Project design document form for CDM project activities

(Version 05.0)

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Enercon Wind Farms in Karnataka Bundled Project – 30.40 MW
Version number of the PDD	7.0
Completion date of the PDD	19/08/2014
Project participant(s)	Wind World (India) Ltd
Host Party	Government of India (Host)
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope 1 Energy industries (renewable/ non-renewable sources). 'Consolidated baseline methodology for grid-connected electricity generation from renewable sources', ACM0002, Version 06 and 'consolidated monitoring methodology for grid-connected electricity generation from renewable sources', ACM0002, Version 06
Estimated amount of annual average GHG emission reductions	65.774

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Objective of the Project

The objective is development, design, engineering, procurement, finance, construction, operation and maintenance of Enercon Wind Farm (Chitradurga) Ltd 8.8 MW and other wind power projects of 21.60 MW capacity ("Project") in the Indian state of Karnataka to provide reliable, renewable power to the Karnataka state electricity grid which is part of the Southern regional electricity grid. The Project will lead to reduced greenhouse gas emissions because it displaces electricity from fossil fuel based electricity generation plants.

Nature of Project

The Project harnesses renewable resources in the region, and thereby displacing non-renewable natural resources thereby ultimately leading to sustainable economic and environmental development. Wind World (India) Ltd (name of Enercon (India) Ltd. has been changed to Wind World (India) Ltd. effective from 01/01/2013, hereafter Enercon will be referred as Wind World) will be the equipment supplier and the operations and maintenance contractor for the Project. The generated electricity will be supplied to Karnataka Power Transmission Company Ltd ("KPTCL")/ Bangalore Electricity Supply Company Ltd ("BESCOM") / Hubli Electricity Supply Company Ltd ("HESCOM") under long-term power purchase agreements (PPA). Enercon Wind Farm (Chitradurga) Ltd is owned by Wind World (India) Ltd and the rest of the projects are owned by Wind World's customers. The details of the Projects are as under:

1. Enercon Wind Farms (Chitradurga) Ltd: 8.80 MW
2. Steelfab Offshore 0.80 MW
3. Dewanchand Ramsaran: 0.80 MW
4. Elpro International: 0.80 MW
5. Gautam Ladkat: 0.80 MW
6. Sameer Ladkat: 0.80 MW
7. Panama Business Centre: 1.60 MW
8. Sameer Ladkat: 1.60 MW[1]
9. Panama Infrastructure: 1.60 MW
10. MK Agrotech Private Ltd: 1.60 MW
11. Srinivas Sirigeri: 0.80 MW
12. Power Link System Private Limited1: 0.80 MW[2]
13. Dempo Industries: 0.80 MW
14. Desai Brothers: 0.80 MW
15. Abhilash Garments & Estates (P) Ltd: 0.80 MW
16. Prasad Global Solutions: 1.60 MW
17. Siddaganga Oil Extractions Ltd.: 1.60 MW

[1] Due to the demise of Sri Balasaheb Ladkat change of ownership has taken place from Late Balasaheb Ladkat to his son Sameer Ladkat for a commissioned capacity of 1.6 MW (bearing Location No. 59 & 69, Unique Identification No. BMLGH2-01, BMLGH2-02)

[2] Ownership of one machine (0.8 MW) has been transferred from "R.K.Marbles" to "Power Link System Private Limited"

18. Gangadhar Narsingdas Agarwal: 4.00 MW
Contribution to sustainable development
The Project meets several sustainable development objectives including:

- contribution towards the policy desire of Government of India and Government of Karnataka of incremental capacity from renewable sources;
- contribution towards meeting the electricity deficit in Karnataka;
- CO2 abatement and reduction of greenhouse gas emissions through development of renewable technology;
- reducing the average emission intensity (SOx, NOx, PM, etc.), average effluent intensity and average solid waste intensity of power generation in the system;
- conserving natural resources including land, forests, minerals, water and ecosystems; and
- developing the local economy and create jobs and employment, particularly in rural areas, which is a priority concern for the Government of India;

A.2. Location of project activity

A.2.1. Host Party

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The host party to the project activity is the Government of India.

A.2.2. Region/State/Province etc.

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The Project is located in the State of Karnataka that forms part of the Southern regional electricity grid of India.

A.2.3. City/Town/Community etc.

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Project Name	Capacity	As per Commissioning Certificate
Enercon Wind Farms (Chitradurga) Ltd.	8.80	Bharampura, Chitradurga
Steelfab Offshore	0.80	Lakkihalli, Chitradurga
Dewanchand Ramsaran	0.80	Lakkihalli, Chitradurga
Elpro International	0.80	Gulihosahalli, Chitradurga
Gautam Ladkat	0.80	Lakkihalli, Chitradurga
Sameer Ladkat	0.80	Gulihosahalli, Chitradurga
Panama Business Centre	1.60	Lingadevarahalli, Chitradurga
Sameer Ladkat	1.60	Lingadevarahalli, Chitradurga
Panama Infrastructure	1.60	Gulihosahalli, Chitradurga & Mulashiranahalli
MK Agrotech Private Ltd.	1.60	Gulihosahalli, Chitradurga
Srinivas Sirigeri	0.80	Janakal, Chitradurga
Power Link Systems Pvt. Ltd.[3]	0.80	Janakal, Chitradurga
Dempo Industries	0.80	Janakal, Chitradurga

[3] Ownership of one machine (0.8 MW) has been transferred from “R.K.Marbles” to “Power Link System Private Limited”

Desai Brothers	0.80	Gundikeri, Chitradurga
Abhilash Garments	0.80	Machenehalli, Gadag
Prasad Global Solution	1.60	1. MAjjur village shirihatti 2. Ranathur, Gadag
Siddganga Oil Extraction	1.60	Gulihosahalli, Chitradurga
Gangadhar Narsingdas Agarwal	4.00	1. Majjur 2. Machenehalli & Ranathur, Gadag

A.2.4. Physical/Geographical location

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Sr. No.	Project Owner	Unique Identification No.	Loc. No.	Latitude			Longitude		
				Deg.	Min.	Sec.	Deg.	Min.	Sec.
1	Enercon Wind Farms (Chitradurga) Ltd.	EWCLA-01	1	14	2	45.2	76	28	8.3
		EWCLA-02	2	14	2	49	76	28	6.3
		EWCLA-03	3	14	2	52.6	76	28	5
		EWCLA-04	4	14	2	56.7	76	28	4.4
		EWCLA-05	5	14	3	0.6	76	28	3.8
		EWCLA-06	6	14	3	4.4	76	28	3
		EWCLA-07	7	14	3	8.8	76	28	2.4
		EWCLA-08	8	14	3	14.6	76	28	1.2
		EWCLA-09	9	14	3	18.4	76	28	0.3
		EWCLA-10	10	14	3	22.1	76	27	59.2
		EWCLA-11	11	14	3	26	76	27	58.6
2	Steelfab Offshore	SFOGH2-01	71	13	57	3.6	76	25	4.9
3	Dewanchand Ramsaran	DRGH2-01	72	13	57	0	76	25	6.7
4	Elpro International	EILGH2-01	59	13	58	50.7	76	25	24.9
5	Gautam Ladkat	GLGH2-01	69	13	57	10.8	76	25	0.9
6	Sameer Ladkat	SLGH2-01	45	13	59	22.4	76	23	52.6
7	Panama Business Centre	PBCGH2-01	65	13	57	23.5	76	24	55
		PBCGH2-02	66	13	57	20	76	24	54.6
8	Sameer Ladkat	BMLGH2-01	67	13	57	16.3	76	24	55.9
		BMLGH2-02	68	13	57	12.9	76	24	57.5
9	Panama Infrstructure	PIPPGH2-01	43	13	59	28.2	76	23	46.2
		PIPPGH2-02	44	13	59	28.5	76	23	50.8
10	MK Agrotech Private Ltd.	MKAGH2-01	61	13	58	44.3	76	25	26.3
		MKAGH2-02	62	13	58	40.9	76	25	28
11	Srinivas Sirigeri	SSHD-01	7	13	57	0.10	76	19	29.80
12	Power Link System Private Limited[4] (earlier R K Marbles)	PLSHD-01	5	13	57	8.10	76	19	27.30
13	Dempo Industries	DIPLHD-01	6	13	57	4.30	76	19	28.20
14	Desai Brothers	DBLHD-01	1	13	59	27.70	76	18	45.70
15	Abhilash Garments & Estates (P) Ltd.	AGEGA-01	11	15	8	57.30	75	38	38.20

[4] Ownership of one machine (0.8 MW) has been transferred from "R.K.Marbles" to "Power Link System Private Limited"

16	Prasad Global Solutions	PGSGA-01	1	15	10	7.90	75	38	34.50
		PGSGA-02	17	15	8	19.4	75	39	1.80
17	Siddaganga Oil Extractions Ltd.	SOEGA-01	14	15	8	40.3	75	38	44.3
		SOEGA-02	15	15	8	36.5	75	38	46.8
18	Gangadhar Narsingdas Agarwal	GNAGA-01	6	15	9	34.3	75	38	27.1
		GNAGA-02	7	15	9	26.4	75	38	31.5
		GNAGA-03	8	15	9	20.5	75	38	32
		GNAGA-04	12	15	8	48.7	75	38	39.4
		GNAGA-05	13	15	8	44.7	75	38	41

The sites are located at a distance of 200 km from Bangalore by road. The nearest railway station is at Bangalore. A location map is attached at Annex 2.

A.3. Technologies and/or measures

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The Project involves 38 wind energy converters (WECs) of Wind World make 800 kW E-48 with internal electrical lines connecting the Project with local evacuation facility. The WECs generates 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEC with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking System.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.

Wind World (India) Ltd 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.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)

Government of India (Host)	Wind World (India) Ltd	No

The contact details of the entities are provided in Appendix – 1. All the projects have authorized Wind World (India) Ltd to take them through the CDM process.

A.5. Public funding of project activity

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Not Applicable

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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The approved consolidated baseline and monitoring methodology ACM0002 Version 6.0 (19May 2006) has been used. The titles of these baseline and monitoring methodologies are “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” and “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources.”

B.2. Applicability of methodology and standardized baseline

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The Project is wind based renewable energy source, zero emission power project connected to the Karnataka state grid, which forms part of the Southern regional electricity grid. 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 Southern regional electricity grid.
The approved consolidated baseline and monitoring methodology ACM0002 Version 6 is the choice of the baseline and monitoring methodology and it is applicable because:

- the Project is grid connected renewable power generation project activity
- the Project represents electricity capacity additions from wind sources
- the Project does not involve switching from fossil fuel to renewable energy at the site of project activity since the Project is green-field electricity generation capacities from wind sources at sites where there was no electricity generation source prior to the Project, and
- the geographical and system boundaries of the Southern electricity grid can be clearly identified and information on the characteristics of the grid is available.

B.3. Project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity generation from power plants connected to the Southern Grid	CO_2	Included	Main emission source
		CH_4	Excluded	This source is not required to be estimated for wind energy projects under ACM0002
		N_2O	Excluded	This source is not required to be estimated for wind energy projects under ACM0002
Project scenario	Electricity generation from the Project	CO_2	Excluded	Wind energy generation does not have any direct GHG emissions.
		CH_4	Excluded	
		N_2O	Excluded	

B.4. Establishment and description of baseline scenario

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According to ACM0002, for project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following:

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described below.

As the Project does not modify or retrofit an existing generation facility, the baseline scenario is the emissions generated by the operation of grid-connected power plants and by the addition of new generation sources. This is estimated using calculation of Combined Margin multiplied by electricity delivered to the grid by the Project.

B.5. Demonstration of additionality

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The additionality of the project is being proved using additionality tool Version 2.

Step 0: Preliminary screening based on the starting date of the project activity

If project participants wish to have the crediting period starting prior to the registration of their project activity, they shall:

a) Provide evidence that the starting date of the CDM project activity falls between 1 January 2000 and the date of the registration of a first CDM project activity, bearing in mind that only CDM project activities submitted for registration before 31 December 2005 may claim for a crediting period starting before the date of registration.

b) Provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity. This evidence shall be based on (preferably official, legal and/or other corporate) documentation that was available at, or prior to, the start of the project activity.

The additionality of the project is being proved using additionality tool Version 2.

The Project start date is prior to the date of validation of the PDD.

