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

CONTENTS

Annexes

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

2.85 MW Bundled Wind Power Project by Ramraj Handlooms in Tamil Nadu (India)

Version - 02
Date: 04/10/07

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

2.85 MW Bundled Wind Power Project (hereafter referred as the 'project') is a grid connected renewable energy project located at Tamil Nadu state, India. The objective of the proposed project is to generate electricity using state-of-the-art wind power generation technology and to sell into Southern Region Power Grid. The proposed project will achieve CO_2 emission reductions by replacing electricity generated by fossil fuel fired power plant connected into Southern Region Power Grid.

The bundled project activity consists of 5 bundles which have been defined based on the location of Wind Turbine Generators (WTGs):

Bundles	No. x Capacity	Name of Promoter	WTG Manufacturer	Date of Commissioning	Location
I	1 no. x 750 kW	Ramraj Handlooms	NEG MICON	03 March, 2005	Survey No: 219 (P), 220/1C (P) Sundankuruchi Region, Azhagiapandipuram Village, Tiruneiveli Taluk, Tiruneveli District, Tamilnadu
II	1 no. x 750 kW	Ramraj Handlooms	NEG MICON	May 19, 2006	Survey No: 26 (P) South West Chinnapudur Region, Uthupalayam Village, Dharampuram Taluka, Erode District, Tamilnadu
III	1 no. x 850 kW	Ramraj Handlooms	GAMESA EOLICA	March 24, 2005	Survey No:182/9&10 Kurungulam Village, Radhapuram Taluka, Tiruneivelі District, Tamilnadu
IV	1 no. x 250 kW	N. Sumati	PIONEER WINCON	May 2005	Survey No:419/2B (P) Sellakarachal Village Palladam Taluk, Coimbatore District, Tamilnadu

Bundles	**No. x Capacity**	**Name of Promoter**	**WTG Manufacturer**	**Date of Commissioning**	**Location**
V	1 no. x 250 kW	Thiru. K. R. Nagarajan	PIONEER WINCON	May 2005	Survey No:419/2A (P) Sellakarachal Village Palladam Taluk, Coimbatore District, Tamilnadu
Total					**2.85 MW**

N. Sumati & Thiru. K. R. Nagarajan are Directors of Ramraj Handlooms, however, set up WTGs in their name. Ramraj Handlooms will be co-ordinating this bundled wind power project.

The electricity generation from this project will contribute to annual GHG reductions estimated at 5518.996 tCO_2e. Although the project life is envisaged as 20 years, it is proposed that the project activity needs to mitigate the risks involved in renewable energy technology for the first 10 years. The project activity will evacuate approximately 5.936 GWh of renewable power annually to the power deficit Southern Region Grid.

Purpose of the project activity:

The main purpose of the project activity is to generate electrical energy through sustainable means using wind power resources, to utilize the generated output for either meeting the captive energy demand and/or selling it to the state electricity utility and to contribute to climate change mitigation efforts.

Apart from generation of renewable electricity, the project has also been conceived for the following:

- To enhance the propagation of commercialisation of wind turbines in the region.
- To contribute to the sustainable development of the region, socially, environmentally and economically.
- To reduce the prevalent regulatory risks for this project through revenues from the CDM.

Contribution of project activity to sustainable development:

Indian economy is highly dependent on “Coal” as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and places immense stress on the environment. Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of Renewable Energy (RE) sources.

Government of India has stipulated following indicators for sustainable development in the interim approval guidelines[1] for CDM projects.

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

1. Social well-being

The proposed project activity leads to alleviation of poverty by establishing direct and indirect employment benefits accruing out of ancillary units for manufacturing towers for erecting the WTGs and for maintenance during operation of the project activity. The infrastructure in and around the project area will also improve due to project activities. This includes development of road network and improvement of the quality of electricity in terms of its availability and frequency as the generated electricity is fed into a deficit grid.

2. Economic well-being

The project contributes to the economic sustainability around the plant site, which is promotion of decentralization of economic power, leading to diversification of the national energy supply, which is dominated by conventional fuel based generating units. The generated electricity is fed into the Southern Regional Grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers and sub-urban habitants) which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

3. Environmental well-being

The project utilizes wind energy for generating electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants, thereby contributing to the reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions. As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power. Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus the project causes no negative impact on the surrounding environment contributing to environmental well-being.

