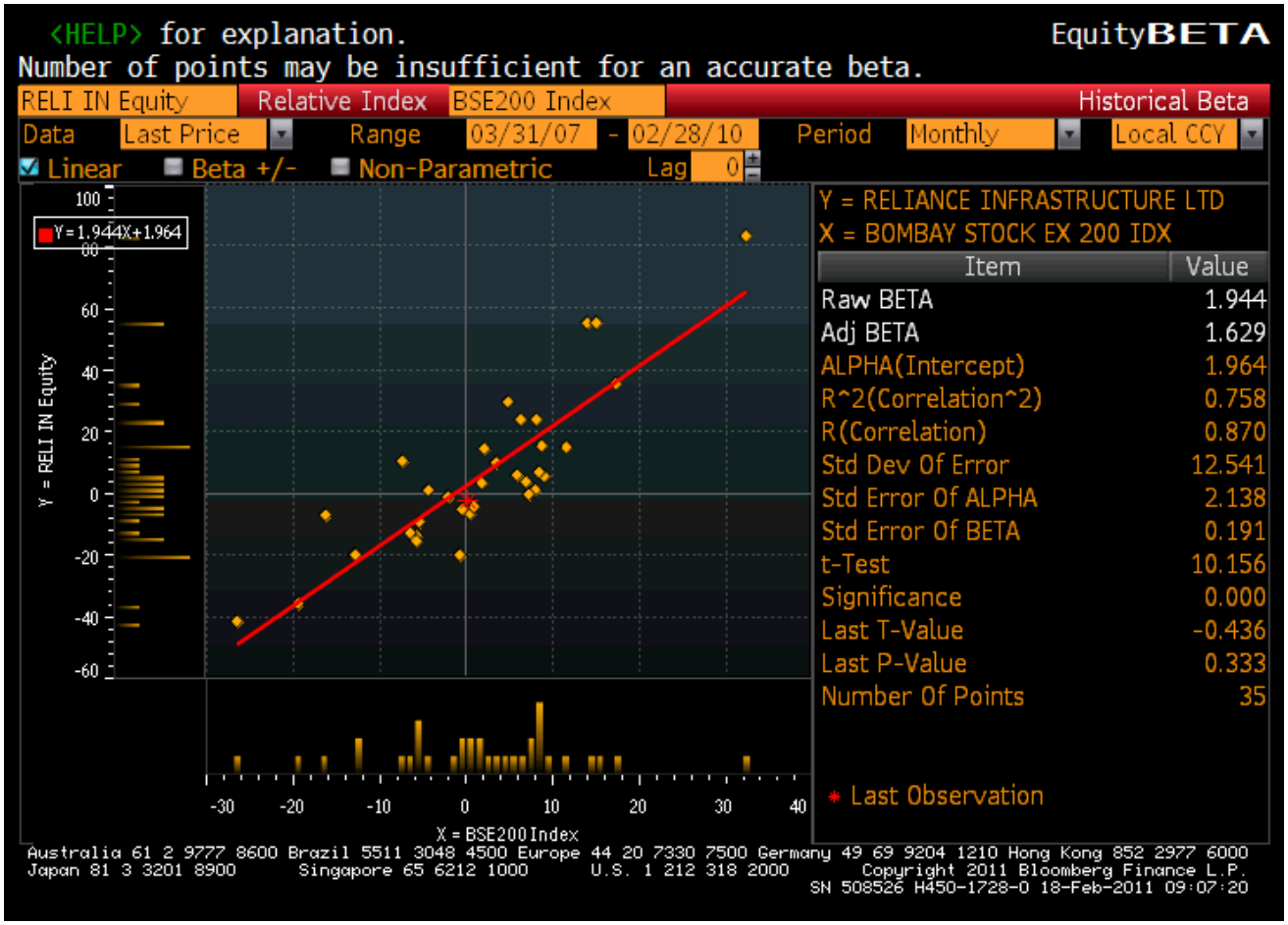
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EquityBETA
Number of points may be insufficient for an accurate beta.