Wind power projects prior to the implementation Project were required to share CDM revenues with KPTCL in accordance with the PPAs approved by Karnataka Electricity Regulatory Commission (KERC). While KPTCL requested KERC to retain the sharing of CDM revenues, KERC removed the sharing of CDM revenues with KPTCL while approving the PPAs for the Project recognizing the nascent stage of the CDM market and potential adverse impact on new investments. The various regulatory orders that a) allowed CDM benefits to be shared between KPTCL and the developers for earlier projects, and b) did not allow KPTCL to share CDM benefits with developers will be provided to the validator.

Wind World's management had considered CDM benefits in wind power development and already had experience with CDM process (CERUPT tender of 2001, Letter of Intent for other wind power projects in Karnataka in December 2003, etc.). It had also informed its customers of the CDM benefits. Evidence for this is available which will be provided to the validator.

Wind World had entered into discussions with a CER purchaser for purchase of emission reductions and a Memorandum of Understanding was signed on 1st July 2005, which is prior to the start date of the Project.

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

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

1. Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives are to include:

- The proposed project activity not undertaken as a CDM project activity;
- All other plausible and credible alternatives to the project activity that deliver outputs and on services (e.g. electricity, heat or cement) with comparable quality, properties and application areas;
- If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

Alternative(s) available to the project participants or similar project developers include:

(a) The Project is not undertaken as a CDM project activity.

(b) Setting up of comparable utility scale fossil fuel fired or hydro power projects that supply to the Karnataka grid under a PPA.

Continuation of the current situation where no project activity or any of the above Alternatives are undertaken would not be applicable as Karnataka had energy (MU) shortages of 0.7% and peak (MW) shortages of 9.8% in 2005-06 (Source: Southern Region Power Sector Profile, August 2006, Ministry of Power).

Outcome of step 1 a:

Alternatives a and b, as identified above are realistic and credible alternatives to the project activity.

Sub-step 1b. Enforcement of applicable laws and regulations

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

3. If an alternative does not comply with all applicable legislation and regulations, then show that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that noncompliance with those requirements is widespread in the country. If this cannot be shown, then eliminate the alternative from further consideration.
4. If the proposed project activity is the only alternative amongst the ones considered by the project participants that is in compliance with all regulations with which there is general compliance, then the proposed CDM project activity is not additional.

There are no legal and regulatory requirements that prevent Alternatives (a) and (b) from occurring.

Outcome of step 1 b

Both alternative a and alternative b are in compliance with mandatory laws and regulations taking into account the enforcement in the region or country and EB decision on national and sectoral policies. Hence Alternative a and b as identified in the step 1 a are realistic and credible alternatives to the project activity.

Proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis). (Project participants may also select to complete both steps 2 and 3.)

Step 2: Investment Analysis

Determine whether the proposed project activity is the economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. - Determine appropriate analysis method

1. Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

Sub-step 2b. – Option I. Apply simple cost analysis

2. Document the costs associated with the CDM project activity and demonstrate that the activity produces no economic benefits other than CDM related income.

Sub-step 2b. – Option II. Apply investment comparison analysis

3. Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in $/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision-making context.

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

4. Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in $/kWh or levelized cost of delivered heat in $/GJ) most suitable for the project type and decision context.

Option I – Simple cost analysis is not applicable as the project activity sells electricity to the grid and obtains economic benefits in the form of electricity tariffs.

Wind World proposes to use **Option III – Benchmark analysis** and the financial indicator that is identified is the post-tax return on equity or the equity IRR.

Our project is a 30.4 MW bundled wind power project that generates and supplies electricity to the state electricity grid in the state of Karnataka, India. During the request for registration stage, the EB referred our project to "request for review" and sought clarifications from us. In response to the queries raised in request for review, we presented the clarifications in EB 36. The EB then instructed to register our project with corrections provided we submit a revised PDD and corresponding revised validation report that provides clarification regarding suitability of the 16% regulatory commission benchmark. Subsequently, the Executive Board in EB 40 meeting ruled that the 16% post tax return considered by regulatory commissions is not a suitable benchmark.

We also understand that as per Guidance to investment analysis issued in EB 41 (paragraph 11), the required return on equity can be considered as appropriate benchmark for Equity IRR. In light of this and keeping in mind the EB 40 ruling, we have considered the cost of equity[5] applicable to the project type i.e. electricity generation projects, as the suitable benchmark for the project. The cost of equity has been determined using the Capital Asset Pricing Model (CAPM) considering Beta values of all listed power generating companies in India. The CAPM economic model is widely used 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.

In line with the requirements of the Guidance to Investment Analysis (paragraph 12), data and parameters used in calculation of cost of equity i.e. beta values of power generating companies in India, risk free rate of return, market risk premium etc. have been derived from publicly available data sources. The detailed calculations of cost of equity along with an elaboration of the approach are provided in Annex 1.

As can be seen, the benchmark cost of equity works out to 17.75 %

Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):

5. Calculate the suitable financial indicator for the proposed CDM project activity and, in the case of Option II above, for the other alternatives. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but including subsidies/fiscal incentives where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.

6. Present the investment analysis in a transparent manner and provide all the relevant assumptions in the CDM-PDD, so that a reader can reproduce the analysis and obtain the same results. Clearly present critical techno-economic parameters and assumptions (such as capital costs, fuel prices, lifetimes, and discount rate or cost of capital). Justify and/or cite assumptions in a manner that can be validated by the DOE. In calculating the financial indicator, the project's risks can be included through the cash flow pattern, subject to

[5] The Guidance to investment analysis (paragraph 13) states that, for projects where there are more than one possible project developers, the internal cost of equity can not be considered as the benchmark as benchmarks should not include the subjective profitability expectations or risk profile of a particular project developer. The project activity is a Greenfield renewable energy generation activity that generates and supplies electricity to the Karnataka state grid; and hence can have more than one potential project developer. Therefore, we have not used company or project specific parameters for the calculation of the benchmark (such as company Beta etc.).

project-specific expectations and assumptions (e.g. insurance premiums can be used in the calculation to reflect specific risk equivalents).

7. Assumptions and input data for the investment analysis shall not differ across the project activity and its alternatives, unless differences can be well substantiated.

8. Present in the CDM-PDD submitted for validation a clear comparison of the financial indicator for the proposed CDM activity and:
   (a) The alternatives, if Option II (investment comparison analysis) is used. If one of the other alternatives has the best indicator (e.g. highest IRR), then the CDM project activity cannot be considered as the most financially attractive;
   (b) The financial benchmark, if Option III (benchmark analysis) is used. If the CDM project activity has a less favourable indicator (e.g. lower IRR) than the benchmark, then the CDM project activity cannot be considered as financially attractive.

Detailed assumptions used and the results of financial analysis for Panama Infrastructure, the project with the highest equity IRR, is presented below.

Owner:	**Panama Infrastructure**
Project:	1.6 MW
Location:	Karnataka

Assumptions for Financial Model

Capacity of Machines in kW	800
Number of Machines	2
Project Capacity in MW	1.60
Project Commissioning Date	6-Mar-06
Project Cost (Rs. Million)	76
Project Cost per MW (Rs. In Millions)	47.5

Operations	
Plant Load Factor	26.5%
Insurance Charges @ % of capital cost	0.18%
Operation & Maintenance Cost base year @ % of capital cost	1.25%
% of escalation per annum on O & M Charges	5.0%

Tariff	
Base year Tariff for 10 years - Rs./kWh	3.40
Annual Escalation (Rs./kWh per Year)	0.00
Tariff applicable after 10 years (Rs/kWh)	Cost plus 16% return on equity

Project Cost Land and Infrastructure, Generator & Electrical Equipments, Mechanical Equipments, Civil Works, Instrumentation & Control, Other Project Cost, Pre operative Expenses, etc.	Rs Million
Total Project Cost	76

Means of Finance		Rs Million
Own Source	25%	19.00
Term Loan	75%	57.00
Total Source		76.00
Terms of Loan		
Interest Rate	9.00%	
Tenure	12.0	Years
Moratorium	6	Months

Income Tax Depreciation Rate (Written Down Value basis)	
on Wind Energy Generators	80%
On other Assets	10%
Book Depreciation Rate (Straight Line Method basis)	
On all assets	7.86%
Book Depreciation up to (% of asset value)	90%

Income Tax	
Income Tax rate	30%
Minimum Alternate Tax	10%
Surcharge	10%
Cess	2%

Working capital	
Receivables (no of days)	45
O & M expenses (no of days)	30
Working capital interest rate	12%

Crediting period starts	15-Sep-07
Length of Crediting period	10

Baseline Emission Factor for Southern Region (tCO2/GWh)	932.04

The equity IRR for this sub project without CDM revenues is 11.56%.

The financial analysis also demonstrates that the equity IRRs of other projects are in the range of 9% to 11.56% i.e. less than the benchmark rate of 17.75%. Equity IRRs of all sub projects that comprise the project activity are provided in Annex 4.

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):

9. Include a sensitivity analysis that shows whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favor of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive (as per step 2c para 8a) or is unlikely to be financially attractive (as per step 2c para 8b).

Sensitivity analysis of the Equity IRR to the Plant Load Factor (the most critical assumption) has been carried out considering a plant load factor of 23% and 28% (the range indicated in KERC Order dated 18 January 2005). Plant Load Factor is the key variable encompassing variation in wind profile, variation in off-take (including grid availability) including machine downtime. The post tax Equity IRRs at the stated PLFs are as follows:

	PLF at 23%	PLF at 26.5% (Base case)	PLF at 28%
Post tax Equity IRR without CER revenues	5.59%	11.56%	14.41%

Tariff

Apply a fixed electricity tariff through the life time of the project;
In EB 36, the Executive Board has required us to consider a fixed electricity tariff for the entire project life period. We would like to submit that the tariff for our project is governed by a legally binding Power Purchase Agreement (PPA) signed between the project developer and the off-taker. The fixed tariff of Rs. 3.40 is applicable for the PPA tenure which is 10 years. For tariff beyond 10th year, the PPA states that [Source: Section on Rates and Charges]: "*From 11th year onwards, from the date of signing of the agreement the corporation shall pay to the company for the energy delivered at the metering point at a rate based on operating costs and incentives to be agreed upon by mutual negotiations*"

As can be seen, the PPA very clearly states that only "operating costs" and "incentives" to be agreed upon by mutual negotiation will determine the tariffs from 11th year to the 20th year. You will notice in the financial model that the tariffs from the 11th to 20th year have accordingly been considered – operating costs plus the 16% return on equity that KERC considers for setting wind power tariff. The reason why the tariff number comes down substantially after the 10th year is because the largest component of tariff being the debt service (principal repayment and interest payments) is over by the 10th year of operations and these have already been factored in while determining the regulated tariff for the first 10 years. In fact
KERC, while working out the tariff schedule for wind energy projects for the first 10 years, has noted that the reduction in tariff from year to year is mainly on account of repayment of debts and

also that there are no running costs other than O&M costs which increases only marginally from year to year. Please refer Page 19 third line of KERC order dated 18th January 2005 which is applicable to project activity.
(Source: http://www.kerc.org/order2005/Order%20on%20NCE%20Tariff%20(FINAL).doc).

Thus, from the 11th year to the 20th year, the tariff number cannot contain the element of debt service (principal repayment and interest payment) and even with the increased operating costs, the overall tariff number is lower in the 11th year. In the public hearing held by KERC on 28-December-2004 to seek inputs on its "Consultation Paper on Back ground Issues on treatment of Renewable Energy Projects in the light of Electricity Act- 2003" under article (8-vii), common issues raised in the discussion paper on renewable energy projects: Tariff determination for old and new projects, KERC has ruled that the same tariff cannot be applied for projects that have completed 10 years of operational life since these projects has completed their loan repayment obligations.

It is therefore clear that the tariff for the project activity beyond the initial PPA period would be lower. This is bound to happen in any regulated tariff structure and several instances are available in the cost plus tariff regulated power projects (both in case of non conventional as well as conventional coal-fired power projects) where the tariff comes down significantly after the debt service is over.

For example, in case of Maharashtra wind power projects, the MERC order provides a clear understanding of the approach to be followed for tariff setting beyond the initial PPA period. [MERC order Section 1.4.2, Para 2, page-25 of 116, weblink:
http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf]

The Commission notes that in Cost Plus Approach, which the Commission has adopted for tariff proposal, rate per unit charged by such projects during initial period of 10 years is bound to be higher as during this period the project has various debt related obligations. ***However, it is essential that the consumer is able to enjoy the benefit of cheaper power once all debt related obligations are paid off and project has virtually no variable costs.***

This can be further corroborated from the table 3 on page 69 of MERC order (link: http://www.mercindia.org.in/pdf/Detail_Wind_Energy_Order.pdf) that beyond the 11th year the cost of electricity only comprises O & M cost and return of equity for tariff calculation.