4. Technological well-being

The project activity leads to the promotion of renewable energy generation by wind, demonstrating the success of wind turbine generators in the region, which feed the generated power into the nearest sub-station, thus increasing energy availability and improving quality of power under the service area of the substation. Hence, the project leads to technological well-being.

In view of the above, the project participant considers that the project activity profoundly contributes to the sustainable development.

A.3 Project participants:

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

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

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

A.4.1.1 Host Party(ies):

India.

A.4.1.2 Region/State/Province etc.:

Tamil Nadu.

A.4.1.3 City/Town/Community etc:

Bundles	Capacity	Location
I	750 kW	Survey No: 219 (P), 220/1C (P) Sundankuruchi Region, Azhagiapandipuram Village, Tiruneiveli Taluk, Tiruneveli District, Tamilnadu
II	750 kW	Survey No: 26 (P) South West Chinnapudur Region, Uthupalayam Village, Dharampuram Taluka, Erode District, Tamilnadu
III	850 kW	Survey No:182/9&10 Kurungulam Village, Radhapuram Taluka, Tiruneiveli District, Tamilnadu
IV	250 kW	Survey No:419/2B (P) Sellakarachal Village Palladam Taluk, Coimbatore District, Tamilnadu
V	250 kW	Survey No:419/2A (P) Sellakarachal Village Palladam Taluk, Coimbatore District, Tamilnadu

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

Unique identification		
Region	**Latitude**	**Longitude**
Tiruneiveli Taluka	8˚ 43’ 60 N	77˚ 42’ 0 E
Dharampuram Taluka	10˚ 43’ 60 N	77˚ 31’ 0 E
Paddalam Taluka	12˚ 34’ 60 N	79˚ 57’ 60 E

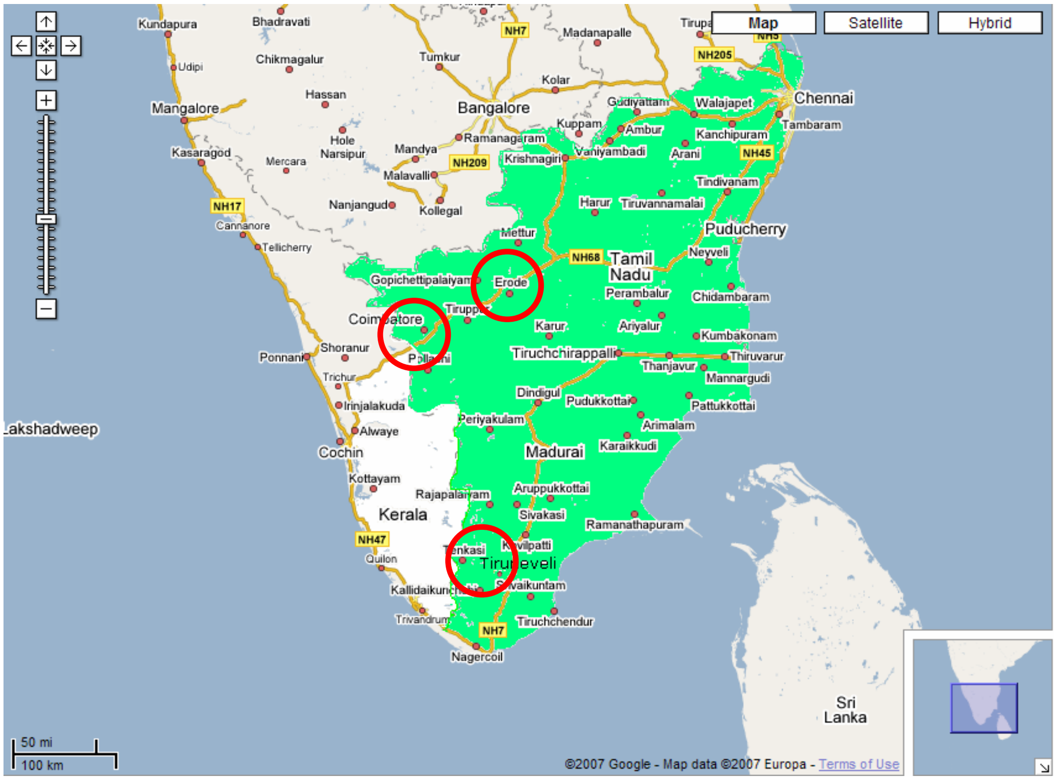

Figure 01, Location Map

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

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

- **Type** : **I – Renewable Energy Projects**
- **Project Category** : **I.D. – Grid connected renewable electricity generation (Version 12: EB 33)**

Technology Used:

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind has considerable amount of kinetic energy when blowing at high speeds. This kinetic energy when passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity.

