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

CONTENTS

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

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"3 MW Wind Power Project at Chikkasiddavanahalli village, Chitradurga district, Karnataka" by M/s Lanco Infratech Limited (Webhosted for public comments with the name "Lanco 3 MW Wind Project in Karnataka")
Version 10
23/01/2013

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

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The Lanco wind power project mainly comprises of four Wind Electric generators (WEG) of 750 KW capacity each commissioned in March of 2002 and are operational since then. The project was implemented by Lanco Infratech Ltd (LITL) (formerly known as Encon Services Limited) and the project was expected to produce approximately 6.44 Million Units (MU) of electricity per annum (net production) at 25% capacity factor. The site has adequate infrastructure for evacuation of power to the grid. Karnataka Power Transmission Corporation Limited (KPTCL), which was engaged in the purchase, transmission, distribution and supply of electricity, has already been buying electricity from the LITL since March 2002.

Purpose

The purpose of the project is to generate clean electricity using wind energy. At present approximately 5.2 Million Units, at an average 20.19% CUF, of power generated from this clean energy source is being exported to the Karnataka grid per annum. The project is also responsible for sustainable economic growth, conservation of environment through use of wind as renewable source and reduction of Green House Gas (GHG) emission. In view of the steep increase of energy cost to HT consumers in Karnataka state and the good wind potential in Jogimatti Zone after taking into consideration the clear policy supported by the Government of Karnataka, LITL has established wind farm at Chikkasiddavanahalli Village, Chitradurga District, Karnataka State. In order to attain the standard financial returns, LITL has explored the options to avail the benefits under the Clean Development Mechanism (CDM) of United Nations Framework Convention for Climate Change (UNFCCC) for sustainable operation of the project. The Project contributes to sustainable development in the following manner:

Project's contribution to sustainable development

The project primarily assists the state of Karnataka and India as a whole in stimulating and accelerating the commercialization of grid connected renewable energy technologies. In addition to this, wind power projects like this demonstrates the viability of grid connected wind farms, which improve energy security, air quality and local livelihoods, as well as assisting the development of a domestic sustainable renewable energy industry. The specific goals of the project are:

- Sustainable development through generation of eco-friendly power
- Increasing the share of renewable energy power generation in the regional and national grid
- To bridge India's energy deficit in the business as usual scenario

- Providing national energy security, especially when global fossil fuel reserves threaten the long term sustainability of the Indian economy.
- Strengthening India's rural electrification coverage
- Essentially reducing GHG emissions compared to a business-as-usual scenario
- Reducing other pollutants (SOx, NOx, PM etc.,) resulting from power generation industry
- Contribute towards reducing power shortage especially in the state of Karnataka, India;
- Demonstrate and help in stimulating the growth of the wind power industry in India;
- Enhancing local employment in the vicinity of the project, which is a rural area;
- Capacity building and empowerment of vulnerable sections of the rural communities dwelling in the project area;
- Power generation from Renewable Energy sources paves way for energy security of future
- generations
- Conserving natural resources including land, forests, minerals, water and ecosystems;

The National strategy for sustainable development also aims at providing access to clean energy with the objective that increased availability of power in the rural areas will lead to industrial activity aimed at generating employment and reduce poverty. For these reasons, the wind power project of LITL is fully in line with the overall goals for sustainable development of the Government of India (GOI) and the requirement of Karnataka state.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India	Lanco Infratech Limited (Private entity. Project developer.)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

See contact information in Annex-1 to this PDD

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

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

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Project comprises of Wind Electric Generator (WEG) with NEG Micon Technology, NM-750/48. The project consists of four machines and generators, each with 750 KW generation capacity. The electricity will be then transmitted through a transmission line to the nearest KPTCL substation at Aimangala. The turbines to be used are certified and manufactured according to International Standards and has the following characteristics:

- Power rating of 750 KW
- Induction generator of 1500 rpm
- With 48.2 meter blade diameter

- 3 blade rotor made of Glass Reinforced Polyester (GRP)
- Total hub height is 45 meters

NEG Micon NM-750/48 WEG is designed to give maximum generation under Indian wind conditions and is working successfully in the state of Karnataka.

A.4.1.1. Host Party(ies):

>> **India**

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

>> **Karnataka**

A.4.1.3. City/Town/Community etc:

>> **Chikkasiddavanahalli Village, Chittradurga District**

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

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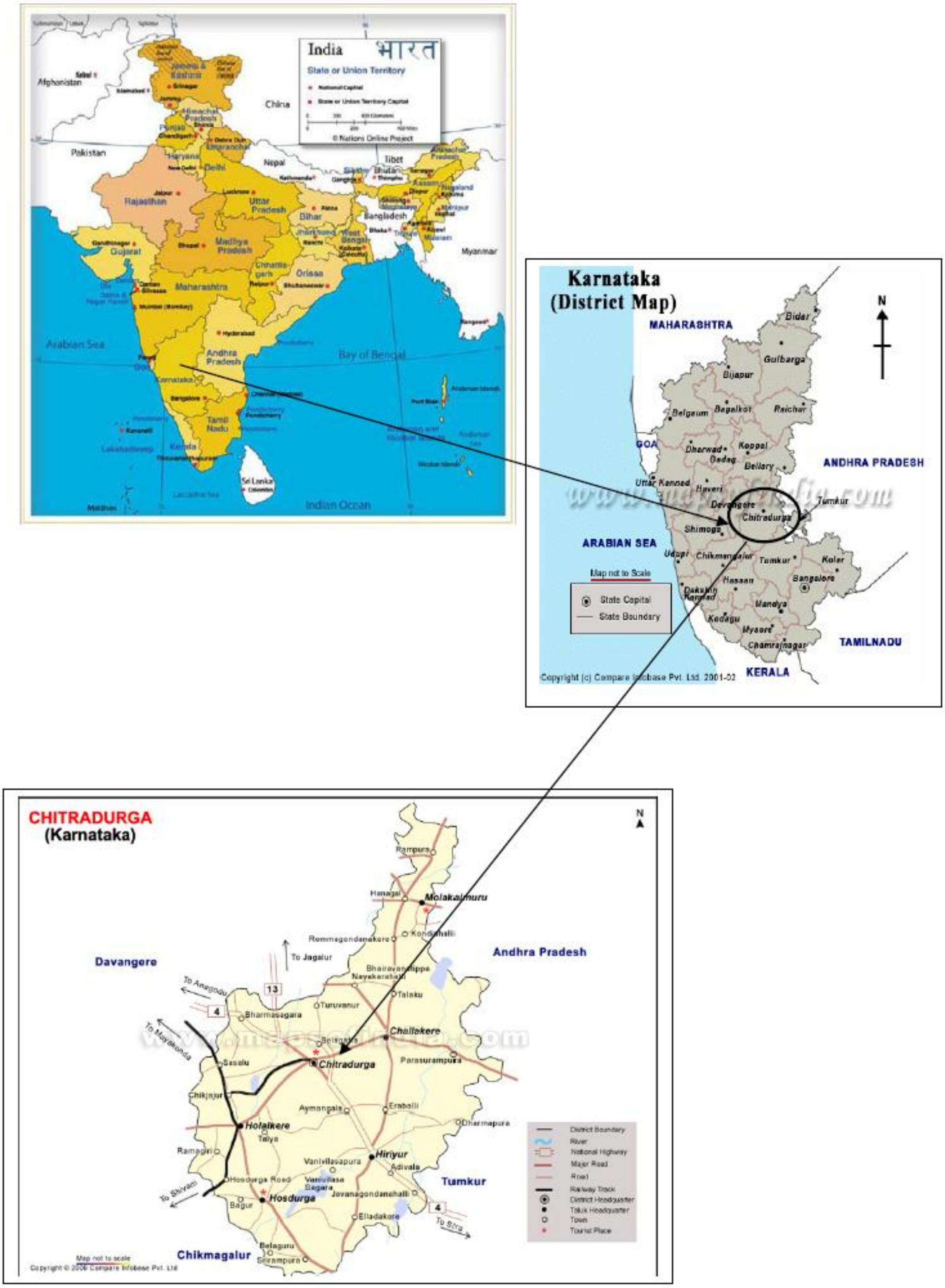
The plant is located in Jogimatti wind zone, Chikkasiddavanahalli Village, Chitradurga district, Karnataka state. The site has been identified as ideally suited for wind power generation based on the micrositing studies and data analysis based on annual wind speed and frequency distribution, carried out by eminent agencies like Indian Institute if Tropical Meteorology and Karnataka Renewable Energy Development Limited. The feasibility of these sites for wind power production has been established by reputed consultants. The latitude of the project activity: 14^{0} 14'N and longitude of project activity: 76^{0} 26' E. The location of the project sites in the state map of Karnataka is as shown below:


India
भारत
State or Union Territory
Karnataka
(District Map)
MAHARASHTRA
ANDHRA PRADESH
ARABIAN SEA
TAMILNADU
KERALA
GOA
Map not to Scale
State Capital
State Boundary
CHITRADURGA
(Karnataka)
Davangere
Andhra Pradesh
Tumkur
Chikmagalur
Chitradurga
Challakere
Hiriyur
Hosdurga
Holalkere
Molakalmuru
Map not to scale

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

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As per Clause 2 & 3 of Type I.D of Appendix B of **simplified modalities and procedures for small-scale CDM project activities (Version 10: 23 December 2006**), If the unit added has both renewable and non-renewable components (e.g.. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW, and Biomass combined heat and power (co-generation) systems that supply electricity to and/or displace electricity from a grid are included in this category. To qualify under this category, the sum of all forms of energy output shall not exceed 45 $MW_{thermal}$ e.g. for a biomass based co-generating system the rating for all the boilers combined shall not exceed 45 $MW_{thermal}$ for the project to qualify as a small-scale CDM project. Therefore, the project activity can be defined under.

Type I: Renewable Energy Projects (Small Scale)
Category: "D", Grid connected Renewable Electricity Generation (Wind based Power Project)

Technology of the project

The technology adopted for the project activity is a standard and widely accepted practice for power generation using renewable sources. No technology transfer is involved for the project and know-how for the project technology is well established.

This project is a clear renewable energy project that uses wind energy for generation of electricity with available proper conversion technology. This meets the basic requirement of type I.D (version 10) of Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

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

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Years	Annual estimation of emission reductions in tonnes of CO_2e
2007 – 2008 (Oct to Dec)	1216
2008 - 2009	4823
2009 – 2010	4823
2010 – 2011	4823
2011 – 2012	4823
2012 – 2013	4823
2013 – 2014	4823
2014 – 2015	4823
2015 – 2016	4823
2016 – 2017	4823
2017 – 2018 (Jan to Sep)	3607
Total estimated reductions (tones of CO2e)	**48228**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	4823

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

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No public funding from parties included in Annex I is available to the project.

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

According to Appendix C of Simplified Modalities & Procedures for small scale CDM project activities, 'Debundling' is defined as the fragmentation of a large project activity into smaller parts.

With reference to the criteria mentioned, this 3 MW wind power plant is not a de-bundled component of a large project activity as there is no registered small scale CDM project activity (previous 2 yrs) or an application to register another small scale CDM project activity by the same project proponent (LITL), in the same project category and technology/measure with project boundary within 1 km radius of this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Title:

Grid connected Renewable electricity generation

Reference:

The project activity meets the eligibility criteria to use the simplified modalities and procedure for small scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". Reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Renewable technologies that supply electricity to the grid are covered in category I.D (Version 10). The category comprises renewable such as small hydro, wind, geothermal and biomass that supply electricity to an electricity distribution system that is or would have been supplied by at least one fossil fuel or nonrenewable biomass fired generation unit.

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

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Since the project activity is a renewable energy power project it exports green power to state electricity grid. State grid generation mix comprises of power generated through other sources such as coal based thermal power plants, hydro power stations, renewable energy sources including small/micro hydro projects, bagasse/biomass based cogeneration/power projects etc.

Type I: Renewable Energy Projects (Small Scale)

Category: "D", Grid connected Renewable Electricity Generation (Wind based Power Project)

As per the Kyoto Protocol (KP) baseline should be in accordance with the additionality criteria of article 12, paragraph 5(c), which states that the project activity must reduce emissions that are additional to any that, would occur in the absence of the certified project activity.

Document Annex B to attachment 3 regarding indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, provides guidelines for preparation of Project Design Document (PDD) including baseline calculations. The category and the sub type of the activity are given above.

Baseline methodology mentioned in the paragraph no. 9 of Type I. D. Version 10 of Appendix B of the simplified modalities and procedures for small scale CDM project activities, states that the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in transparent and appropriate manner.

B.3. Description of the project boundary:

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As per the guidelines mentioned in Type I. D. of Annex B of the simplified modalities and procedures for small-scale CDM project activities, project boundary encompasses the physical and geographical site of the renewable generation source.

The project boundary includes the electricity generation from 3.00 MW (4 machines of 750 kW each) wind farm of LITL located at Jogimatti wind zone, Chikkasiddavvancahalli Village, Chitradurga district, Karnataka state and the transport through the electricity grid. Hence, project boundary is considered within these terminal points. However, for the purpose of calculation of baseline emission Southern regional Grid is also included in the project boundary

B.4. Description of baseline and its development:

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The baseline methodology has followed the one specified under Project category I.D (Version 10) in Appendix B of the Simplified M&P for small scale CDM project activities.

The Central Electricity Authority (CEA), under the Ministry of Power, Government of India, has estimated the Combined Margin for the Southern Grid, the details of which are available on the following website:

http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm (Version 02)

As per the latest guidelines in I.D (Version 10) to estimate the baseline emissions, the emission factor is calculated as per the procedures laid in paragraph 9 (a) & (b). As this methodology suggested adopting the procedures laid in ACM0002, the same has been considered for calculations. The baseline emissions and the emission reductions from project activity are estimated based on the quantum of electricity to be exported by the project activity to the grid and the **Baseline Emission Factor (BEF)** of the southern regional grid calculated as a **combined margin (CM)**, consisting of the combination of **operating margin (OM)** and **built margin (BM)** factors. The project proponent wishes to use the BEF calculated

Ex-ante, and has fixed the same for the entire crediting period. The detailed calculation procedures are provided in Annex 3.