Also in case of projects in other states, like Maharashtra, that are approaching the end of the term for the PPA, the state utilities have applied for the petition for revision in tariff which is much lower than the tariff for the term of the PPA. The state utility in the state of Maharashtra has approached commission for revision in tariff after the period of 13 years of the PPA (MERC has provided PPA term for the period of 13 years for wind power projects) at the rate of INR 1.17 per kWh [Source: MERC order dated 20 November 2007, para 2(a)] which is much lower than the tariff [INR 3.50 per kWh with escalation of INR 0.15 per year for the first 13 years of operation] approved by the Maharashtra electricity regulatory commission for the first 13 years under PPA.

As you would note from the above the regulatory framework for tariff setting in India do not allow us to obtain a fixed tariff through out the lifetime of the project activity. Therefore, for carrying out the investment analysis, we have considered the tariff in accordance with the terms of the Power Purchase Agreement that governs the sale of electricity for the first 10 years and have adopted the approach considered by the commission for computing the tariff beyond the term of PPA.

Therefore we would like to submit that it is unrealistic to assume that the project will be able to obtain the same constant tariff beyond the PPA tenure. We have carried out sensitivity analysis considering a reasonable escalation in tariff of 10% (as per EB Guidance para 17, Annex 45 of EB 41). As can be seen, with reasonable variations in tariff the IRR remains below the benchmark. The IRR based on constant tariff of Rs. 3.40 for the entire project life is also presented in the table.

Sensitivity Analysis	-10% (on base Case)	Tariff as per KERC principles beyond 13th year (Base Case)	+10% (on base Case)	Rs. 3.40 Per Kwh (unrealistic/Not Possible)
Post tax Equity IRR without CER revenues	10.46%	11.56%	12.52%	16.80%

As can be seen from above, the Project is not the most financially attractive (as per step 2c para 8a) we proceed to Step 4 (Common practice analysis).

Step 4. Common practice analysis

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

1. Provide an analysis of any other activities implemented previously or currently underway that are similar to the proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities are not to be included in this analysis. Provide quantitative information where relevant.

Sub-step 4b. Discuss any similar options that are occurring:

2. If similar activities are widely observed and commonly carried out, it calls into question the claim that the proposed project activity is financially unattractive (as contended in Step 2) or faces barriers (as contended in Step 3). Therefore, if similar activities are identified above, then it is necessary to demonstrate why the existence of these activities does not contradict the claim that the proposed project activity is financially unattractive or subject to barriers. This can be done by comparing the proposed project activity to the other similar activities, and pointing out and explaining essential distinctions between them that explain why the similar activities enjoyed certain benefits that rendered it financially attractive (e.g., subsidies or other financial flows) or did not face the barriers to which the proposed project activity is subject.
3. Essential distinctions may include a serious change in circumstances under which the proposed CDM project activity will be implemented when compared to circumstances under which similar projects where carried out. For example, new barriers may have arisen, or promotional policies may have ended, leading to a situation in which the proposed CDM project activity would not be implemented without the incentive provided by the CDM. The change must be fundamental and verifiable.

We analyze the extent to which wind energy projects have diffused in the electricity sector in Karnataka. In 2004 – 05, wind electricity generation was 485.57 GWh and the total electricity availability at bus-bar in the state of Karnataka was 33,523.92 GWh (Source: CEA General Review 2006). This works out to 1.45%, showing that wind energy power generation is insignificant as compared to other power project generation sources in Karnataka.

Installed capacity of wind energy generation sources stood at 276 MW as of 31 March 2005 (Source: CEA General Review 2006). There are approximately 201 MW wind energy projects that are currently in the CDM pipeline (UNFCCC website) and more are expected to follow.

Outcome of step 4
Clearly, wind power project development in Karnataka is insignificant when compared to the power sector of Karnataka. Further, wind power project development is substantially dependent on CDM mechanism and thus is not common practice.

Sub-steps 4a and 4b are satisfied.

Step 5. Impact of CDM registration

Explain how the approval and registration of the project activity as a CDM activity, and the attendant benefits and incentives derived from the project activity, will alleviate the economic and financial hurdles (Step 2) or other identified barriers (Step 3) and thus enable the project activity to be undertaken.

Registering the project activity as a CDM activity provides a significant amount of revenue, improving the project's cash flow and improving the equity IRR by 3.74%. The revenues from sale of the Certified Emission Reductions would enhance the viability of the project and would partially offset the risks associated with the possible changes in policy, wind regime, project implementation risks (time and cost overruns), etc. Further, CER revenues will be high quality cash flows coming from creditworthy parties and denominated in foreign currency. The CDM revenues will attract new players to wind investments in Karnataka, as they provide compensation for the regulatory and project risks implicit in the wind power projects.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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According to the approved baseline methodology ACM0002, the emission reductions ER_y by the project activity during a given year "y[6]" is

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

Where: BE_y is the baseline emissions
PE_y is project activity emissions and;
L_y is the amount of emissions leakage resulting from the project activity.

[6] Throughout the document, the suffix y denotes that such parameter is a function of the year y, thus to be monitored at least annually.

Baseline Emissions for the amount of electricity supplied by project activity, BE_y is calculated as

$$BE_y = EG_y * EF_y \text{ ……(2)}$$

where EG_y is the electricity supplied to the grid, EF_y is the CO_2 emission factor of the grid as calculated below.

The emission factor EF_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 $EF_{OM,y}$ and $EF_{BM,y}$, then the EF_y is given by:

$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y} \text{ ……(2)}$$

with respective weight factors w_{OM} and w_{BM} (where $w_{OM} + w_{BM} = 1$).

The Operating Margin emission factor

As per ACM0002, dispatch data analysis should be the first methodological choice. However, this option is not selected because the information required to calculate OM based on dispatch data is not available in the public domain for the Southern electricity regional grid.

The Simple Operating Margin approach is appropriate to calculate the Operating Margin emission factor applicable in this case. As per ACM 0002 the Simple OM method can only be used where low cost must run resources constitute less than 50% of grid generation based on average of the five most recent years. The generation profile of the Southern grid in the last five years is as follows:

Generation in GWh	**2004-05**	**2003-04**	**2002-03**	**2001-02**	**2000-01**
Low cost/must run sources					
Hydro	24,951	16,943	18,288	26,260	29,902
Wind & Renewables	3,256	1,865	1,607	1,456	1,262
Nuclear	4,408	4,700	4,390	5,244	4,331
Other sources					
Coal	99,010	98,435	92,053	84,032	83,292
Diesel	2,434	3,295	4,379	4,155	2,868
Gas	12,428	14,214	13,950	10,331	7,132
Total Generation	**146,487**	**139,451**	**134,667**	**131,478**	**128,787**
Low cost/must run sources	32,615	23,508	24,285	32,960	35,496
Low cost/must run sources	22%	17%	18%	25%	28%

Source: Table 3.4 of CEA General Review 2004-05, 2003-04, 2002-03, 2001-02, 2000-01

From the available information it is clear that low cost/must run sources account for less than 50% of the total generation in the Southern grid in the last five years. Hence the Simple OM method is appropriate to calculate the Operating Margin Emission factor applicable.

Build Margin Emission Factor

The Build Margin emission factor EF_BM_y (tCO_2/GWh) is given as the generation-weighted average emission factor of the selected representative set of recent power plants represented by the 5 most recent plants or the most recent 20% of the generating units built (summation is over such plants specified by k):2

$$EF_{BM,y} = [\sum_i F_{i,m,y} * COEFi] / [\sum_k GEN_{k,m,y}] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

as the default method. The summation over i and k is for the fuels and electricity generation of the plants in sample *m* mentioned above.

The choice of method for the sample plant is the most recent 20% of the generating units built as this represents a significantly larger set of plants, for a large regional electricity grid have a large number of power plants connected to it, and is therefore appropriate.

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 CO2 Baseline Database provides information about the Operating Margin and Build Margin Emission Factors of all the regional electricity grids in India. The Operating Margin in the CEA database is calculated ex ante using the Simple OM approach and the Build Margin is calculated ex ante based on 20% most recent capacity additions in the grid based on net generation as described in ACM0002. We have, therefore, used the Operating Margin and Build Margin data published in the CEA database, for calculating the Baseline Emission Factor.

Combined Margin Emission Factor

As already mentioned, baseline emission factor (EF_y) of the grid is calculated as a combined margin (CM), calculated as the weighted average of the operating margin (OM) and build margin (BM) factor. In case of wind power projects default weights of 0.75 for EF_{OM} and 0.25 for EF_{BM} are applicable as per ACM0002. No alternate weights are proposed.

Using the values for operating margin and build margin emission factors provided in the CEA database and their respective weights for calculation of combined margin emission factor, the baseline carbon emission factor (CM) is 932.04 tCO_2e/GWh or 0.93204 tCO_2e/MWh.

Project Emissions:

The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

$PE_y = 0$

Leakage:

Emissions Leakage on account of the project activity is ignored in accordance with ACM0002.

$L_y = 0$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{OM,y}$
Unit	tCO_2e/MWh
Description	Operating Margin Emission Factor of Southern Regional Electricity Grid
Source of data	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	2002 – 03 0.9970 2003 – 04 1.0094 2004 – 05 1.0038
Choice of data or Measurement methods and procedures	Operating Margin Emission Factor has been calculated by the Central Electricity Authority using the simple OM approach in accordance with ACM0002.
Purpose of data	Calculation of baseline emissions
Additional comment	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data / Parameter	$EF_{BM,y}$
Unit	tCO2e/MWh
Description	Build Margin Emission Factor of Southern Regional Electricity Grid
Source of data	"CO2 Baseline Database for Indian Power Sector" published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO2 Baseline Database for Indian Power Sector" is available at www.cea.nic.in
Value(s) applied	2004 – 05 0.718
Choice of data or Measurement methods and procedures	Build Margin Emission Factor has been calculated by the Central Electricity Authority in accordance with ACM0002.
Purpose of data	Calculation of baseline emissions
Additional 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

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Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.

Baseline emission factor (combined margin)
= 932.04 tCO2e/GWh

Annual electricity supplied to the grid by the Project
= 30.40 MW (Capacity) x 26.5% (PLF) x 8760 (hours) / 1000 GWh
= 70.57056 GWh

Annual baseline emissions
= 932.04 tCO2e/GWh x 70.57056 GWh
= 65,774 tCO2e

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
25 October 2007 to 31March2008	22,565	0	0	22,565
01 April 2008 to 31 March 2009	65,774	0	0	65,774
01 April 2009 to 31 March 2010	65,774	0	0	65,774
01 April 2010 to 31 March 2011	65,774	0	0	65,774
01 April 2011 to 31 March 2012	65,774	0	0	65,774
01 April 2012 to 31 March 2013	65,774	0	0	65,774
01 April 2013 to 31 March 2014	65,774	0	0	65,774
01 April 2014 to 31 March 2015	65,774	0	0	65,774
01 April 2015 to 31 March 2016	65,774	0	0	65,774
01 April 2016 to 31 March 2017	65,774	0	0	65,774
01 April 2017 to 24 October 2017	43,209	0	0	43,209
Total	657,740	0	0	657,740
Total number of crediting years	10			
Annual average over the crediting period	65,774	0	0	65,774

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	EG_y
Unit	MWh (Mega-watt hour)
Description	Net electricity supplied to the grid by the Project

Source of data	Electricity supplied to the grid as per Joint Meter Readings (Form B) taken at 33kV metering point for each of the sub project included in the project activity.
Value(s) applied	Annual electricity supplied to the grid by the Project = 30.40 MW (Capacity) x 26.5% (PLF) x 8760 (hours) MWh = 70570.56 MWh

Measurement methods and procedures

Monitoring: All the meters are **two-way trivector meters capable of recording import and export of electricity** and provide output in the form of net electricity supplied to the grid. The procedures for metering and meter reading will be as per the provisions of the power purchase agreement except or otherwise explicitly stated in the monitoring plan. Metering system for the project activity consists of dedicated main and check meters for each of the sub project owner included in the project activity at 33 kV metering location.