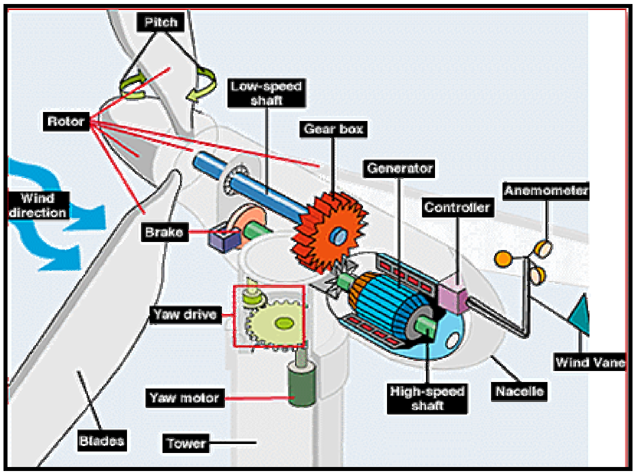

Figure 02, Major Mechanical Parts of a Wind Turbine

Technical specification of the turbines used in the project activity has been detailed below:

Model	NM48/750
Name of manufacturer	M/s NEC Micon (India) Private Ltd.
Particulars	**Specifications**
Operational condition	
Calculated lifetime	20 Years
Cut-in wind speed	< 3.5 m/s
Cut-out wind speed	22 m/s
Maximum rotational speed	22/15 rpm
Main Specification	
Power control	Stall
Rotational speed (Synchronous)	22.2/14. 8rpm
Rotor position	Upward
Nominal Power	750 kW
Hub height	55 m
Rotor	
Rotor diameter	48.2 m
Rotor swept area	1824 m^2
Number of blades	3
Rotor revolution	22/15 rpm
Blade	
Material	GRP
Blade length	23.5 m
Main gearbox	
Gear ratio	1:67:5
Lubricating system	Splash lubrication
Mechanical power	807 kW
Generator	
Type	Asynchronous, 4/6 pole
Nominal power	750/200 kW

Rotational speed	1500/1000 rpm
Nominal voltage	690 V
Yawing System	
Yaw bearing	Ball bearing
Yaw motor	4 nos. 0.37 kW
Tower	
Type	Conical modular tower, 24 edged
Height	53.6 m
Control System	
Type	Microprocessor based

Model	G58-850 kW
Name of Manufacturer	Gamesa Eolica (marketed and supplied in India by M/s Pioneer Asia Wind Turbines).
Particulars	**Specifications**
Blades	
Number of blades	3
Length	28.3 m
Material	Epoxy reinforced glass fibre
Whole blade weight	2500 kg
Rotor	
Swept area	2642 m^2
Diameter	58 m
Rotation direction	Clockwise (front view)
Rotational speed	Variable, 14.6-30.8 rpm
Gearbox	
Type	1 stage planetary / 2 stage helical
Gear ratio	50 Hz 1:61:74 / 60 Hz 1:74.5
Cooling	Oil pump and oil cooler
Oil heater	1.5 kW
Generator	
Type	Doubly fed machine
Rated power	850 kW
Voltage	690 V AC
Frequency	50 Hz / 60 Hz
Rated power factor	1.0
Rotational speed range	900:1, 900 rpm (rated 1,620 rpm)

Model	P 250 / 29
Name of manufacturer	**M/s Pioneer Wincon Pvt. Ltd.**
Particulars	**Specifications**
Operational condition	
Rated power	250 kW
Power regulation	Stall
Cut-in wind speed	4 m/s
Cut-out wind speed	25 m/s
Rotor speed	38.5 rpm

Rotor	
Rotor diameter	30 m
Rotor swept area	661 m^2
Number of blades	3
Main gearbox	
Type:	3 Step, Helical
Gear ratio	1:39:5
Lubricating system	Splash

Generator	
Type	4, Pole Asynchronous
Rated power	250 kW
Rotational speed	1500 rpm
Rated voltage	415 V
Yawing system	
Yaw bearing, type	Ball bearing
Yaw motor	2 EI. Motors, planetary worn gear wind vane
Tower	
Type	Lattice tower
Height	50 m
Brake	
Mechanical brake	Disc brake
Position	High-speed shaft
Control system	
Type	Microprocessor based

Note: This project does not involve any technology transfer. It is an indigenous technology being implemented for project activity.