For *ex ante calculation*, the methodology ACM0002 requires that the operating margin is calculated as the average of the three most recent years (here 2003-04 – 2005-06). Since wind is an intermittent energy source, the promoter is allowed to assign a weight of 75% to the operating margin, and 25% to the build margin. Therefore, the resulting combined margin is 0.93 t CO2/MWh for southern regional grid. This value is used for projecting the emission reductions in the PDD as well as for calculating the actual emission reductions.

$EF_{BL} = (0.75 \text{ X } EF_{OM}) + (0.25 \text{ X } EF_{BM})$

Where

EF_{BL} = Baseline Emission Factor (t CO_2/MWh)
EF_{OM} = Emission Factor – Operating Margin
EF_{BM} = Emission Factor – Built Margin

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

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

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

Further referring to Appendix A to Annex B document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants shall provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barrier(s) ;

- Investment barrier
- Other barriers

Considering above, the Lanco 3 MW wind power project proves its additionality due to following reasons:

Investment Barriers: Though it was envisaged full support for renewable power projects in the country by MNES and state governments by providing some incentives , historically it is observed that even this support is not sufficient enough to make these projects economically viable without some external funding like CDM revenue (which was proved by registration of several renewable projects in India with UNFCCC) and hence the developer realized CDM funds would be needed to make the project an attractive investment as outlined below:

Though the potential locations for wind mill installations were identified through detailed micro-siting where available wind velocity is more than 18 m/s by reputed organizations in the country, the capacity factor of the wind mills in the country is very low. The capacity factor of the mills during 2002-03[1] was just 14%. This indicates the poor micro-siting of various potential wind sites in the country. The project activity is one of such affected sites where the actual CUF has been considerably lower than expected during DPR stage. The low capacity factors of the wind mills adversely affect the profitability of the project. LITL wind farm is no exception from the low capacity factor conditions and is contributing to lowest returns to the management since inception. The actual load factor of the project since commissioning is as shown below:

S. No	Year	CUF (%)
1	2002 – 2003	17.59
2	2003 – 2004	21.35
3	2004 – 2005	22.95
4	2005 - 2006	18.88

The economic viability of the project at DPR stage was first estimated at Capacity Utilization Factor (CUF) of 25.00[2]% where the returns from the project activity were 14.68% which was below the standard returns on equity from power plants of 16% and above[3]. The above CUF was the prevailing value in the area which was arrived based on the data available with the KPTCL for other similar project with similar capacity WEGs commissioned prior to LITL project activity in the region. The key assumptions made to calculate the IRR are given below:

Project Size	3
Capacity of WEG	750
No. Of WEGs	4
Cost per WEG	392.25
Cost of Project per MW	523.00
Total Project Cost	1569.00
Means of Finance	
Debt	70%
Equity	30%
Operating Parameters	
Total Generation for the project at 100% PLF	262.8
Plant Load Factor	25.00%
Total Generation for the project at above PLF	65.28
T&D Losses	2.00%
Wheeling Charges in percentage	0.00
Nett export after losses	63.97
Life of the Wind Turbine assumed	20.00
O&M Cost per WTG – Rs.	3.00

[1] www.dae.gov.in/pub/doc10/index.htm (para 3.4)

[2] Source: Letter No. KPTCL/B-28/B-13/1450/90-91 Dated:15 Mar 2005

[3] Source: Order on NCE Tariff (Final) – www.kerc.org/order2005.html (year 2005 orders)

O&M Cost	12.00
Escalation for year on year from the end of 2nd year	5%
Insurance Cost	
Total Considered	0.60%
Interest on Term Loan	
Rupee Loan	13.00%
Working Capital Interest	9.50%
Margin Money on WC	25%
Upfront fees on term loan	0.1%
Tariff	
For first year	3.16 (based on the prevailing rate)
Escalation in tariff from second year onwards	5%
Corporate Tax	35.70%
Taxation	8.475%

The detailed IRR calculations are attached in excel sheet separately.

However, to make the project viable and to bring the returns more than the expected ones for similar project activities, a CUF of more than 29% is required which was practically not possible to achieve considering the prevailing CUF of WEGs commissioned prior to the LITL project activity and wind potential available at the site. Hence, PP had considered CDM revenue at the beginning to mitigate the risks in achieving the required CUF.

Policy barrier:

Also, at the time of project conceptualization, KPTCL had not entered into PPA with any of other players in the market including the project activity due to delay in formation of electricity regulatory commission in the Karnataka state and there was lot of uncertainty on the price per kWh to be considered to calculate the project returns. KERC also cancelled all the earlier PPA and requested KPTCL to enter in to fresh PPA for all the projects which entered in to PPA prior to formation of regulatory commission. It was assumed that the tariff from the KPTCL would increase at a compound rate of 5% per year as per MNES guidelines and considered Rs 3.16 as base price for the calculations. As discussed above, with these assumptions, the equity IRR of the project was less (14.68%) than the required one (16%[4]) for these kinds of project activities. But the actual tariff when the PPA was signed after more than one year was with just 2.0% increase per year which drastically affected the revenue from the sale of power. Also, considering the present scenarios of tariff increase at a compound rate of 2% and an average CUF of 20.19%, the project IRR without CDM revenue is just 7.90 % and the same is expected to improve by 9.03%. All the above reasons substantiate the need for the CDM revenue for the project for the sustainable and successful operation throughout its life time.

Prevailing Practice

[4] KERC suggested to consider equity IRR of 18% for the wind based project activities which is 2% more than other renewable based projects

As a result of the impressive growth attainted by the Indian Power Sector, the installed capacity has grown from mere 1,713 MW in 1950 to 124,287 MW as on 31.03.2006, consisting of 82,411 MW Thermal, 32,326 MW Hydro, 3,360 MW Nuclear[5]. As can be seen, the coal based thermal power is the mainstay of Indian power scenario.

As per MNES, the total potential for wind energy based power generation in India is 45,195 MW of which Karnataka has the potential of 6620 MW. During 2001-02 at the time of conceptualizing of the project activity, the total installed capacity in Karnataka was 53.4 MW[6]. Also, LITL was only the second project in the Jogimatti area when the project was commissioned and first with 750 kW machine. As on 31st March 2006, the cumulative installed capacity of wind energy based power projects in India is 6270.40 MW (13.87 %) and in Karnataka is only 745.60 MW i.e. 11.25 %[7]. This shows that wind power is still not the feasible option for project promoters in India as well as in Karnataka. Hence, the project was not a business as usual scenario.

Other barriers:

Higher Transaction costs: Being a small facility with a minimum output of 3 MW, LITL faced the barrier of project development costs and transaction costs for financing (short tenor, high rate) that are disproportionately high, as is often the case for low capacity renewable projects.

Implementation cost of wind electric generation project is still costlier than the conventional alternative power generation systems. Due to high capital cost & low PLF per unit power generation cost is higher compared to other fuel options such as coal or diesel/FO. A comparative study of costs of electricity generation from different alternatives of power production is given below.