In addition to this Joint meter readings are also noted at main and check meters (bulk meters) located at the substations. The subprojects included in the project activity are connected to following four substations:

Sr. No.	Name of Customer	Capacity (MW)	Wind World Sub-station
1	Enercon Wind Farms (Chitradurga) Ltd.	8.8	Wind World Sub-station at Imangala
2	Steelfab Offshore	0.8	GIM-II Sub-station at Gownalli
3	Dewanchand Ramsaran	0.8	
4	Elpro International	0.8	
5	Gautam Ladkat	0.8	
6	Sameer Ladkat	0.8	
7	Panama Business Centre	1.6	
8	Sameer Ladkat	1.6	
9	Panama Infrastructure	1.6	
10	MK Agrotech Private Ltd.	1.6	
11	Srinivas Sirigeri	0.8	EP-II Sub-station at Nandana Hosuru
12	Dempo Industries	0.8	
13	Power Link Systems Pvt. Ltd.	0.8	
14	Desai Brothers	0.8	
15	Siddganga Oil Extraction	1.6	Gadag Sub-station at Banikoppa
16	Abhilash Garments	0.8	
17	Prasad Global Solution	1.6	
18	Gangadhar Narsingdas Agarwal	4.0	

The bulk meters are connected to the machines of the project activity and the machines commissioned by the other project developers. Therefore in order to determine the electricity supplied to the grid by the project activity at high voltage side of the substation, the state utility applies the transmission loss between 33 kV metering point and meter reading noted at high voltage side of the receiving substation to the meter reading recorded at the 33 KV metering point.

The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of Wind World and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR (Form B) recorded at 33kV metering point.

Frequency of recording data: Monthly

Recording: The values of electricity supplied to the grid are sourced from JMR for the sub projects at 33 kV metering point.

Responsibility: Joint responsibility of Wind World and state utility.

Refer Appendix 5 for an illustration of the provisions for measurement methods.

Monitoring frequency	Monthly
QA/QC procedures	QA/QC procedures will be as implemented by the state utility pursuant to the provisions of the power purchase agreement. Refer Appendix – 5 for an illustration of the provisions for QA/QC procedures.
Purpose of data	Calculation of baseline emissions
Additional comment	The data is archived for a period up to 2 years after the finishing of crediting period.

Data / Parameter	EG_{Export}
Unit	MWh (Mega-watt hour)
Description	Electricity Export recorded at meters (main and check meters). All the subprojects included in the project activity have dedicated main and check meters at 33 kV metering point.
Source of data	Electricity export to the grid as per joint meter reading (FormB) for each of the sub project taken at 33 kV metering point.
Value(s) applied	This value will be taken from the JMR (Form B) taken at 33kV metering point and will be applied directly.
Measurement methods and procedures	Monitoring: Electricity export to the grid will be recorded by the meters (main and check meters) at 33kV point. Refer section B.7.3 and Appendix 5 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The values of electricity exports to the grid are sourced from JMR for the sub projects at 33 kV metering point. Responsibility: Joint responsibility of Wind World and state utility
Monitoring frequency	Monthly
QA/QC procedures	QA/QC procedures will be as implemented by state utility and the PP except or otherwise explicitly stated in the PDD. Refer Appendix 5 for an illustration of the provisions for QA/QC procedures.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter	EG_{import}
Unit	MWh (Mega-watt hour)
Description	Electricity Import recorded at meters (main and check meters). All the subprojects included in the project activity have dedicated main and check meters at 33 kV metering point.
Source of data	Electricity import from the grid as per joint meter reading for each of the sub project taken at 33kV metering point.

Value(s) applied	This value will be taken from the JMR (Form B) taken at 33 kV metering point and will be applied directly.
Measurement methods and procedures	Monitoring: Electricity import from the grid will be recorded by meters (main and check meters) at 33kV metering point. Refer section B.7.3 and Appendix 5 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The values of electricity import to the grid are sourced from JMR for the sub projects at 33 kV metering point. Responsibility: Joint responsibility of Wind World and state utility
Monitoring frequency	Monthly
QA/QC procedures	QA/QC procedures will be as implemented by state utility and the PP except or otherwise explicitly stated in the PDD. Refer section B.7.3 Appendix 5 for an illustration of the provisions for QA/QC procedures.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be archived on electronic media as well as on paper. The archive will be kept for the period up to two years after the completion of the crediting period.

Data / Parameter	T_E
Unit	MWh (Mega-watt hour)
Description	Transmission loss for export between the metering location at 33 kV metering point and the high voltage side of the substation to which the subproject is connected.
Source of data	Transmission Loss for export will be sourced from the joint meter reading (Form B) taken at 33kV metering point for all the sub projects included in the project activity.
Value(s) applied	This value is certified by the State utility in the JMR (Form B). This value will be directly sourced from the JMR (Form B).
Measurement methods and procedures	Monitoring: Transmission loss between metering location at 33 kV and the metering location at receiving substation is applied to the meter reading taken at meters connected at 33 KV point for the project activity. The Substation is connected to the machines of the project activity and the machines commissioned by the other project owners. Therefore transmission loss is applied by the state utility as reflected in the JMR (Form B) taken at 33kV point for all the sub projects included in the project activity. The JMR is signed by the representatives of Wind World and the state utility. Refer section B.7.3 and Appendix 5 for an illustration of the provisions for measurement methods. Frequency of recording data: Monthly Recording: The value of transmission loss is sourced from JMR for all the sub projects at 33 kV metering point. Responsibility: Joint responsibility of Wind World and state utility Refer section B.7.3 and Appendix 5 for an illustration of the provisions for measurement methods.

Monitoring frequency	Monthly
QA/QC procedures	QA/QC procedures will be as implemented by state utility and the PP. Refer section B.7.3 and Appendix 5 for an illustration of the provisions for QA/QC procedures.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be stored in hard format and values will be taken from JMR.

The data will be stored in hard format and soft format by PP (Wind World) at the project site office. Joint meter reading is taken in the presence of the persons representing Wind World [Operation and Maintenance Contractor] and the state utility. The archive will be kept for the period up to two years after the completion of the crediting period.

B.7.2. Sampling plan

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Not Applicable

B.7.3. Other elements of monitoring plan

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Approved monitoring methodology ACM0002 / Version 06 Sectoral Scope: 1, "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources", by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

This approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where ex post determination of grid emission factor has been chosen

Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required.

There is dedicated main and check meters for each of the sub projects included in the project activity at 33 kV metering point. The feeders of 33 kV metering point are further connected to step up transformer at substation and subsequently to bulk meter at high voltage side of receiving substation.
The bulk meters are connected to machines of the project activity and the machines commissioned by the other project developers. The subprojects included in the project activity are connected to following four substations where the bulk meters are located:

Sr. No.	Name of Customer	Capacity (MW)	Wind World Sub-station	State Utility Sub-station
1	Enercon Wind Farms (Chitradurga) Ltd.	8.8	Wind World Sub-station at Imangala	Aiamangala, 66/11 kV KPTCL sub-station
2	Steelfab Offshore	0.8	GIM-II Sub-station at Gownalli	Hiriyur, 220/66/11 kV KPTCL sub-station
3	Dewanchand Ramsaran	0.8		
4	Elpro International	0.8		
5	Gautam Ladkat	0.8		
6	Sameer Ladkat	0.8		

7	Panama Business Centre	1.6		
8	Sameer Ladkat	1.6		
9	Panama Infrastructure	1.6		
10	MK Agrotech Private Ltd.	1.6		
11	Srinivas Sirigeri	0.8	EP-II Sub-station at Nandana Hosuru	Ramagiri, 66/11 kV KPTCL substation
12	Dempo Industries	0.8		
13	Power Link Systems Pvt. Ltd.	0.8		
14	Desai Brothers	0.8		
15	Siddganga Oil Extraction	1.6	Gadag Sub-station at Banikoppa	Dambal, 110/33/11 kV KPTCL sub-station.
16	Abhilash Garments	0.8		
17	Prasad Global Solution	1.6		
18	Gangadhar Narsingdas Agarwal	4.0		

Therefore in order to determine the net electricity supplied to the grid by the project at high voltage side of receiving substation, the state utility applies the transmission loss to the meter reading recorded at the 33 KV metering point. The transmission loss calculated by the state utility is endorsed / confirmed jointly by the representatives of Wind World and the state utility. The transmission loss applied to the project activity by the state utility is reflected in the JMR (Form B) for each sub project recorded at 33kV metering point. Net electricity supplied to the grid is calculated by applying transmission loss to the meter readings taken at 33 kV metering location for all the sub projects included in the project activity.

The procedure for calculation of transmission loss as given in the PPA is set-out below:

$$Z = \frac{(x1+x2+x3...+xn)-y \quad X\ 100}{(X1+X2+X3...+Xn)}$$

The procedure for calculation of transmission loss as given in the PPA is set-out below:

$$Z = \frac{(x1+x2+x3...+xn)-Y \quad X\ 100}{(X1+X2+X3...+Xn)}$$

Z = Percentage transmission loss for export incurred in transmission line between the meters located at 33 kV metering point (including the machines of the project activity and other project developers) and the meters located at high voltage side (bulk meter: main and check) of receiving sub-station.

Summation of meter readings at 33 kV metering points for all the project developers connected to receiving substation (including the machines of the project activity and other project developers) = (X1+X2+X3...+Xn)

Xi = Energy Export Reading (Xi) noted at energy meter installed at 33kV metering point where i vary from 1 to n which represents the meters connected to project activity and other project developers.
X1, X2, X3,…Xn are the meters that are installed at 33kV metering point (including the machines of the project activity and other project developers) and further connected to the receiving substation by internally connected lines.

Y = Energy Export Reading at bulk meter installed at high voltage side of transformer of the receiving sub-station

The Export Reading Xi is adjusted for transmission loss that is determined by the state utility and is applied directly to the JMR (Form B) for each sub project included in the project activity taken at 33 kV metering point. This can be checked from the JMR signed jointly by the representatives of Wind World and the state utility.

Transmission Loss in Export (T_E) = Transmission Loss (Z) * Energy Export at 33kV metering point (EG_{Export})

The transmission loss in export is generally less than 5%. However in case of Energy Import, the state utility conservatively applies adjustment of 15% to the import values noted at 33 kV metering point.

EG_y (Sub project) = EG_{export} – 115%*EG_{import} – Transmission Loss (T_E)

The Joint meter reading for each of the sub project noted at 33 KV metering location contains the following data:-

1. Electricity Export (EG_{export})
2. Electricity Import (EG_{import})
3. Transmission Loss (T_E) between 33 kV metering point and high voltage side of receiving substation
4. Net Electricity supplied to the Grid [EG_{export}-115%*EG_{import}-T_E]

JMR is signed by the representatives of Wind World and the state utility. The meter readings (both export and import), transmission loss and net electricity supplied to the grid are recorded in the JMR (33 KV metering point). Hence all these values are reproduced from the JMR for calculation of emission reductions.

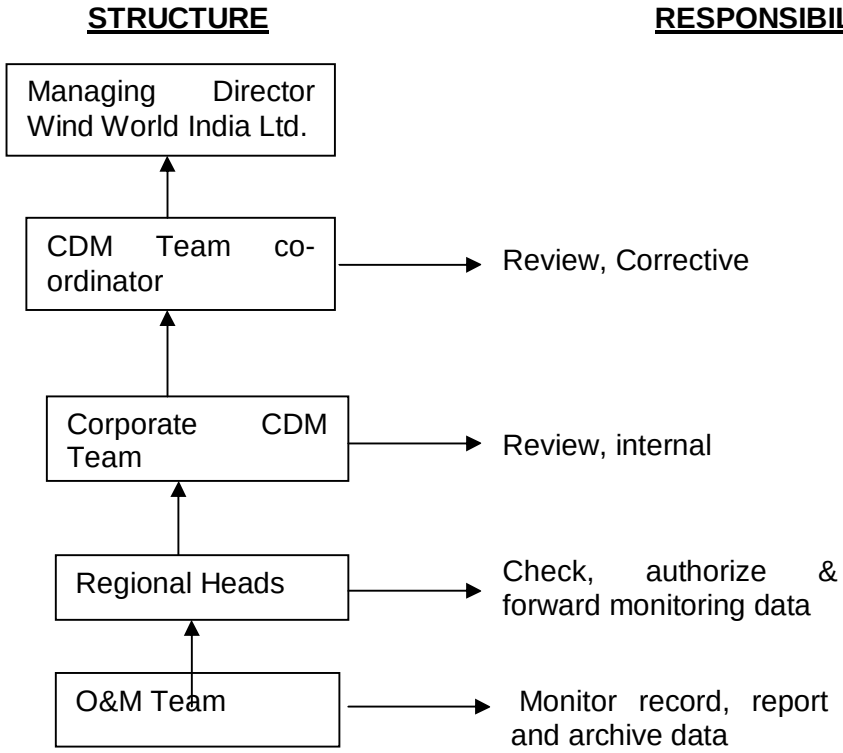
In addition to the JMR (Form B) at 33kV metering location for each of the sub project included in the project activity, the following documents are also be provided to the DoE for verification:

1. JMR (Form B) at high voltage side of receiving sub-station (bulk meters: main and check).
2. Transmission loss calculation endorsed / confirmed jointly by the representatives of Wind World and the state utility.