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

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2008-09	5518.996
2009-10	5518.996
2010-11	5518.996
2011-12	5518.996
2012-13	5518.996
2013-14	5518.996
2014-15	5518.996
2015-16	5518.996
2016-17	5518.996
2017-18	5518.996
Total estimated reductions	55189.96
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (t of CO_2 eqiv.)	5518.996

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

The project has not received any public funding from Annex I countries and Official Development Assistance (ODA).

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

According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities (FCCC/CP/2002/7/Add.3), a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants
- In the same project category and technology
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small scale activity

None of the above applies to the project activity and project proponent has not registered or applied for registration of another wind project. Therefore, the proposed project activity is not a debundled component of a larger CDM 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:

Project Type : **I – Renewable** Energy Projects
Project Category: **D –** Grid connected renewable electricity generation
(Version 12: EB 33)

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

Methodology AMS I.D. also refers to:-

Revision to the approved consolidated methodology ACM0002 **"Consolidated baseline methodology for grid-connected electricity generation from renewable sources"**
Version: 06
Scope no: 1
Sectoral Scope Energy Industries: (Renewable/non-renewable)
Date: 19 May 2006

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

The project category is grid connected renewable electricity generation system hence as per appendix B- 'indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories', Version- 10 of the simplified modalities and procedures for small scale CDM project activities (FCCC/KP/2005/8/ADD.1), the proposed CDM project falls under category ***I.D – Grid connected renewable electricity generation.*** The applicability of the project activity as small scale as per approved methodology *AMS I.D*. has been demonstrated below:

Applicability criteria	Project case
This category comprises renewable energy generation units, such as photovoltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.	The project is a wind power project supplying electricity to Southern Regional Grid, hence applicable to this category.
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[1], the capacity of the entire unit shall not exceed the limit of 15MW.	There is neither non-renewable component added, nor co-firing is required for the proposed project activity. The renewable project capacity is 2.85 MW, well below the limit of 15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	This is not a combined heat and power (co-generation) system.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	Not applicable, the entire wind turbines are new and this project is not capacity enhancement or up gradation project.
Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	Not applicable. This project is not a retrofit or modification of existing facility.

The above comparison confirms that the chosen methodology is applicable for this project activity**.**

B.3 Description of the project boundary:

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

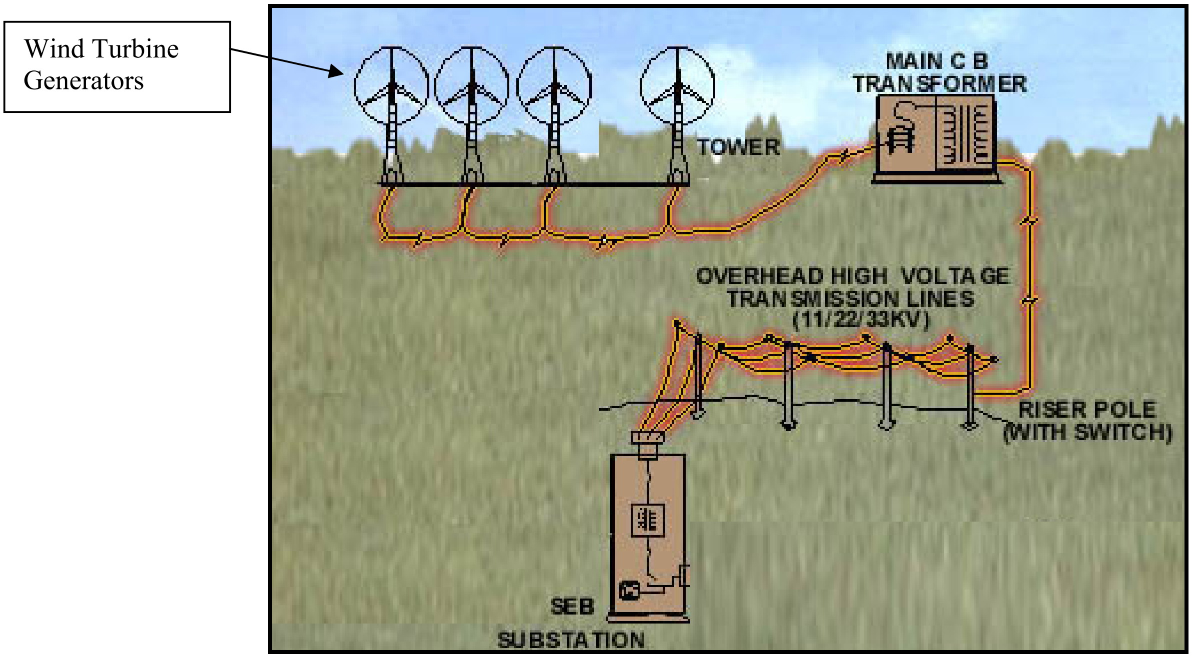

Figure 03, Project Boundary

B.4	Description of baseline and its development:

The project category is renewable electricity generation for a grid system, which is also fed by both fossil fuel fired generating plants (using fossil fuels such as coal, natural gas, diesel, naphtha etc.) and non-fossil fuel based generating plants (such as hydro, nuclear, biomass and wind). According to approved methodology AMS ID / ACM0002, for project activities that do not modify or retrofit an existing electricity generation facility, in the absence of the CDM project activity, the electricity that is being delivered to the grid by the CDM project would have been generated by the operation of grid-connected power plants and by the additions of new generation sources.

Baseline Scenario

The baseline scenario as explained above is that the electricity supplied by the CDM project activity would have been supplied by the operation of the power plants connected to the grid and by addition of new generation sources. These generation sources will be depicted in OM and BM calculations as part of the combined margin method for calculation of the baseline emission factor. The calculation of the baseline emission factor using the combined margin methodology has been detailed in Section B.6.1.

Grid System for the Project Activity

The Southern Region of India comprises of four states and one Union Territory (UT) namely Tamil Nadu, Kerala, Karnataka, Andhra Pradesh and Pondicherry (UT). Pondicherry has only one combined cycle gas power generating station (32.50 MW) and hence receives power from the states in the Southern Region, through allocations and also imports power from Western and Eastern Regions[2].

The installed capacity of Southern Region at the end of financial year 2006- 07 was 36823.32 MW (source: CEA). The total installed capacity comprises Hydro - 11011.71 MW (29.91 %), Thermal + Gas + Diesel - 20698.12 MW (56.20 %), Nuclear - 880 MW (2.39 %) and Wind + R.E.S - 4233.49 MW (11.50 %). The Hydro Thermal ratio was 35:65 as on 31.03.2007[3].

As per the generation statistics of power stations in the Southern Region during the year 2006-07 (as on 31.03.2007), the quantum of hydro, thermal + gas + diesel, nuclear, state wind power & IPPs generation in the region during 2006-07 was 38,254.52 MUs (20.32 %), 1,20,423.03 MUs (63.95 %), 5,161.53 MUs (2.74 %), 35.45 MUs (0.02%) & 24,424.22 MUs (12.97%) respectively[4].

Type	Generation, MUs		% increase in generation
	2005-2006	2006-2007	
Hydro	32970.78	38254.52	16.03
Thermal + Gas + Diesel	108660.66	120423.03	10.82
Nuclear	4711.56	5161.53	9.55
Wind Power	34.68	35.45	2.22
IPPs	20675.86	24424.22	18.13
Total	167053.54	188298.75	12.72
Source: Southern Regional Power committee Annual Report / 2006-2007			

The power sector in India including the southern region is driven by thermal power stations (as shown by the figures above). As clear from the table above, during 2006-2007 there was an increase of only 2.22 % in generation by wind projects from the previous year whereas thermal power shows an explicit growth of 10 %.

A list of future capacity additions based on the energy demand has been planned by Central Electricity Authority (CEA) and these plans are revised from time to time based on demand projections. Detailed projections are available for the eleventh plan period, i.e. 2007 till 2011 in report of working group on power (11th plan). As per the report to bridge power shortages in the country in the business as usual scenario, nearly 82,369 MW of fresh capacity addition would be required at the end of 11th year plan (inclusive of renewable energy sources), more than 72% of which is likely to be fossil fuel based and only 16% would be renewable energy based[5].