S. No	Source	Power Generation Cost / kWh
1	Coal	Rs. 2.27 / kWh
2	Fuel Oil	Rs. 3.57 / kWh
3	Wind Energy	Rs. 4.24 / kWh
Reference Nagda Hills Registered Wind PDD (Annex 5)		

If adequate weightage is given to environmental benefits, economics of wind energy further improves. In view of present power tariff policy of India, wind energy is not a commercially viable power generation option without subsidies. Project financial viability improves if one takes into account all the indirect subsidization provided in form of carbon funds through clean development mechanism of Kyoto Protocol (Investment Barrier).

Due to natural calamities:

The generation of electricity from wind is, of necessity, an entirely an outdoor activity which is usually located in a remote location, beyond the control of project promoter. The wind generators and the grid are constantly subject to natural elements such as high winds and rain and a calamity such as a severe thunderstorm and lightning can damage the generators and/or the grid. Whereas the cost of repairing the

[5] http://www.cea.nic.in/planning/c%20and%20e/user%20guide%20ver1.1.pdf

[6] Source: KRDEL

[7] http://mnes.nic.in/annualreport/2006_2007_English/HTML/ch3_pg2.htm

generators or grid can be recovered by insuring them, the loss in revenue due to the turbine not generating electricity when it is damaged or the grid not functioning cannot be recovered as insurance companies normally do not provide liquidated damages in their insurance cover.
The aforementioned arguments clearly states that the project activity is additional and not a business as usual scenario.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Monitoring methodologies / guidelines mentioned in the UNFCCC document of "Annex B of the simplified modalities and procedures for small scale CDM project activities" for small scale projects (Type I: D) is considered as basis for monitoring methodology for the activity. The document states that the monitoring shall consist of metering the electricity generated by the renewable technology. The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7.

Details of approved methodology for baseline calculations for CDM projects of capacity less than 15 MW are available in the "Appendix B of the simplified modalities and procedure for small scale CDM project activities". As the project activity is of 3.00 MW capacity, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

Southern Regional grid is considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation. It is observed that, in the southern regional grid generation mix, coal, diesel and gas based power projects are responsible for GHG emissions. The data published by Central Electricity Authority (CEA) has been used as the baseline emission factor.

The Ministry of Power intends to achieve 100% rural electrification by the year 2012. India is highly dependent on its coal reserves which provide a sense of energy security. Hence, coal has been identified as the main fuel source for electricity generation. Considering the above fact, it is evident that in the future, the grid electricity generation using fossil fuel is likely to increase in Southern Regional Grid. Hence, the baseline factor considered for the calculation of the emission reductions may be considered appropriate.

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

(Copy this table for each data and parameter)

Data / Parameter:	**BEF**
Data unit:	tCO_2/MWh
Description:	Baseline Emission Factor for Southern Grid
Source of data used:	CEA
Value applied:	0.93
Justification of the choice of data or description of measurement methods and procedures	As in Methodology ACM0002 (Version 06), the weightage for OM is 0.75 and for BM is 0.25 in case of Wind Energy Projects.

actually applied :	
Any comment:	Details of the calculation provided in Annex - 3

B.6.3 Ex-ante calculation of emission reductions:

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Baseline Emissions (Emission Reductions due to displacement of electricity or $ER_{electricity,y}$)

The basic assumptions for calculating baseline emissions of the project activity are due to the displacement of grid electricity. Hence, the following formula is applied for estimation of baseline emissions.

$ER_{electricity,y} = EF_{electricity,y} * EG_y$

$EG_y = E_{exp,grid}$ (Please refer Annex-4 for detailed calculation)

The anticipated electricity export from the project activity during the year *y*, multiplied with emission factor as published by CEA (Combined Margin) for southern region grid.

Leakage

The project uses wind energy only for power generation, which leads to zero net GHG on-site emissions. Hence there is no net emission within the project boundary.

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

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Operating Years	Project Emissions (tonnes of CO_2)	Baseline Emissions (tonnes of CO_2)	Estimation of leakage (tonnes of CO_2)	Estimation of overall Emission Reductions (tonnes of CO_2)
2007 – 2008 (Oct to Dec)	0	1216	0	1216
2008 - 2009	0	4823	0	4823
2009 – 2010	0	4823	0	4823
2010 – 2011	0	4823	0	4823
2011 – 2012	0	4823	0	4823
2012 – 2013	0	4823	0	4823
2013 – 2014	0	4823	0	4823
2014 – 2015	0	4823	0	4823
2015 – 2016	0	4823	0	4823
2016 – 2017	0	4823	0	4823
2017 – 2018 (Jan to Sep)	0	3607	0	3607
Total (tonnes of CO_2e)	0	**48228**	0	**48228**

Therefore, an conventional energy equivalent of 52.00 Million kWh for a period of 10 years in Karnataka would be saved by exporting power from the 3 MW Wind based power plant which in turn will reduce 48,228 tons of CO2 emissions considering baseline calculations.

Baseline data used for the calculation is provided in Annex-3 and the detailed calculation using the formulae is presented in an Excel Sheet (refer Enclosure – I to this PDD.)

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

B.7.1 Data and parameters monitored:

Data / Parameter	$E_{exp,grid}$
Unit	kWh
Description	Net Electricity Export to the grid by project activity
Source of data	Monthly billing records issued by KPTCL
Value of data	5.20 million kWh per annum
Brief description of measurement methods and procedures to be applied:	Net electricity supplied to the KPTCL will be calculated based on the difference between measured values of "export" and calculated value "115% of import[8]" on the KPTCL meter at the project site (at 33kV sub-station) and the percentage transmission loss incurred in the transmission line between the project and the interconnection point (between 33 kV KPTCL sub-station and 66 kV KPTCL sub-station)[9]. The meter reading is taken during Joint Meter Reading (JMR) by KPTCL & LITL official. Refer to Annex 4 of the PDD for more details on apportioning and accounting of transmission loss percentage. The parameter is continuously measured and monthly recorded
QA/QC procedures to be applied (if any):	The quantity of net electricity supplied will be cross-verified from the invoices raised on KPTCL by the project proponent. The main and check meters at 33 KV and 66 kV sub-station are calibrated as per the provisions of article 6 of PPA. Please refer Annex 4 for details.
Any comment	A CUF of 20.19% (Avg. of last 4 years) and 8760 hours of working has been considered for calculation of ex-ante purpose.

Data / Parameter	$E_{exp,site}$
Unit	kWh
Description	Electricity Export to the 66 kV sub-station from 33 kV sub-station by project activity
Source of data	Monthly billing records issued by KPTCL
Value of data	-
Brief description of measurement methods and procedures to be applied:	All the WTGs of the PP are connected to a common energy meter (main and check) at the project site at 33 kV sub-station. The reading is taken to note the gross export of electricity by the project activity 33 Kv sub-station. The detailed procedures are described in the monitoring plan mentioned in Annex 4. The parameter is monthly calculated.
QA/QC procedures to be applied (if any):	The generation records registered at Central Monitoring System (CMS) which is

[8] Please refer to parameter $E_{imp,site}$

[9] Transmission losses = E_{TL} x $E_{exp,site}$

	in control of O&M contractor will be checked to ensure consistency. The main and check meters installed at 33 kV sub-station are calibrated as per the requirements detailed in Annex 4.
Any comment	-