The net electricity supplied to the grid can be cross checked from the invoices for each of the sub project raised on the state utility for supply of net electricity supplied to the grid.

Net electricity Supplied to Grid for the project activity is summation of Net electricity Supplied to Grid for each of the sub project included in the project activity.

The Project is operated and managed by Wind World (India) Ltd. The operational and management structure implemented by Wind World is as follows:



Training and maintenance:

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 Wind World'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 Wind World Training Academy provides need-based training to meet the training requirements of Wind World 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.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
Date of completion: 12/02/2007

Name of responsible person/entity:
PricewaterhouseCoopers (not a Project Participant)

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
17/08/2005

C.1.2. Expected operational lifetime of project activity

>>
20 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
Fixed Crediting Period

C.2.2. Start date of crediting period

>>
25/10/2007; or date of registration with CDM-EB whichever is later.

C.2.3. Length of crediting period

10 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
Wind World appointed Aditya Environmental Services Private Limited to conduct Rapid Environmental Impact Assessment Study, in the districts of Chitradurga and Gadag where the project activity of Wind World is located, to assess the impact of the project on the local environment

Environmental Impact Assessment (EIA) of this project is not an essential regulatory requirement, as it is not covered under the categories as described in EIA Notification of 1994 or the Amended Notification of 2006. However, Wind World conducted the EIA to study impacts on the environment resulting from the project activity.

The EIA study included identification, prediction and evaluation of potential impacts of the CDM activities on air, water, noise, land, biological and socio-economic environment within the study area. The ambient air concentrations of Suspended Particulate Matter, Respirable Particulate Matter, Oxides of Nitrogen, Sulphur dioxide and Carbon Monoxide were monitored and were found under limits as specified by CPCB. The noise levels were observed through out

the study period and were found to be in the permissible range. Water quality monitoring studies were carried out for determination of physico- chemical characteristics of bore wells. The ph level of water was found to be under the specified limits.
The study area represents part of Chitradurga and Gadag districts. The terrain comprises hilly areas which are sparingly populated, the hills are generally covered with shrubs and grass and trees are not found on the hilltops. Moreover the project area doesn't fall under any protected land for wildlife and it has no adverse ecological impacts on the surroundings, flora and fauna found in the vicinity of the project area. The wind-farms do not effect the path of migratory birds

D.2. Environmental impact assessment

>>
EIA demonstrated that there is no major impact on the environment due to the installation and operation of the windmills. The local ecology is not likely to get impacted by this type of project activity. The local population confirmed that there is no noise or dust nuisance due to windmills. The EIA also ruled out any adverse impacts due to the project activity.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>
The comments from local stakeholders were invited through local stakeholder meeting conducted on 2 September at Arashinagundi Village, Hiriyur in Chitradurga District and 15 June 2006 in Dhoni, Mundaragi in Gadag district. An advertisement was placed in a local newspaper in Vijaya Karnataka on 19 August 2006 inviting the local stakeholders for the meeting for the Chitradurga district projects and in Vijaya Karnataka on 4 June 2006 for the Gadag district projects.

The local stakeholder consultation meeting had representatives from the nearby villages, representatives of Wind World and representative of Aditya Environmental Services (consultant to Wind World) in Chitradurga district and representative of Care Sustainability (consultant to Wind World) in Gadag district. The minutes of the two meetings are set out in Annex 3.

E.2. Summary of comments received

>>
Chitradurga district:
The local stakeholders commented that the development of wind projects has helped the local villagers and provided employment. Further, there is no impact of windmills on the rainfall in the region. The local stakeholders queried Wind World if any afforestation work is being conducted, impact on ground water, generation capacity of the machine, if public can purchase the machines and whether revenue land is used wherever electricity overhead lines pass through.

The local villagers responded to the questions queries made by Wind World by stating that there is no noise pollution as the projects are located in hilltops and away from villages. Further, there is no water draining and soil erosion due to wind mills and there has been no problem with No cattle grazing in the hills. There has been better food production due to better quality of electricity and less load shedding. There has been no deforestation noticed except while road formation and installation of machines and no damage or accidents during construction or erection.

Gadag district:

The local stakeholders commented that there is no adverse impact of wind project activities including no adverse impact on livelihood. The local villages do not use the hill tops or slopes for cattle grazing. There is no impact on ground water or supply of water to agriculture fields. There is no disturbance or high noise level due to operation of the wind mills. There have been no accidents and no disturbance or heavy traffic on account of wind mills. No dust emissions were observed at project site or in the neighbourhood. The wind projects have not affected migratory path of birds. There have been local employment opportunities. Improvement in quality of electricity supply has been observed.

The local stakeholders suggested that in addition to planting medicinal plants at the project site, Wind World should also plant them at the down plains. Wind World should extend help to villagers by providing "lift/transportation" and additional watchmen should be deployed to warn of forest fire.

E.3. Report on consideration of comments received

>>

Wind World provided the following responses in relation to the comments received from the local stakeholders in Chitradurga district:

Wind World is carrying out afforestation work in all the hills where the wind turbines are installed. There is no impact on ground water due to wind mills.

Generation capacity of wind mills is 800 kW.

It is possible to purchase wind mills. In Maharashtra, farmers association has purchased one wind machine.

Revenue land is not being used wherever electrical overhead lines pass. Access to the land is required only for line inspection in case of a fault.

Wind World provided the following responses in relation to the comments received from the local stakeholders in Gadag district:

Regarding planting medicinal plants, Wind World is currently doing it at the project site and would also be planting on the slopes.

Regarding assistance with transport, Wind World would do their best to provide help to the villagers in the emergency cases.

Regarding forest fire warning/safety, Wind World would be constructing a three teet trench on the slopes and around the project site. It has also instructed watchmen and security guards to be vigilant and provide warning in the cases of occurrences of forest fires.

SECTION F. Approval and authorization

>>

The project activity got Host Country Approval dated 4th June 2007 issued by Host Party.

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	√ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Wind World (India) Limited
Street/P.O. Box	A-9, Veera Industrial Estate, Veera Desai Road, Andheri (West)
Building	Wind World Tower
City	Mumbai
State/Region	Maharashtra
Postcode	400 053
Country	India
Telephone	+91-22-6692 4848
Fax	+91-22-6692 1175
E-mail	yogesh.mehra@windworldindia.com
Website	www.windworldindia.com
Contact person	
Title	Managing Director
Salutation	Mr.
Last name	Mehra
Middle name	
First name	Yogesh
Department	Corporate
Mobile	+91-9820040301
Direct fax	+91-22-6692 1175
Direct tel.	+91-22-6692 4848 extn. 7111
Personal e-mail	yogesh.mehra@windworldindia.com

Appendix 2. Affirmation regarding public funding

There is no ODA being used to fund the project activity.

Appendix 3. Applicability of methodology and standardized baseline

Please refer Section B.2

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

BASELINE INFORMATION

The Operating Margin data for the most recent three years and the Build Margin data for the Southern
Region Electricity Grid as published in the CEA database are as follows:

Simple Operating Margin

	tCO2e/GWh
Simple Operating Margin - 2002-03	997.0
Simple Operating Margin - 2003-04	1,009.3
Simple Operating Margin - 2004-05	1,003.7
Average Operating Margin of last three	1,003.3

Build Margin

	tCO2e/GWh
Build Margin	717.9

Combined Margin calculations

	Weights	tCO2e/GWh
Operating Margin	0.75	1003.3
Build Margin	0.25	717.9
Combined Margin		**932.0**

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

Appendix 5. Further background information on monitoring plan

MONITORING INFORMATION

Metering: Electricity supplied to the grid is metered jointly by state utility and Wind World through dedicated main and check meters at 33 kV metering point for each of the sub project included in the project activity.
In addition to this there are main and check meters (Bulk meters) at high voltage side of receiving sub-station covering sub projects of the project activity and machines of other project developers.
There are four receiving stations to which the sub projects included in the project activity are connected. The sub projects and the respective sub stations to which they are connected is provided under section B.7.3.
The schematic diagram shows location of meters for the project activity is attached as Annex 8.

Metering Equipment: Metering system for the project activity consists of main and check meter at 33kV metering point for each of the sub project included in the project activity and set(s) of main and check meters at high voltage side of receiving substation. All the meters are **two-way trivector meters capable of recording import and export of electricity**. The meters installed are capable of recording and storing half hourly readings of all the electrical parameters for a minimum period of 35 days with digital output.

Meter Readings: The electricity export and import to the grid is recorded by taking a Joint Meter Reading (JMR) in the presence of Officials from state Utility and Wind World India Limited at 33kV metering point for each of the sub project included in the project activity. The Joint meter reading contains the value of energy imported, exported, transmission loss and the net electricity exported to the grid during the recording period. This Joint meter reading is certified by the Executive engineer of the state utility and by Wind World Officials. These certified readings are then used by the state utility to prepare the tariff invoices. Thus net electricity supplied to the grid for each of the sub project included in the project activity can be crosschecked with the value mentioned in the invoices raised on the state utility by each of the sub project included in the project activity.

Inspection of Energy Meters: All the main and check energy meters and all associated instruments, transformers installed at the Project are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not to be interfered with by either Party except in the presence of the other Party or its accredited representatives.

Meter Test Checking: All the main and check meters are tested (and calibrated if found necessary) for accuracy on annual basis with reference to a portable standard meter. The portable standard meter is owned by KPTCL. The main and check meters shall be 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 will hold good for the purpose of metering electricity supplied to the grid as long as the error in the main meters is within the permissible limits. All the meters will be tested / calibrated for accuracy annually.

If during the meter test checking,

- the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then the meter reading will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
- the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible of error, then the meter reading for the month up to the date and time of such test shall be as per the check meter. There will be a revision in the meter reading for the period from the previous calibration test up to the current test based on the readings of the check meter. The main meter shall be calibrated immediately and meter reading for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.
- both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the main meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive the correct reading of energy supplied for metering electricity supplied to the grid for the period from the last month's meter reading up to the current test. Meter reading for the period thereafter till the next monthly reading shall be as per the calibrated main meter.

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

Appendix 6. Summary of post registration changes

- Name of Enercon (India) Ltd. has been changed to Wind World (India) Ltd. effective from 01/01/2013, hereafter Enercon will be refereed as Wind World).
- Revision of monitoring plan has been successfully completed and approved by UNFCCC on 21/07/2011 for the project activity, the same has been incorporated in PDD.
- Due to the demise of Sri Balasaheb Ladkat change of ownership has taken place from Late Balasaheb Ladkat to his son Sameer Ladkat for a commissioned capacity of 1.6 MW (bearing Location No. 59 & 69, Unique Identification No. BMLGH2-01, BMLGH2-02).
- Japan Carbon Finance Limited has been removed from MOC as Project Participant on 26/06/2013.

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Document information

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b

Version	*Date*	*Description*
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document

Annex 1

COST OF EQUITY CALCULATION

Calculation of Cost of Equity:

The expected return on equity has been determined using the Capital Asset Pricing Model (CAPM)[7]. 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;

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 rate of interest on government bonds are considered as risk free rates. Page 191 of text book on "Corporate Finance Theory and Practice" by Dr. Aswath Damodaran[8] of Stern School of Business, New York University (attached as Annex 7) describes that the long term government bond 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 long dated Indian government bond rates at the project start date (which is August 2005) which 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 government bond rates is published by Reserve Bank of India. (Web-link: http://rbidocs.rbi.org.in/rdocs/Publications/PDFs/80303.pdf)

The applicable risk free rate is 6.11%.

Risk Premium:

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 return on government securities. It is preferred to use long term premimums, 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, attached as Annex 6]. It is also preferred to calculate the risk premium based on geometric mean of the returns since arithmatic

[7] 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

[8] Dr. Damodaran is one of the foremost authorities in the world in the field of Investment Analysis

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, attached as Annex 6]
Therefore the risk premium has been calculated as the difference in compounded annual return bewteen the BSE-200 since the year of inception of BSE 200 and the Government bond rates, i.e. 1979 – 80. The detailed calculations are presented in the attached excel sheet.