The proposed project activity can evacuate approximately 5.936 Million Units of clean electricity per year using wind turbines. Taking into account energy shortages and current trend of investment in fossil fuel based energy generation in the region, in absence of the project activity, an equivalent amount of electricity would have been generated using fossil fuel based power plants. Thus the generation from the project activity displaces the energy

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[2] Source: Southern Regional Power committee Annual Report / 2006-2007

[3] Source: Southern Regional Power committee Annual Report 2006-2007

[4] Southern Regional Power committee Annual Report 2006-2007

[5] http://www.cea.nic.in/ (working group on power 11th plan, table 1.37, 1.38, (page no. 44, 47, 48) chapter 1)

generated using fossil fuel fired power plant and leads to an emission reduction of 55,338.36 tCO_2e annually over the ten-year crediting period. In the proposed baseline, Southern Region grid is used as the reference region for estimating the current generation mix.

Baseline Estimation:

Baseline methodology for project category *I.D* has been detailed in paragraphs 7-11 of the approved small scale methodology *AMS I.D*. (Version 12, date: EB 33) Paragraph 9 of the approved methodology applies to this project activity, which states that:

For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use Simple OM and the Average OM calculations must be considered.

OR

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

Baseline emission reductions have been estimated using combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

In the proposed baseline, Southern Region grid is used as the reference region for estimating the current generation mix.

Central Authority of India (CEA), Ministry of Power, Government of India now provides the database for the grid emission factor of various regional grids in India. The estimation of the Grid Emission Factors by CEA is based on the approved methodology ACM0002, Version 06 (Refer pg. no. 17, 19 of CO_2 Baseline Database Version 2, dated- June 2007).

Formulas used for calculation of combined margin have been elaborated in section B.6.1

Following information is used for baseline determination:

Sr. No.	Key information/data used for baseline determination	Source of data/information
1	Grid emission factor (Southern Region)	CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 2, Date: June, 2006) http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Baseline Completion Date: 04 October 2007.

Name of person/entity determining the baseline: M/s Ramraj Group of Companies and their consultant.

Organization:	M/s Ramraj Handlooms
Street/P. O. Box:	Senguptapuram 1st Street, Mangalam Road
Building:	Ramraj-V-Tower
City:	Tirupur (District -Coimbatore)
State/Region:	Tamilnadu
Postfix/ZIP:	641 604
Country:	India
Telephone:	0421-2248147, 2248148, 2248149
Fax:	0421-2205148
E-Mail:	ramrajcotton@eth.net
URL:	www.ramrajcotton.com
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Nagrajan
Middle Name:	R.
First Name:	K.
Department:	Management
Mobile:	Not Available
Direct Fax:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	Not Available

Note: Consultant is not a project participant as meant in Annex I

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 argument presented below is as per Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities.

Barriers and Additionality

In this case, we establish that significant barriers exist and would have prevented the project from being undertaken or completed and also establish that the CDM activity would act as an impetus for this project to survive. The primary relevant barriers to the project activity are:

Investment Barriers:

The entire project was based on the arrangement of supplying the electricity produced to the Southern Grid of India. Wind energy has been the most unpredictable of all other common sources of generating energy i.e. coal, diesel etc. Further, wind turbine generation plants have lower plant load factor of all other sources i.e. about 25.90% to 27.46%, as per TNERC-Tamil Nadu Electricity Regulatory Commission (TNERC).

Project proponent has chosen the activity for their urge of sustainable development, despite being not so financially rewarding as compared to the usual business returns. During the period of installation of the 5 different units (i.e. 2004 to 2006) investments in Govt. Securities generated a return of 5.43 to 7.85%, long term bank deposits yielded 5.75 to 7%, minimum bank lending rates were 10.25% to 10.75%, term lending Institutions rates were 8.50 to 14.51%, (Ref: Reserve Bank of India – Handbook of Statistics on Indian Economy Table 74). Investment in Infrastructure projects have long gestation periods. Uncertainties in the future cash flows are high.

Wind power projects are comparatively more risky because wind, the main source for generating the energy is not very predictable and totally beyond anybody's control. As Such TNERC as per their orders dt.15.5.2006 also maintained that investors should earn at least 16% return on their investments. Hence the investment analysis has been carried out with 16% as returns expected by owners.