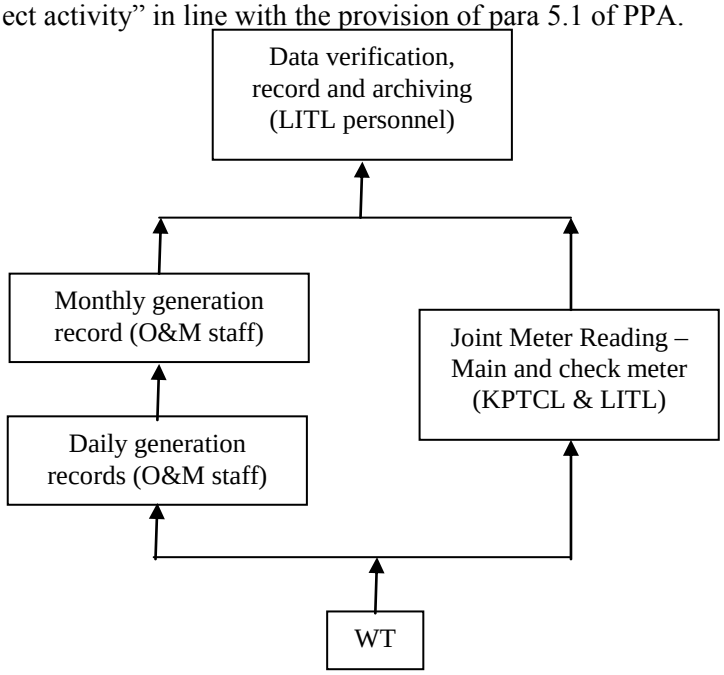
Data / Parameter	$E_{imp,site}$
Unit	kWh
Description	Electricity Import by the project activity
Source of data	Monthly billing records issued by KPTCL
Value of data	-
Brief description of measurement methods and procedures to be applied:	All the WTGs of the PP are connected to a common energy meter (main and check) at 33 kV sub-station at the project site. The reading is taken to note the import of electricity by the project activity. The parameter is continuously measured and monthly recorded.
QA/QC procedures to be applied (if any):	The data will be directly measured during JMR. All relevant records will be checked to ensure consistency. The meters will be calibrated as per the provisions of article 6 of PPA

Data / Parameter	E_{TL}
Unit	%
Description	Percentage Transmission loss between the project site (33 kV sub-station) and the interconnection point (66 kV sub-station)
Source of data	Monthly billing records issued by KPTCL
Value of data	-
Brief description of measurement methods and procedures to be applied:	The percentage transmission loss percentage will be calculated using the reading of the bulk energy meters at 33 kV sub-station10 and bulk meter at 66 kV sub-station. The calculation of percentage transmission losses is performed by KPTCL based on the main and check meter readings of 33 kV and 66 kV sub-station bulk meters. The detailed procedures are described in the monitoring plan mentioned in Annex 4. The parameter is continuously measured and continuously recorded.
QA/QC procedures to be applied (if any):	The data will be cross-verified using the Form – B provided by KPTCL as a part of the monthly JMR
Any comment	-

B.7.2 Description of the monitoring plan:

[10] This involves all the 33kV sub-station meters which monitor the electricity fed to 66kV sub-station. Refer figure: Block diagram of metering arrangement

>>
The electricity generated by the WTGs is monitored through a common energy meter (main and check) connected to all WTGs of the PP at the project site at 33kV sub-station. Similar metering arrangement exists for the other project developers also. The electricity is fed from the 33 kV sub-station to 66 kV sub-station. As shown in the figure: Block diagram of metering arrangement, the 33 kV sub-station including the PP's 33 kV sub-station are connected to 66 kV substation. The KPTCL personnel have a regular monthly schedule for capturing the readings from these meters at the project site and sub-station. The available recorded data is further verified by the LITL personnel. A monthly generation report is prepared showing the aggregate and individual energy generation of WTGs captured at 33 kV sub-station. The recorded monthly energy generation values can be verified with KPTCL's monthly generation report. The recorded data is further utilized to calculate the parameter "Net Electricity Export to the grid by project activity" in line with the provision of para 5.1 of PPA.



The data will be archived for crediting period plus two years after the end of crediting period. The graphical representation of the same is as provided below. Further details regarding monitoring, data uncertainty and apportioning for T&D losses is provided under Annex 4 of this document.

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

>>
Date of completing the final draft of this baseline section: *DD/MM/YYYY*
29/06/2007

Name of person/entity determining the baseline:
M/s Lanco Infratech Limited, who is also a project participant (refer Annex 1 for the details)

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
10/12/2001

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

>>
Life time of the project: 20 years

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

C.2.1. Renewable crediting period

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

>>
Not applicable

C.2.1.2. Length of the first crediting period:

>>
10 Years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
01/10/2007
However, project participant will not start the crediting period before the date of registration with UNFCCC.

C.2.2.2. Length:

>>
10 years (10-y)

SECTION D. Environmental impacts

>>

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

>>
The project being a renewable energy based power project it does not fall under the purview of the Environmental Impact Assessment (EIA) notification of 1994 of the Ministry of Environment and Forest,

Government of India. EIA is only required for those industries/projects which are listed in the Schedule of the notification. Hence, it is not required by the host party.

The project activity does not have any significant environmental impacts. However, some of the impacts likely to be caused by the project activity have been discussed below:

During construction

Impact on air
Movement of construction material during construction will have some impact on the air. As the transportation is quite less for the project activity, the impacts were negligible.

Impact on water
There was no waste water discharge during construction. However, proper sanitary arrangements were provided during construction phase.

Impact on Land use
The land for setting up of the project activity was sub leased from KREDL. The closest settlement is 5 km from the site and as the land was already allotted for setting up wind project in the area, no R&R of local population was required. In fact the land value appreciated due to the project activity and other wind energy developers and the landowners benefited due to the project activity.

Impact due to noise
No impact on ambient noise level was envisaged. Taking into consideration the project life cycle, the magnitude of the impacts during the construction phase is negligible and is temporary which will remain till the end of construction phase. Therefore, it would not effect the environment considerably. The impacts on the environment due to construction activities of wind turbines are negligible

Operation and Maintenance Phase

Impact on air
No impact on ambient air quality as WTGs are most eco-friendly source of energy and there is no use of any fossil fuel during the operation of the WTGs.

Impact on water
No waste water discharge during operation of wind turbine generators.

Impact on ecology
There are no known migratory birds/endangered species in the region of project activity. Therefore no harm on the ecological environment is envisaged.

Impact due to noise
Noise is generated due to the movement of rotor blades. The noise levels are below the regulatory norms. Since there is no settlement within 500 m of the site, no impact due to the noise from the operation of the WTGs is envisaged. The considering the overall impact of the project in reducing GHG's, creation of employment etc., makes this effect negligible.

Socio-Economic Impacts

The project activity has proven to have a positive impact on the socio-economic environment in the region. The locals have benefited economically through land sales. The project provided employment opportunities not only during the construction phase, but will provide during its operational lifetime. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainable development of the region.

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

>>

Not Applicable

SECTION E. Stakeholders' comments

>>

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

>>

The stakeholders identified for the project are as under.