Source: BSE Stock Exchange (www.bseindia.com) The applicable risk premium is 11.14%.
Beta:

Beta (B) indicates the sensitivity of the company to market risk factors. 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. 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 electricity generating companies in India. The group of companies considered includes renewable as well as conventional power generating companies. 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 applicable Beta value has been determined on the basis of the Beta values of all 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 and screenshots are available in Annex 5.

The table below summarises the beta values:

Beta Values of all Lised Power Generating Companies in India at the time of Project Investment		
Bloomberg Symbol	Company Name	Beta
RELE IN Equity	RELIANCE ENERGY	1.05
GIP IN Equity	GUJARAT INDS	1.62
TPWR IN Equity	TATA POWER CO	1.45
CESC IN Equity	CESC LTD	2.14
		1.56

Source:Bloomberg

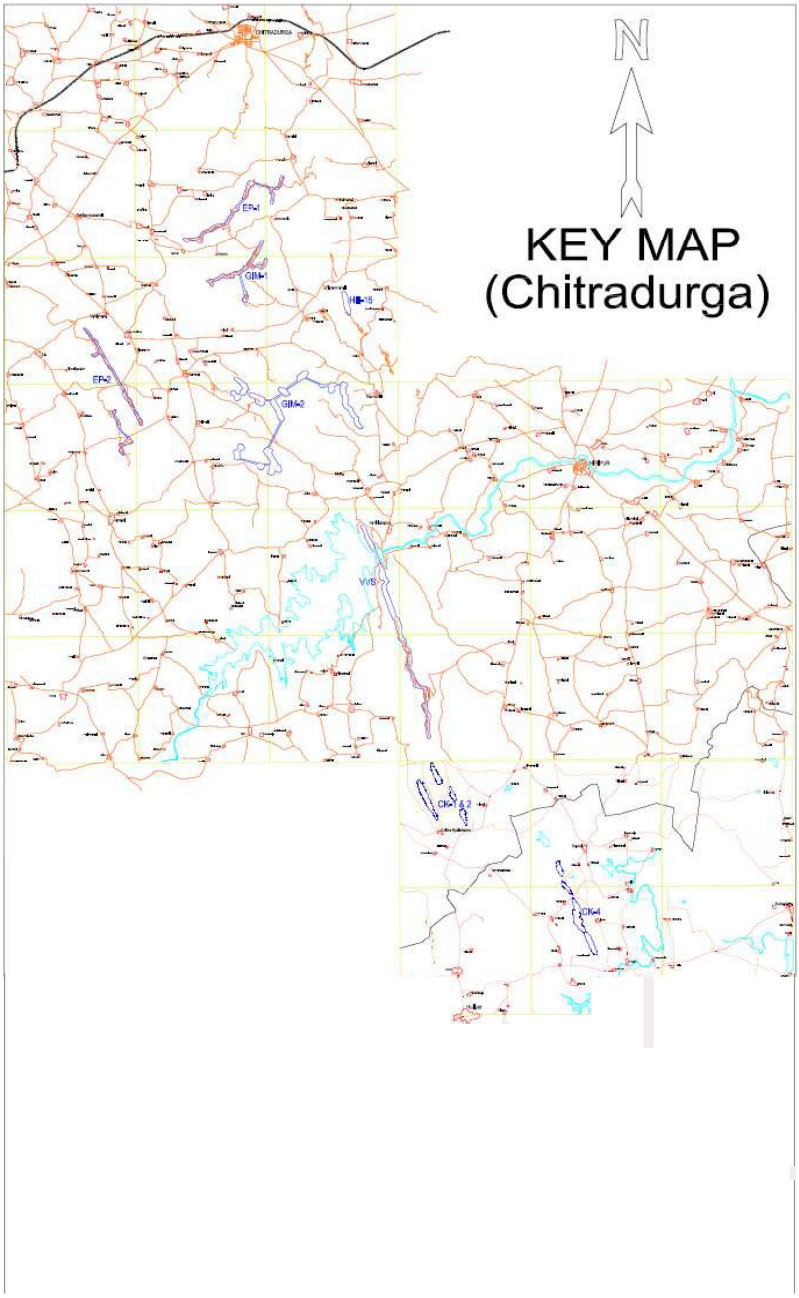
Note: Beta Period- 3 Year (Aug 2002-July 2005)

The average beta of stocks is 1.56. However, conservatively we have choosen the minimum beta of 1.05 of Reliance Infrastructure for computation of Cost of Equity.

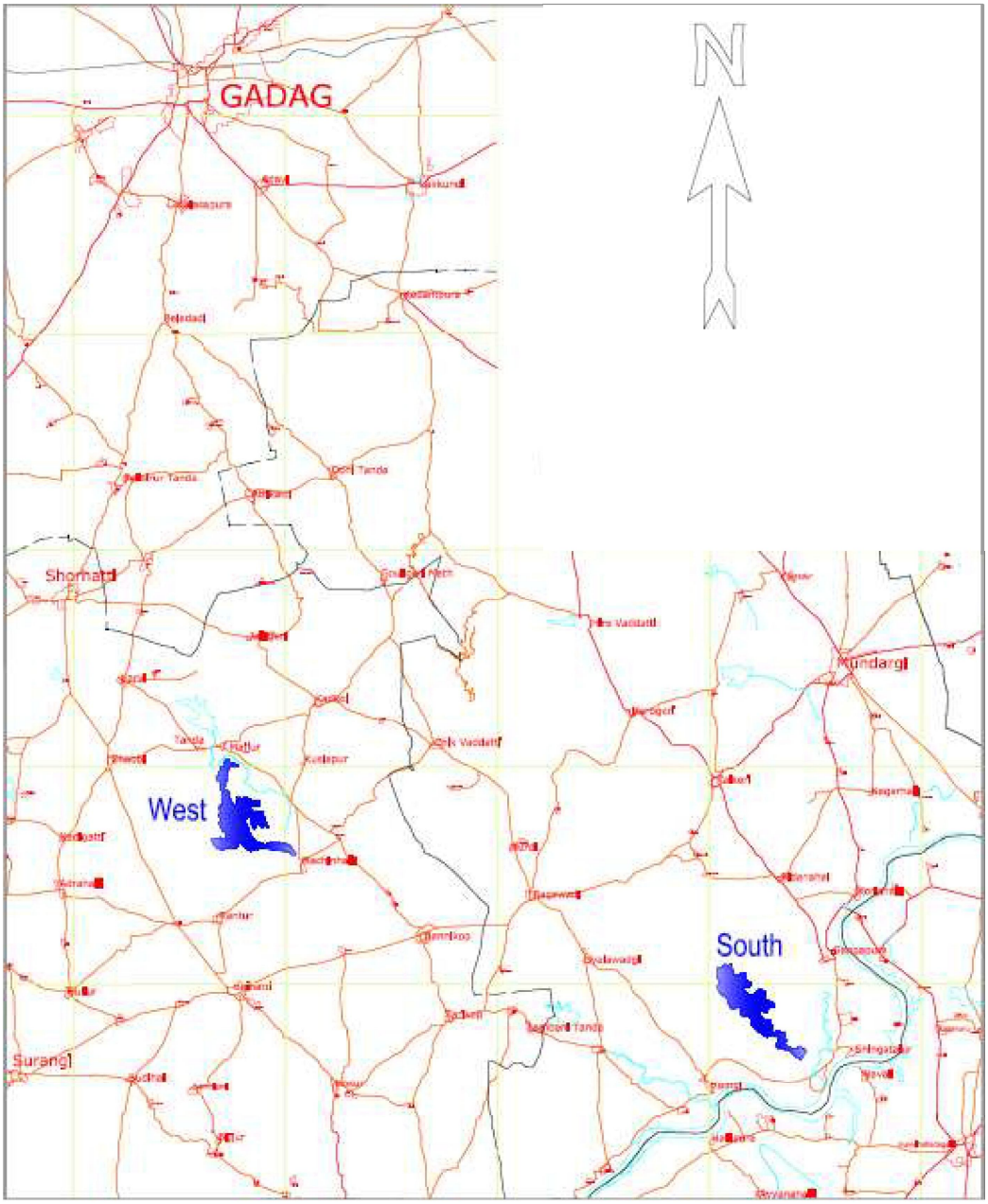
Accordingly, the benchmark cost of equity works out to: Rf + B (Rm – Rf) = 6.11% + 1.05 x 11.14% Cost of Equity = 17.75%

Annex 2
Location Map

For sub-Projects 1 to 14



For sub-Projects 15 to 18



Annex 3 - Minutes of stakeholder consultation meeting

Public Consultation Meeting for Wind Farm Projects as Clean Development Mechanism Projects at sites – CK 1&2, Gim Sites and VVS, Chitradurga District, Karnataka State.

Venue: Wind World (India) Limited, CK 1 & 2 Site, Arashinagundi Village, Hiriyur, Chitradurga Dist.

Date: 02nd September 2006, 10 am – 12 pm

Members from the Villages:
1. Sri. Thimmanna
2. Sri. Kanumappa
3. Sri. Rajappa

And 19 participants from the village.

Members from Wind World (India) Ltd., Chitradurga
1. Mr. C.B.Poonacha
2. Mr. Sajith
3. Mr. Fathahulla
4. Mr. Naveen Kumar
5. Mr. Ravidhara

Members from Wind World(India) Ltd., Mumbai
1. Mr. Vivek Sen
2. Mr. Neeraj Gupta

Members from Aditya Environmental Services Pvt. Ltd.
1. **Mr. Gurmeet Singh**

Agenda of the Meeting:
1. Welcome Address and Introduction
2. Project Profile, CDM, Environmental and social issues
3. Description about Wind Energy Conversion.
4. Suggestions and Opinions
5. Queries and Responses from the Stakeholders and Co. Authorities respectively.
6. Vote of Thanks.

1. Welcome Address: In the Welcome Address, Mr. C.B.Poonacha has briefed about the purpose of this Public Meeting, how Wind Mills and Wind Energy are occupied major role in generating power thereby rural population is benefited. Further he was pointing out how the benefits of employment opportunities, economical growth taken place in the areas. And also he has quoted examples of various social and religious activities taken up in the villages, for ex. construction of temples, roads through villages etc.

Then Mr. C.B.Poonacha invited Mr. Thimmanna, Village Panchayat leader to preside over the meeting and conducts the further proceedings. And also he has invited village leaders viz. Mr. Kanumappa and Mr. Rajappa on the dias.

2. Project Profile:

Mr. Md. Fathahulla: Mr. Md. Fathahulla has described about the Wind Mills and how the Wind Power is generated, why it is called Green Energy and our project is emission free and it is pollution free energy when compared with Thermal power. He reiterated that in Thermal Power, carbon would be emitted into the air, which causes air pollution. He said that the public would not have any bad impact by the Wind Mills. When asked by the villagers about the clouds running away due to running of Wind Mills and thereby causing deficiency in rainfall, Mr. Fathahulla has cleared the doubts of the stakeholders by convincing them about the height of the clouds and the height of the Wind Mill Erector. He said we are conducting aforestation and drainage work to eradicate the soil erosion from the hills. He also informed that the co-operation by the villagers required for successful completion and service of Wind Mills.

Mr. Ravidhara: Mr. Ravidhara has described to the villagers how the power is converted from Wind to Electricity and how the generators are running and generate electricity power. And also he has specified where the generated power will be transmitted and at what rate. He has told about the safety measures taken in our Wind Erectors and automatic stoppage of m/c with more rpm in order to avoid any untoward incidence.

3. President's Address:

a) Sri. Thimmanna who has presided over the meeting has informed the villagers about how Wind Mills are helped our Villagers and Farmers, benefits to the unemployed one. And we have benefited more from wind mills rather loss of any kind. He also strongly quoted that "The economic and social life has changed due to wind mills in and around Chitradurga Villages. He extended fullest cooperation for development of such activities and also stated that lack of rainfall in the region is not due to Wind Mills. Since last two years we had plenty of rainfall. He also pledged that the cooperation from our villagers is there in future also and sought the same from Wind World.
b) Sri. Kanumappa has accepted that the temple work is been completed by Wind World only and praised about the social and religious activities by Wind World. Eco friendly project like wind power should come up in all villages which will not harm any environmental balancing, he specified.
c) Sri. Rajappa, who has told that there was no rainfall shortage due to Wind Mills.

Questionnaire:
a) By the Stakeholders:
i) Are you conducting afforestation work in the hills where the plants are removed? Ans: Yes, We are doing afforestation work in all the hills where M/cs are installed.
ii) Are there any chances of drying up Ground Water?
Ans: No, Wind Mills do not use any ground water for its process. iii) What is the generation capacity of the Machine?
Ans: 800 KW per hour.
iv) Is there any scope of purchasing machine by the public?
Ans: Yes, In Maharashtra farmers association has purchased one machine.
v) There is a rumour that revenue land is used wherever the electrical line passes through? Is it true?
Ans: No, Only line inspection will be done.

b) By the Company:

i) Is there any Noise Pollution by running the Wind Mills?