RELI IN Equity
Relative Index
BSE200 Index
Historical Beta
Data
Last Price
Range
03/31/07
-
02/28/10
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Lag
0
Y=1.944X+1.964
Y = RELI IN Equity
X = BSE200 Index
Y = RELIANCE INFRASTRUCTURE LTD
X = BOMBAY STOCK EX 200 IDX
Item
Value
Raw BETA 1.944
Adj BETA 1.629
ALPHA(Intercept) 1.964
R^2(Correlation^2) 0.758
R(Correlation) 0.870
Std Dev Of Error 12.541
Std Error Of ALPHA 2.138
Std Error Of BETA 0.191
t-Test 10.156
Significance 0.000
Last T-Value -0.436
Last P-Value 0.333
Number Of Points 35
* Last Observation
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000
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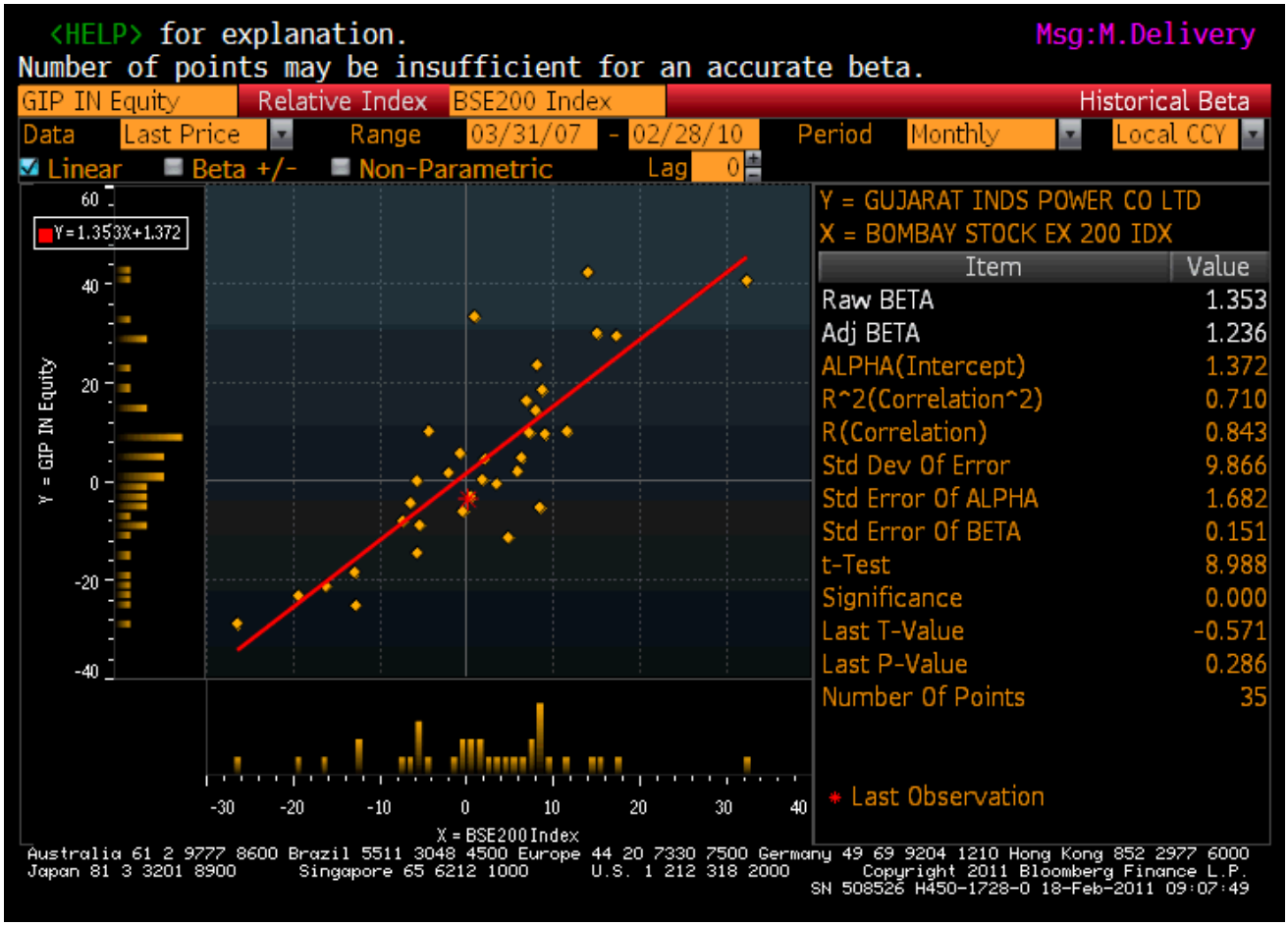
SN 508526 H450-1728-0 18-Feb-2011 09:07:20


<HELP> for explanation.
Msg:M.Delivery
Number of points may be insufficient for an accurate beta.
GIP IN Equity
Relative Index
BSE200 Index
Historical Beta
Data
Last Price
Range
03/31/07
-
02/28/10
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Lag
0
Y=1.353X+1.372
Y = GIP IN Equity
X = BSE200Index
Y = GUJARAT INDS POWER CO LTD
X = BOMBAY STOCK EX 200 IDX
Item
Value
Raw BETA 1.353
Adj BETA 1.236
ALPHA(Intercept) 1.372
R^2(Correlation^2) 0.710
R(Correlation) 0.843
Std Dev Of Error 9.866
Std Error Of ALPHA 1.682
Std Error Of BETA 0.151
t-Test 8.988
Significance 0.000
Last T-Value -0.571
Last P-Value 0.286
Number Of Points 35
* Last Observation
Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000
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Appendix 3: Line Diagram of the project Activity