- Local population
- Karnataka Sate Pollution Control Board
- Ministry of Environment & Forests (MoEF)

- Karnataka Renewable Energy Development Authority
- Karnataka Power Transmission Corporation Limited (KPTCL)
- Electrical Inspectorate

Stakeholders list includes the government and non-government parties, which are involved in the project at various stages. All the stakeholders were requested for comments on the project.

LITL had conducted the stakeholder consultation process on 10th December 2005 at the plant site. LITL had invited all the identified stakeholders personally. Among the people present were the local villagers, village administrator, and employee at the plant site, employees of O&M contractors and other stakeholders.

LITL had invited the stakeholders to provide their general feedback on the project activity and specifically asked the villagers and their representative to give them information on how the project has helped them improve their livelihood.

E.2. Summary of the comments received:

>>

Stakeholders Involvement

Local population comprises of the local people in and around the project area, is directly involved with the project. First of all they will be confronted with the construction and operation of a wind power plant in their direct environment. The distance from the wind turbines to the closest settlements is at a distance of 5 km from the site.

Since, the project proponents have proposed all measures to mitigate environmental impacts the impact on stakeholders is minimized. Further, the project will not cause any social impacts on local populace Karnataka State Pollution Control Board (KSPCB) takes care from the environmental angle and prescribes standards and monitors the adherence to the standards. There is no clearance required from pollution Control Board for wind power project in Karnataka. In the environmental clearance process, the documents to be submitted to Ministry of Environment & Forests (MoEF) are project report, public hearing report, site clearance for site specific projects, no objection certificate from State Pollution Control Board (SPCB), environmental appraisal questionnaire, EIA/EMP report, risk analysis for projects involving hazardous substance and rehabilitation plans, if more than 1000 people are likely to be displaced. MoEF amended the EIA notification (S.O.No. 60E) on 10 April 1997, making public hearing mandatory for environmental clearance for 29 categories of Industries. For Wind Power Projects, EIA / Public hearing is not needed.
Karnataka Renewable Energy Development Limited (KREDL) is the policy implementation in respect of Non conventional Renewable power projects in the state of Karnataka. LITL has received office memorandum from KREDL regarding transfer of 3 MW Wind Power Project of M/s Pioneer Wincon Ltd., to LITL. KPTCL as the buyer of the power is a major stakeholder in the project. They hold the key to the commercial success of the project. LITL has already signed Power Purchase Agreement (PPA) with KPTCL for next 10 Years from the date of operation of the project.

LITL had taken the commissioning approval from Electrical Inspectorate for 3 MW WEG & associated equipments before the start of generation of power.

CDM – Executive Board

Stakeholders' Comments

LITL has already received the major necessary approvals and consents from various authorities, required for project implementation like KREDL, KPTCL, MoEF and Government of Karnataka. The project is welcomed by all stakeholders because of various environmental, socio economic benefits. All the attended stakeholders expressed their happiness over the project and made no remarks on the project activity. They appreciated the efforts of LITL and employment opportunities created by the company for few of local people.

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

>>

The relevant comments and important clauses mentioned in the project documents like Detailed Project Report (DPR), environmental clearances, power purchase agreement, local clearance etc. were considered while preparation of CDM project development document. Further, the document will be published on UNFCCC/Validator's website for public comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Lanco Infratech Limited
Street/P.O.Box:	141, Avenue #8, Banjara Hills
Building:	"Lanco House"
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500 034
Country:	India
Telephone:	91-40-2335 8542
FAX:	91-40-2335 5681
E-Mail:	
URL:	www.lancogroup.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Nagaprasad
Middle Name:	-
First Name:	KKV
Department:	-
Mobile:	-
Direct FAX:	91-40-2335 5681
Direct tel:	91-40-2335 8542
Personal E-Mail:	nagaprasad@lancogroup.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Public Funding is available to the project.

Annex 3

BASELINE INFORMATION

Generation Data, Emission Data published by Central Electricity Authority, Government of India. Version 02 has been applied.
http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Gross Generation Total (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	144,292	151,185	155,385	165,735	168,438	179,751
East	58,936	64,048	66,257	75,374	85,776	93,902
South	129,035	131,902	136,916	138,517	144,086	147,355
West	162,329	165,805	177,399	172,682	183,955	188,606
North-East	5,319	5,332	5,808	5,867	7,883	7,778
India	499,911	518,272	541,764	558,175	590,138	617,392

Net Generation Total (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	135,230	141,415	144,743	155,043	157,291	168,206
East	53,350	58,097	59,841	68,428	77,968	86,014
South	121,158	123,630	127,789	128,373	134,676	138,329
West	150,412	153,125	164,448	159,780	170,726	176,003
North-East	5,195	5,213	5,671	5,752	7,762	7,655
India	465,345	481,479	502,492	517,376	548,423	576,206

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

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	25.9%	25.7%	26.1%	28.1%	26.8%	28.1%
East	10.8%	13.4%	7.5%	10.3%	10.5%	7.2%
South	28.1%	25.5%	18.3%	16.2%	21.6%	27.0%
West	8.2%	8.5%	8.2%	9.1%	8.8%	12.0%
North-East	42.2%	41.7%	45.8%	41.9%	55.5%	52.7%
India	19.2%	18.9%	16.3%	17.1%	18.0%	20.1%

Net Generation in Operating Margin (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	100,189	105,076	106,942	111,450	115,151	120,869
East	47,570	50,308	55,377	61,378	69,746	79,863
South	87,114	92,103	104,449	107,603	105,568	100,978
West	138,071	140,173	150,889	145,264	155,731	154,918
North-East	3,002	3,039	3,074	3,343	3,456	3,621
India	375,947	390,700	420,730	429,040	449,653	460,249

20% of Net Generation (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	27,046	28,283	28,949	31,009	31,458	33,641
East	10,670	11,619	11,968	13,686	15,594	17,203
South	24,232	24,726	25,558	25,675	26,935	27,666

West	30,082	30,625	32,890	31,956	34,145	35,201
North-East	1,039	1,043	1,134	1,150	1,552	1,531
India	93,069	96,296	100,498	103,475	109,685	115,241

Net Generation in Build Margin (GWh)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					32,064	34,340
East					15,818	17,567
South					27,987	28,158
West					35,257	35,425
North-East					2,055	1,793
India					113,181	117,283

EMISSION DATA

Absolute Emissions Total (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	97,866,565	102,743,113	106,808,582	109,996,544	112,212,597	120,056,079
East	58,026,488	61,427,499	66,593,200	75,512,010	83,956,860	92,517,515
South	89,019,263	92,112,060	105,187,726	108,049,156	105,539,862	101,712,149
West	135,192,153	141,597,621	148,557,341	144,127,175	157,781,065	153,933,199
North-East	2,202,108	2,158,348	2,280,049	2,462,796	2,468,463	2,532,819
India	382,306,576	400,038,640	429,426,898	440,147,681	461,958,846	470,751,761

Absolute Emissions OM (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	97,866,565	102,743,113	106,808,582	109,996,544	112,212,597	120,056,079
East	58,026,488	61,427,499	66,593,200	75,512,010	83,956,860	92,517,515
South	89,019,263	92,112,060	105,187,726	108,049,156	105,539,862	101,712,149
West	135,192,153	141,597,621	148,557,341	144,127,175	157,781,065	153,933,199
North-East	2,202,108	2,158,348	2,280,049	2,462,796	2,468,463	2,532,819
India	382,306,576	400,038,640	429,426,898	440,147,681	461,958,846	470,751,761