Ans: So far no idea. But as it is in hilltops and away from villages such nuisance may not happen.

ii) Is there any water draining, soil erosion due to Wind Mills? Ans: No, such incidence not occurred.

iii) Is there any problem for animals grazing in the hills? Ans: No, Cattle are grazing in hill areas as usual.

iv) How Wind Mills helped in improvement of Crops?

Ans: By increase in voltage capacity and less load shedding results in increase in food grain production.

v) Have you observed any deforestation problem?

Ans: No, Except while forming the roads and installing the machines, there found no deforestation is taken place.

vi) During construction or erection any damages or accidents occurred?

Ans: Absolutely not. The Project work is taken up very smoothly and run with more safety standards.

For further queries the representatives from WIND WORLD put forward to the participants that they could raise any queries within a week and the same can be submitted at WIND WORLD Office, Bangalore as the address mentioned in the Paper Notification on 19th Aug. 2006.

Vote of Thanks: Mr. Naveen Kumar thanked the village leaders and villagers who have set aside their work and shown interest and eagerness to know about the Wind Mills. He also sought cooperation from all the corners for successful operation of windmills thereby achieving the National Target of self- sufficiency in Power Sector.

MINUTES OF THE PUBLIC CONSULTATION STAKEHOLDERS MEETING HELD AT GADAG, KARNATAKA ON 15/06/06

Venue: The meeting is held at Panchayat office, Dhoni, Mundaragi, GADAG, which is about Nine Km. From the project site.

The meeting has begun at 3:30pm. There are more than forty people attending the meeting. The participants are the people from the villages surrounding the project site- Dambal, Dhoni-Thanda, Kadampura, Katkol, HireVaddatti. Other participants are the panchayat officials- President and Vice President, Representatives from WIND WORLD, and CARE SUSTAINABLILTY

The language of meeting is Kannada. In between Hindi was also used.

The meeting began with the appointment of chairman for the meeting Mr. K.S. Narayanpur. The agenda for the meeting has been as follows:

Welcome to the participants (by representatives from WIND WORLD)
Brief to the participants about the project and CLEAN DEVELOPMENT MECHANISM (CDM)
Questions and answers: concerns/issues/comments/ about the project and related matters by the participants
Response from WIND WORLD
Announcement by the representatives of WIND WORLD Vote of thanks
The list of the participants with their names and signature are in attached sheet.

The meeting proceeded as per agenda

Table below gives the concerns/issues/comments from the participants and response from WIND WORLD

Sr. No.	Questions/concerns/issues/comments relating to the CDM activity	Details of concerns/issues/comments expressed by the participants	Response from WIND WORLD
1	How does the project impact the general quality of the people	All participants expressed that the establishment of the wind units do not adversely affect them (villagers around the project). In brief the projects neither adversely nor bring significant benefits to them. All of them expressed they are happy with the project activity	-
2	Any impact on the livelihood of the villagers	Villagers expressed that their livelihood have not been impacted adversely by the establishment of the wind units. The hill tops or slopes have not been used by them for grazing the cattle.	-
3	Does the project increase the employment opportunities	The following facts have been given by the villagers. During the construction stage, most of the laborers have been locals. During operation stage, at present out of the six local technical staff, two of them at present are locals. All security staff are locals. The drivers are locals.	For locals with ITL(technical training) qualifications, WIND WORLD does provide employment in technical category. Most of the unskilled workers are locals.
4	Does the project improves the electricity supply to villagers/ neighborhood areas	Improvements in the voltage fluctuations and supply are observed. KPCL has established a Sub Station at Dambal	Conditions of electricity and voltage fluctuations have improved this

		There are more than six hundred water pumps (for agricultural activities) in the neighborhood. Operations of them have become for time and without fluctuations at present	year compared to last year, and is expected to improve further. Only KPCL and WIND WORLD have the functioning wind units at the present.
5	Would the project result in drinking water shortage/ increase in shortage of water for agriculture	Water Table has decreased in recent times in the neighborhood agricultural areas. Villagers themselves have expressed that this is not due to the establishment of wind units, but due to the increase in the agricultural activities and number of bore wells in the areas.	-
6	Would the erection of the wind unit result in stoppage of water to agricultural field	Villagers expressed that no stoppage of the water due to the construction of the units and the approach roads to the wind units.	-
7	Would the project increase the noise level in the neighborhood areas and affect the villagers	Villagers expressed that there is no disturbance nor high noise levels are present due to the operation of the wind units	-
8	Any occurrence of accidents. Would the project increase undesirable vehicular traffic during construction or during operation phase	Villagers expressed that no accidents so far have occurred. Also no disturbance or heavy traffic due to the establishment of wind units	-
9	Would the project increase dust particles	During the construction nor the operation stage, no dust emissions are observed in the project sites nor the neighborhood	-
10	Tree/ plantations	Villagers suggested that planting of the medicinal plants could be carried out at the down plains.	WIND WORLD is planting medicinal plants at the project site. They would also

			be planting on the slopes.
11	Social welfare activities	Villagers expressed that help should be extended tovillagers by providing "lifts"/transportation, when they request during cases like "deliveries" cases etc.	WIND WORLD would do their best ot provide help to the villagers in the emergency cases.
12	Forest fire	Villagers expressed fear about the occurrence of forest fire on the hills. (last year there was heavy forest fire on the hill tops). **"Kalpatamallaiah"** temple which is worshipped by the villagers is located on the hill. There should be additional watchmen to be deployed by WIND WORLD for warning the villagers in the event of forest fire.	WIND WORLD told about the efforts being made by them. They would be constructing a three feet trench on the slopes and around the project site. Also watchmen and security guards have been instructed to be vigilant and provide warning in the cases of occurrences of forest fires
13	Does any disturbance to Avi fauna occur due to the wind units?	Villagers expressed that due to the increased usage of pesticide in the agricultural areas in the neighbourhood there is a decrease in the birds due to the lack of insects/worms etc. There is no bird's migratory path in the Areas	-

The representative of WIND WORLD announced that if the villagers or the participants still wish to bring to notice of WIND WORLD any further issues/concerns/comments about the wind farms owned by WIND WORLD, they may approach and convey to their respective representative Mr. Mahesh Arali located at the project site. The response could be made during the next one month starting from the sate of 15/06/06

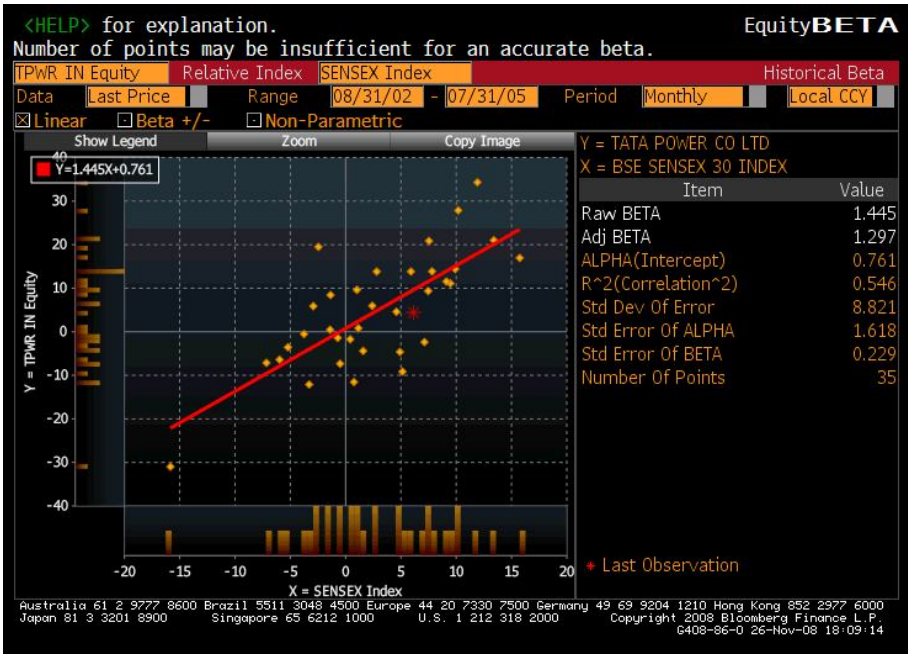
The meeting closed with giving thanks to all the participants and the chairman of the meeting.

Annex 4
Equity IRR of all sub projects

Name of Customers	Type of Mc	No. of Mc	MW	Date of Commissioning	Project Cost	Debt %	Equity %	Interest rate %	Loan tenure (Yrs)	Equity IRR (Without CDM)	Equity IRR (With CDM)
Enercon Wind Farms (Chitradurga) Ltd	0.80	11	8.80	May-06	440.0	70.0%	30.0%	8.5%	10.00	10.86%	13.35%
Panama Business Centre	0.80	2	1.60	Mar-06	76.0	75.0%	25.0%	9.0%	12.00	11.56%	15.07%
Sameer Ladkat	0.80	2	1.60	Mar-06	76.0	75.0%	25.0%	9.0%	12.00	11.56%	15.07%
Elpro International	0.80	1	0.80	Mar-06	38.0	70.0%	30.0%	10.8%	7.00	9.19%	11.33%
Gautam Ladkat	0.80	1	0.80	Mar-06	38.0	75.0%	25.0%	9.0%	12.00	11.56%	15.07%
Panama Infrastructure	**0.80**	**2**	**1.60**	**Mar-06**	**76.0**	**75.0%**	**25.0%**	**9.0%**	**12.00**	**11.56%**	15.07%
Sameer Ladkat	0.80	1	0.80	Mar-06	38.0	75.0%	25.0%	9.0%	*12.00*	11.56%	15.07%
Steelfab Offshore	0.80	1	0.80	Mar-06	38.5	65.0%	35.0%	12.5%	9.00	7.51%	9.69%
MK Agrotech Private Ltd	0.80	2	1.60	Jun-06	76.0	70.0%	30.0%	10.5%	7.00	10.45%	12.56%
Srinivas Sirigeri	0.80	1	0.80	Mar-06	36.3	0.0%	100.0%	0.0%	-	9.80%	11.08%
Power Link System Private Limited[9]	0.80	1	0.80	Mar-06	37.5	74.93%	25.07%	11.75%	5.00	10.17%	12.58%
Dempo Industries	0.80	1	0.80	Mar-06	37.3	0.0%	100.0%	0.0%	-	9.34%	10.59%
Desai Brothers	0.80	1	0.80	Mar-06	38.0	0.0%	100.0%	0.0%	-	9.05%	10.28%
Dewanchand Ramsaran	0.80	1	0.80	Mar-06	37.0	70.0%	30.0%	8.5%	5.00	10.94%	12.94%
Abhilash Garments & Estates (P) Ltd	0.80	1	0.80	Dec-06	38.0	0.0%	100.0%	0.0%	-	9.31%	10.62%
Prasad Global Solutions	0.80	2	1.60	Dec-06	76.6	0.0%	100.0%	0.0%	-	9.18%	10.48%
Gangadhar Narsingdas Agarwal	0.80	5	4.00	Dec-06	195.0	70.0%	30.0%	10.5%	8.00	8.99%	11.37%
Siddaganga Oil Extractions Ltd.	0.80	2	1.60	Dec-06	78.0	58.0%	42.0%	10.8%	5.00	9.00%	10.78%
Total			**30.40**								

[9] Ownership of one machine (0.8 MW) has been transferred from "R.K.Marbles" to "Power Link System Private Limited"

Annex 5: Bloomberg's Screenshots of Individual Companies for Beta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EquityBETA
Number of points may be insufficient for an accurate beta.
TPWR IN Equity
Relative Index
SENSEX Index
Historical Beta
Data
Last Price
Range
08/31/02
- 07/31/05
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Show Legend
Zoom
Copy Image
Y=1.445X+0.761
Y = TPWR IN Equity
X = SENSEX Index
Y = TATA POWER CO LTD
X = BSE SENSEX 30 INDEX
Item
Value
Raw BETA 1.445
Adj BETA 1.297
ALPHA(Intercept) 0.761
R^2(Correlation^2) 0.546
Std Dev Of Error 8.821
Std Error Of ALPHA 1.618
Std Error Of BETA 0.229
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
Copyright 2008 Bloomberg Finance L.P.
G408-86-0 26-Nov-08 18:09:14