Absolute Emissions BM (tCO2)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					17,108,583	20,622,114
East					14,303,611	16,990,438
South					19,839,024	20,029,713
West					27,148,870	22,318,133
North-East					299,121	266,981
India					78,699,210	80,227,378

EMISSION FACTORS

Weighted Average Emission Rate (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.72	0.73	0.74	0.71	0.71	0.71
East	1.09	1.06	1.11	1.10	1.08	1.08
South	0.73	0.75	0.82	0.84	0.78	0.74

West	0.90	0.92	0.90	0.90	0.92	0.87
North-East	0.42	0.41	0.40	0.43	0.32	0.33
India	0.82	0.83	0.85	0.85	0.84	0.82

Simple Operating Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.98	0.98	1.00	0.99	0.97	0.99
East	1.22	1.22	1.20	1.23	1.20	1.16
South	1.02	1.00	1.01	1.00	1.00	1.01
West	0.98	1.01	0.98	0.99	1.01	0.99
North-East	0.73	0.71	0.74	0.74	0.71	0.70
India	1.02	1.02	1.02	1.03	1.03	1.02

Build Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North					0.53	0.60
East					0.90	0.97
South					0.71	0.71
West					0.77	0.63
North-East					0.15	0.15
India					0.70	0.68

Combined Margin (tCO2/MWh) (excl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
North	0.76	0.76	0.77	0.76	0.75	0.80
East	1.06	1.06	1.05	1.07	1.05	1.06
South	0.87	0.85	0.86	0.86	0.85	0.86
West	0.87	0.89	0.88	0.88	0.89	0.81
North-East	0.44	0.43	0.44	0.44	0.43	0.42
India	0.86	0.86	0.86	0.86	0.86	0.85

Annex 4

MONITORING INFORMATION

The real time performance of the system is being monitored by the Operation and Maintenance team at the Central Monitoring Station. In the event of any discrepancies in the above, corrective action will be taken up comparing readings from the various measuring and monitoring equipments.

Metering requirements

- The electricity generated by the project activity will be metered (main and check meter) at the high voltage side of the step up transformer installed at project site at 33 kV sub-station. The delivered energy from 33 kV sub-station and 66 kV sub-station will be metered (main & check meter) at the high voltage side of the step up transformer (i.e. 33 kV and 66 kV sub-station respectively)
- The metering equipment (both main and check meter) installed at project site (33 kV sub-station) and receiving sub-station (66 kV sub-station) will be electronic tri-vector meters of accuracy class 0.2%. The main meter will be installed and owned by the project proponent whereas the check meters will be installed and owned by KPTCL[11].
- The monthly meter readings (both main and check meters) at project site (33kV sub-station) and receiving sub-station (66 kV sub-station) shall be taken simultaneously every month.

Calibration:

- All the main and check meters will be tested for accuracy (0.2% class) with reference to a potable standard meter owned, tested & certified by KPTCL . This reference potable standard meter shall be of an accuracy class of 0.1% and calibrated once a year.
- The accuracy testing of the main and check meter will be carried out in every calendar year quarter. (as PPA page no. 9).

Emergency Conditions as per provisions made under Article 6 of PPA:

- If during any of the monthly meter readings, the variation between the main meter and the check meter is more than that permissible for meters of 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately
- If during the quarterly tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then billing will be as per the main meter as usual. The check meter shall, however, be calibrated immediately.
- If during the quarterly tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible limits of error, then the billing for the month up to the date and time of such test shall be as per the check meter,. There will be a revision in the bills for the period from the previous calibration test up to the current test based

[11] Refer para 6.2 of PPA

on the readings of the check meter, the main meter shall be calibrated immediately and billing for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.

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

Transmission losses:

- In case in a particular month, the JMR issued by KPTCL is unable to provide the transmission loss percentage due to meter failure and/or the logic of KPTCL in arriving at the transmission loss percentage is not clear, the following approach will be adopted to assume the transmission loss:
    - For all non-PP WTGs the historic lowest transmission loss (between 33 kV substation and 66 kV sub-station based on available data for applied monitoring period) will be applied and for all PP's WTGs the historic highest transmission loss (between 33 kV substation and 66 kV sub-station) will be applied to arrive at the net
- For the purpose of accounting for transmission line losses, the bulk meter reading situated at the receiving station is considered. The monthly invoicing will be done as mentioned below:

$E_{exp,grid} = E_{exp,site} – 115\%* E_{imp,site} – E_{TL} \text{ X } E_{exp,site}$

Where,

$E_{exp,grid}$ - Net Electricity Export to the grid by project activity

$E_{exp,site}$ - Electricity Export to the 66 kV sub-station from 33 kV sub-station by project activity

$E_{imp,site}$ –Electricity Import by the project activity

E_{TL} - Percentage Transmission loss between the project site (33kV sub-station) and the interconnection point (66kV sub-station) and shall be calculated as below by KPTCL:

$$E_{TL} = \left\{ \frac{(E_{exp,site} + X_2 + X_3 + X_4 + - - - X_n) – Y}{(E_{exp,site} + X_2 + X_3 + X_4 + - - - X_n)} \right\} \quad \text{X } 100$$

Where,

Y is the reading of bulk energy meter installed on the 66 kV sub-station side of the KPTCL receiving sub-station

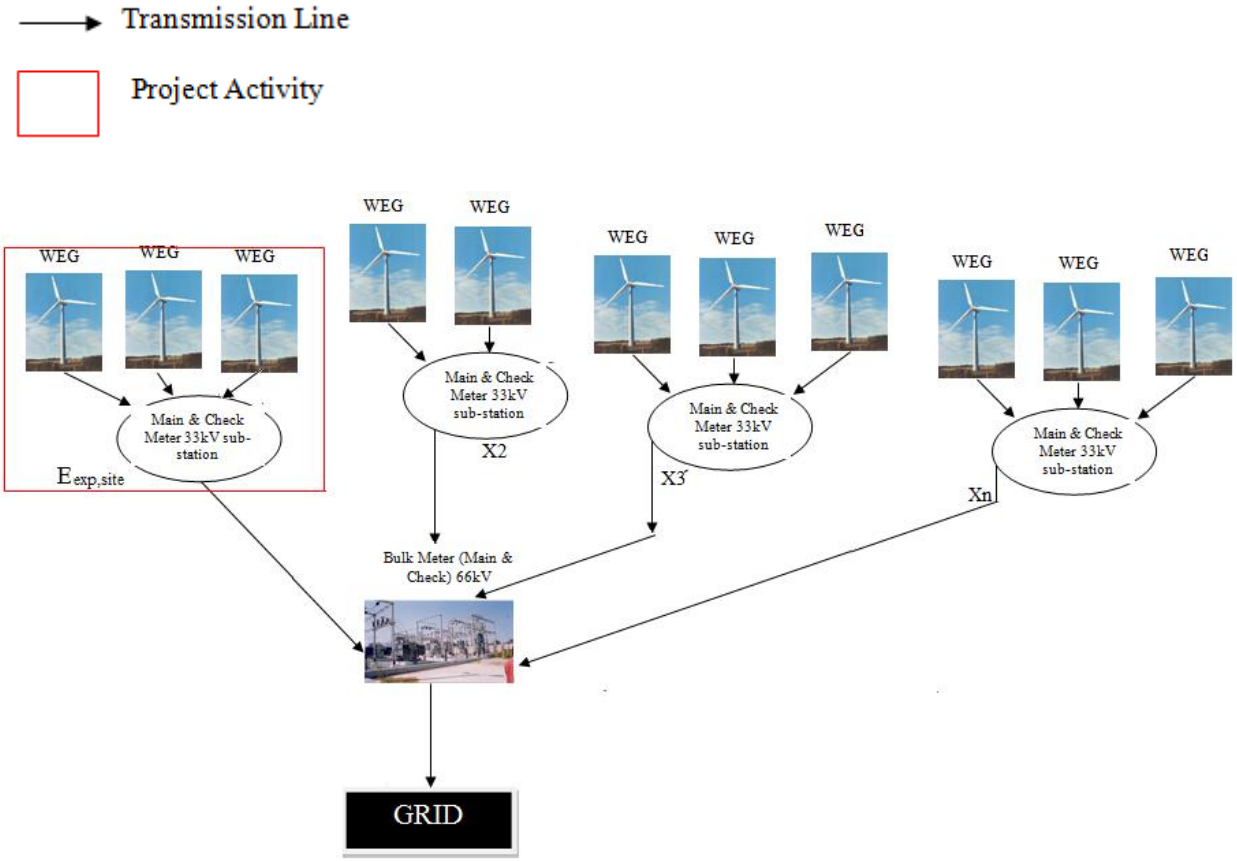
$E_{exp,site} + X_2 + X_3 +..... X_n$ is sum of the export electricity reading of the energy meters installed at 33 kV sub-station.

$E_{exp,site}$, X_2 , $X_3 . . . . X_n$ denotes the electricity monitored by dedicated energy meter for respective project developers (the project developers include all the developers who are connected to the 66 kV sub-station meter through the 33 kV sub-station) installed at 33 kV sub-station on HT side (refer to the diagram

below). The sum of $E_{exp,site}$, X_2 , X_3 . . . . X_n forms the gross power exported by WTGs of all the project developers from the 33kV sub-station to the 66kV sub-station (please refer below diagram for clarity). This value is used to compute the transmission loss percentage (E_{TL}) in conjunction with parameter Y.

$E_{exp,site}$ denotes the gross power exported by the project activity from the 33kV sub-station to the 66kV sub-station

Note: the calculation of E_{TL} is undertaken by the KPTCL based on the parameters (export electricity reading of the energy meters of project developers other than PP), thus PP has opted to directly consider this reading derived by KPTCL personnel under the monitoring plan. The appropriateness of this value can be demonstrated to the verifying DOE subjected to availability of export electricity reading of the energy meters of all involved project developers.
Also in case the KPTCL does not provide the parameter E_{TL} and directly provides the transmission losses in form-B then, the parameter $E_{exp,grid}$ will be directly calculated from the form B which will be issued by the KPTCL to the PP



Each instrument will have a specific identification number and standard procedures will be followed and maintained in calibrating instruments.

Characteristics of instrument used for calculation of emission reductions

S. no.	**Data description**	**Procedure for monitoring the parameter**	**Traceability of calibration method/standard**	**Tag no OR equipment serial no of instrument**	**Service & Tech def. Of instrument and measuring**	**Make of instrument**	**Location of instrument**	**Calibration Method**	**Least Count and range of instrument**	**Uncertainty**	**Linkage with system management, ISO doc number (If system is available)**	**ID number of MP (As given in PDD)**
1	Power Generated	Tri-vector Meter	KPTCL	Main – TNB 00766 Check – TNB 00765	Energy Meter	Pioneer Wincon Limited	KPTCL Sub-station	Accucheck – HT3,0.5 class, 3 phase wire, Trivector Meter Calibration	0.2 Class	Main – 0.026 Check – 0.117	Nil	D 3.1

Abbreviations

CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Certified Emission Reductions
Cm	Centimeter
CO_2	Carbon Dioxide
DPR	Detailed Project Report
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producers
IREDA	India Renewable Energy Development Agency
Kcal	Kilo Calories
Kg	Kilogram
KM	Kilometer
KP	Kyoto Protocol
KW	Kilowatt
KV	Kilovolts
kWh	Kilowatt hour
LITL	Lanco Infratech Limited
MNES	Ministry of Non-Conventional Energy Sources
MT	Metric Tons
MU	Million Units
MW	Megawatt
NGO	Non Government Organizations
NOC	No Objection Certificate
PDD	Project Design Document
PIN	Project Idea Note
PLF	Plant Load Factor
PPA	Power Purchase Agreement
QA	Quality Assurance
QC	Quality Control
RE	Renewable Energy
SEB	State Electric Board
STG	Steam Turbine Generator
T&D	Transmission and Distribution
TJ	Tera Joule
UNFCCC	United Nations Framework Convention on Climate Change

Appendix B

REFERENCE LIST

Sr. No.	References
1	Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) www.unfccc.int/cdm
2	Website of United Nations Framework Convention on Climate Change, http://unfccc.int
3	UNFCCC decision 17/CP.7: Modalities and procedures for a clean development mechanism as defined in article 12 of the Kyoto Protocol
4	UNFCCC document: Annx B to attachment 3, Indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories
5	Detailed project report on 3 MW Wind based power project – Encon Services Limited
6	Website of Central Electric Authority (CEA), Ministry of Power, Govt. of India www.cea.nic.in
7	CEA published document "16th Electric Power Survey of India"
9	Website of KPTCL, www.kptcl.com
10	Website of Ministry Non-Conventional Energy Sources (MNES), Government of India, www.mnes.nic.in
11	www.infraline.com/power/
12	Website of Climate Change Cell, Ministry of Environment & Forest, Govt. of India. www.envfor.nic.in

Year of offer			2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
On-Site Project Emission Reductions													
Generation capacity , KW			3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Plant load factor, %			20.19	20.19	20.19	20.19	20.19	20.19	20.19	20.19	20.19	20.19	20.19
No. of hours of plant operation per annum			2208	8760	8760	8760	8760	8760	8760	8760	8760	8760	6552
No. of units generated in a year, millions			1.34	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	3.97
Auxilliary consumption per annum			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
No. of units exported to grid, millions			1.34	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	5.31	3.97
T&D losses considered on exportable power			0.03	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.08
No. of units replaced in the grid, millions units	**52.00**		1.31	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	5.20	3.89
Baseline emission factor considered, $kgCO_2/kWh$			0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Baseline emissions, tones			1215.62	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	3607.21
Generation by coal as supplimentry fuel (0%)			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Emission factor considered for coal, $kgCO_2/kWh$			0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Project emissions, tones			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net greenhouse gas emissions, tones			1215.62	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	4822.83	3607.21
Actual green power to grid, millions units	**52.00**												
Carbon emission reductions in a year			1216	4823	4823	4823	4823	4823	4823	4823	4823	4823	3607
Commitment period													
No. of years of delivery of CERs	**10 years**												
Total number of CERs	**48228**												