<HELP> for explanation.
EquityBETA
Number of points may be insufficient for an accurate beta.
CESC IN Equity
Relative Index
SENSEX Index
Historical Beta
Data
Last Price
Range
08/31/02
07/31/05
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Show Legend
Zoom
Copy Image
Y=2.137X+3.489
Y = CESC IN Equity
X = SENSEX Index
Y = CESC LIMITED
X = BSE SENSEX 30 INDEX
Item
Value
Raw BETA 2.137
Adj BETA 1.758
ALPHA(Intercept) 3.489
R^2(Correlation^2) 0.359
Std Dev Of Error 19.107
Std Error Of ALPHA 3.506
Std Error Of BETA 0.497
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 Copyright 2008 Bloomberg Finance L.P.
G408-86-0 26-Nov-08 18:10:25


<HELP> for explanation.
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Number of points may be insufficient for an accurate beta.
BFUT IN Equity
Relative Index
SENSEX Index
Historical Beta
Data
Last Price
Range
08/31/02
07/31/05
Period
Monthly
Local CCY
Linear
Beta +/-
Non-Parametric
Show Legend
Zoom
Copy Image
Y=2.067X+6.568
Y = BFUT IN Equity
X = SENSEX Index
Y = BF UTILITIES LTD
X = BSE SENSEX 30 INDEX
Item
Value
Raw BETA 2.067
Adj BETA 1.711
ALPHA(Intercept) 6.568
R^2(Correlation^2) 0.135
Std Dev Of Error 36.951
Std Error Of ALPHA 7.581
Std Error Of BETA 1.027
Number Of Points 28
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 Copyright 2008 Bloomberg Finance L.P.
G408-86-0 26-Nov-08 18:10:59

Annex 6: Page 191 of text book on "Corporate Finance Theory and practice"

on stocks and the riskless return and use it as a risk premium to predict future returns. When we use historical premiums, we implicitly assume that the risk aversion of investors has not changed across time and that the relative riskiness of the risky portfolio (stocks) has not changed over time either.

In calculating the average returns over past periods, a measurement question arises: Should we use arithmetic or geometric averages to compute the risk premium? The arithmetic mean is the average of the annual returns for the period under consideration, whereas the geometric mean is the compounded annual return over the same period. The following example demonstrates the difference.

Year	*Price*	*Return*
0	$50	
1	100	100%
2	60	−40%

The arithmetic average return over the two years is 30%, while the geometric average is only 9.54% ($1.2^{0.5} - 1 = 1.0954$). Those who use the arithmetic average premium argue that it is much more consistent with the framework[5] of the CAPM and a better predictor of the risk premium in the next period. The geometric mean is justified on the grounds that it takes into account compounding and that it is a better predictor of the average premium in the long term. There can be substantial differences in risk premiums based on the choices made at this stage, as illustrated in Table 7.1. The data in the table are based on historical data on stock, treasury bill, and treasury bond returns and provide estimates of historical risk premiums. As you can see, the historical premiums can vary widely depending on whether we go back to 1926, 1962, or 1981, whether we use T. Bills or T. Bonds as the riskless rate, and whether we use arithmetic or geometric average premiums.[6] Although it is impossible to prove one premium right and the others wrong, we are biased toward

- *Longer term premiums,* since stock returns are volatile and shorter time periods can provide premiums with large standard errors. For instance, the premium extracted from 25 years of data will have a standard error[7] of about 4 to 5%.
- *Long-term bond rates as riskless rates,* since our time horizons in corporate financial analysis tend to be long term, and we use the treasury bond rate as our riskless rate.
- *Geometric average premiums,* since arithmetic average premiums overstate the expected returns over long periods.[8] The geometric mean yields lower premium

[5] The CAPM is built on the premise of expected returns being averages and risk being measured with variance. Since the variance is estimated around the arithmetic average, and not the geometric average, it may seem logical to stay with arithmetic averages to estimate risk premiums.

[6] Booth (1999) examines both nominal and real equity risk premiums from 1871 to 1997. Although the nominal equity returns have changed over time, he concludes that the real equity return has been about 9% over this period. He suggests adding the expected inflation rate to this number to estimate the expected return on equity.

[7] Assuming that returns in individual years are independent, the standard error of a 25-year estimate can be calculated by dividing the annual standard deviation in stock prices in the United States (about 25%) by the square root of the number of years ($\sqrt{25} = 5$), yielding a standard error of 5% (25%/5) in the estimate.

[8] When we look at markets like the United States that have survived for 70 years without significant breaks, we are looking at the exception. To provide a contrast, consider the other stock markets in which one could have invested in 1926; many of these markets did not survive, and an investor would have lost much of his or her wealth.

Annex 7: Page 196 of text book on "Corporate Finance Theory and Practice"

Betas

The second set of inputs that we need to put risk and return models into practice are the betas for investments. In the CAPM, the beta of an investment is the risk that the investment adds to a market portfolio. In the APM and multifactor model, the betas of the investment relative to each factor have to be measured. Three approaches are available for estimating these parameters. One is to use historical data on market prices for individual investments; the second is to estimate the betas from the fundamental characteristics of the investment; and the third is to use accounting data. We describe all three approaches in this section.

Historical Market Betas The conventional approach to estimating the beta of an investment is a regression of returns on the investment against returns on a market index. For firms that have been publicly traded for a length of time, it is relatively straightforward to estimate returns that an investor would have made by investing in the firm's stock each interval (such as a week or a month) over that period. In theory, these stock returns on the assets should be related to returns on a market portfolio, that is, a portfolio that includes all traded assets, to estimate the betas of the assets. In practice, we tend to use a stock index, such as the S&P 500, as a proxy for the market portfolio, and we estimate betas for stocks against the index.

The standard procedure for estimating betas is to regress stock returns (R_j) against market returns (R_m).

$$R_j = a + bR_m$$

where

a = Intercept from the regression

$$b = \text{Slope of the regression} = \frac{\text{Covariance } (R_j, R_m)}{\sigma^2_m}$$

The *slope* of the regression corresponds to the beta of the stock and measures the riskiness of the stock.

The *intercept* of the regression provides a simple measure of performance of the investment during the period of the regression, when returns are measured against the expected returns from the capital asset pricing model. To see why, consider the following rearrangement of the capital asset pricing model:

$$R_j = R_f + \beta\,(R_m - R_f)$$
$$= R_f\,(1 - \beta) + \beta\,R_m$$

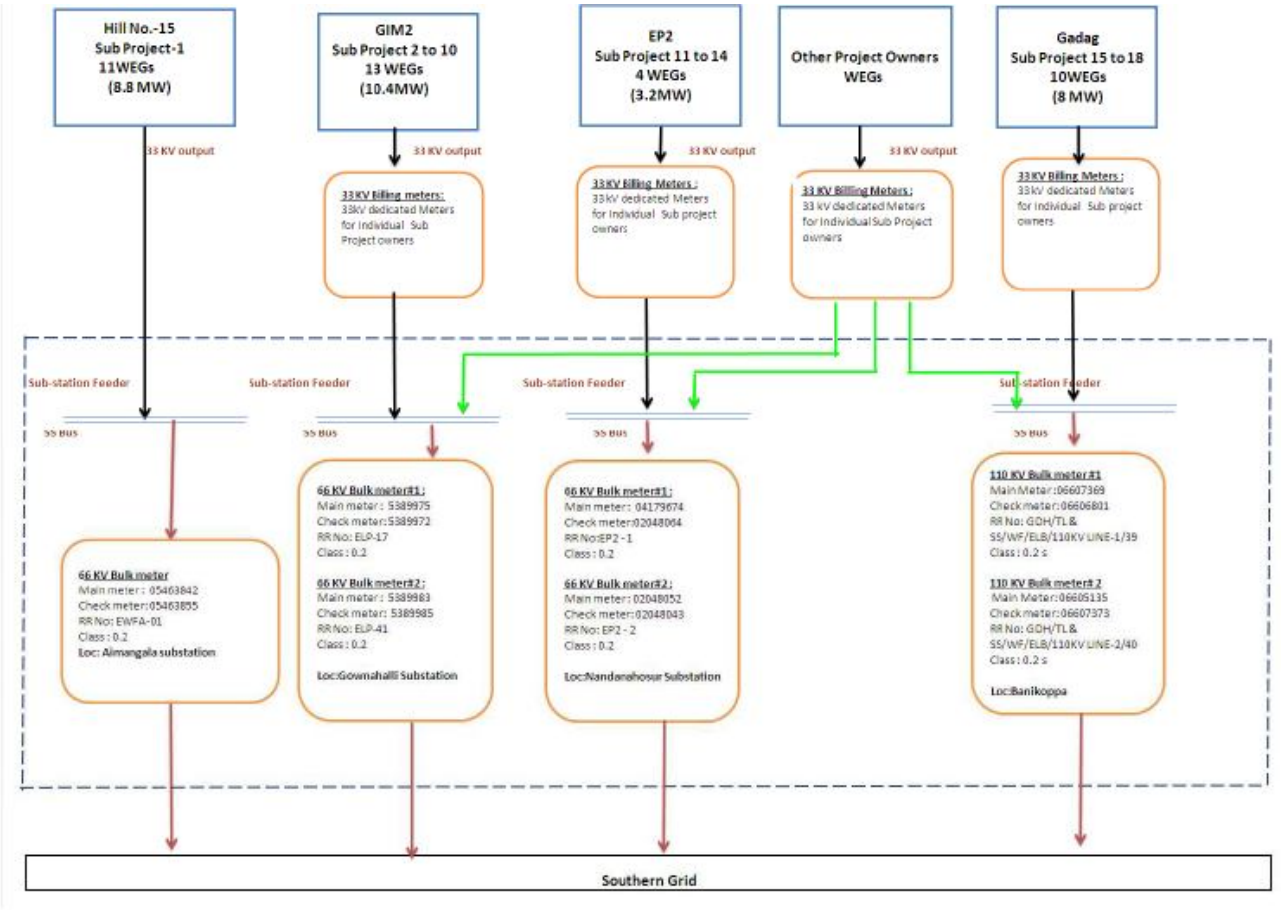
Compare this formulation of the return on an investment to the return equation from the regression:

$$R_j = a + bR_m$$

Thus, a comparison of the intercept (a) to $R_f\,(1 - \beta)$ should provide a measure of the stock's performance, at least relative to the capital asset pricing model.[14] In summary, then:

[14] The regression is sometimes calculated using returns in excess of the riskless rate, for both the stock and the market. In that case, the intercept of the regression should be zero if the actual returns equal the expected returns from the CAPM, greater than zero if the stock does better than expected, and less than zero if it does worse than expected.

Annex 8


Hill No.-15
Sub Project-1
11WEGs
(8.8 MW)
GIM2
Sub Project 2 to 10
13 WEGs
(10.4MW)
EP2
Sub Project 11 to 14
4 WEGs
(3.2MW)
Other Project Owners
WEGs
Gadag
Sub Project 15 to 18
10WEGs
(8 MW)
33 KV output
33 KV output
33 KV output
33 KV output
33 KV Billing meters:
33kV dedicated Meters for Individual Sub Project owners
33 KV Billing Meters :
33 kV dedicated Meters for Individual Sub project owners
33 KV Billing Meters :
33 kV dedicated Meters for Individual Sub Project owners
33 KV Billing Meters :
33 kV dedicated Meters for Individual Sub project owners
Sub-station Feeder
Sub-station Feeder
Sub-station Feeder
Sub-station Feeder
33 BUS
33 BUS
33 BUS
33 BUS
66 KV Bulk meter
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Check meter:0546855
RR No: EWFA-01
Class : 0.2
Loc: Aimangala substation
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Main meter : 5389975
Check meter:5389972
RR No: ELP-17
Class : 0.2
66 KV Bulk meter#2 :
Main meter : 5389983
Check meter: 5389985
RR No: ELP-41
Class : 0.2
Loc:Gowrahalli Substation
66 KV Bulk meter#1 :
Main meter: 04179674
Check meter:02048064
RR No:EP2 - 1
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66 KV Bulk meter#2 :
Main meter: 02048052
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RR No: EP2 - 2
Class : 0.2
Loc:Nandanahosur Substation
110 KV Bulk meter #1
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Check meter:06606801
RR No: GDH/TL &
SS/WF/ELB/110KV LINE-1/39
Class : 0.2 s
110 KV Bulk meter# 2
Main Meter:06605135
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SS/WF/ELB/110KV LINE-2/40
Class : 0.2 s
Loc:Banikoppa
Southern Grid