The project set up by the project proponent generates project IRR of 9.20% only whereas the Weighted Avg. Cost of Capital (WACC) is 10.33%. This return is arrived at on the assumption that estimated generation of units, operation & maintenance expenses and all other variables materialize as expected. However the main variable which can adversely affect Project IRR is saleable units. This can be due to either non- availability of wind, grid connections or technical problems.

Sensitivity Analysis

Salable units up (+) /down (-) by.	-4.0%	-3.0%	-2.0%	-1.0%	2%
Project IRR without CDM	8.5%	8.7%	8.9%	9.0%	9.6%
Project IRR with CDM	10.09%	10.26%	10.43%	10.59%	11.09%

The CDM benefits amount to Rs. 2.202 Million (5518.996 CER x approx euro 7 per CER x Rs 57 per euro). With CDM benefits the Project IRR moves to 10.76% which exceeds the WACC, sufficiently.

Out various options available to the project promoter wind is not the most attractive option to generate power. Though wind energy is a clean energy, it is a costlier option, especially in India where availability of coal is abundance. 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
Alt-1	Coal	Rs 2.27/ kWh
Alt-2	Fuel Oil	Rs 3.57/ kWh
Alt-3	Wind Energy	Rs 4.24/ kWh
Reference -Nagda hills registered wind PDD		

Also according to the World Energy Council report[6] 'India's Energy Scenario In 2020' wind remains a costly option to generate power than other conventional fossil fuel based sources. Wind power projects provide lower IRR as these projects entail high project cost and low PLF. To promote these technologies state government provides incentives like accelerated depreciation, wheeling of power to user etc, however even with these incentives the return

[6] http://www.worldenergy.org/wec-geis/publications/default/tech_papers/17th_congress/1_1_27.asp#Heading6

from wind energy projects is lower than that from the other generation options. Clearly the project is not very attractive with existing power pricing policy of the state.

With CDM benefits the Project IRR moves to 10.76% which is just above the WACC and is respectable. Thus wind energy is not the most attractive option for meeting the power requirements of the Project Participants.

This amply substantiates that an investment barrier did exist for the project activity.

Institutional and Regulatory Barriers:

The main institutional and regulatory barriers faced by the project activity are listed below:

- Delay in sanctioning by the TNEBs and other State agencies
- Unplanned addition of wind farms at sites like Muppandal, Kayathar, Poolavadi, etc., which resulted in inadequate capacity at dedicated substations resulted in shutting down of wind turbines even during peak wind speed periods with loss of generation and hence revenue loss to the wind farm owners.
- Connecting WTGs to weak and rural feeder lines in the absence of dedicated substations at some sites, poor grid, poor generation and loss of revenue.
- TNEB imposing hefty penalties for excess Reactive Power (RkVAh) consumption.
- Absence of third party sale coupled with uncertainty about the tariff structure, inconsistent contractual agreements like the PPA and their enforceability.
- Inadequate power evacuation facilities by TNEBs in many areas, along with inadequate capacity of substations.

Barriers Related to Poor Tariff Structure

Ministry of New & Renewable Energy (then -The Ministry of Non-conventional Energy Sources), Government of India had issued guidelines for power purchase tariff to be Rs. 2.25 per kWh with 5 % escalation every year for all renewable energy to promote generation of renewable clean energy in the year 1996. TNEB followed the same guidelines until the year 2001. In 2001, however TNEB changed its policy and froze the power purchase tariff for wind energy at Rs. 2.70 per kWh with no escalation till 2006 and had informed that this power purchase tariff will be reviewed in 2006 and a new tariff will be fixed then. This figure was arrived by escalating the base tariff of Rs. 2.25 by 5% over a term of 5 years from 1996 – 2001. The price being paid for wind energy is one of the lowest in the country at Rs. 2.70 with no escalation. The PPA for all the sub-bundles has been signed at this rate with no escalation. This is much lower than what some of the other States are paying for wind power. The tariff has only changed marginally over the last couple of years and third party sale is also not permitted in the state of Tamilnadu. Whereas the power purchase tariff from industrial waste/municipal waste based generation is at Rs. 3.49 in the year 2005 against wind power being paid just Rs. 2.70. Comparison of tariff rates for different states has been presented in the Annex 5.

Because of the above tariff, about 65 % of the total investment in Tamilnadu has been carried out for captive purposes. According to the data provided by two major EPC contractors in the Tamilnadu states (ENERCON India Limited & Suzlon Energy Limited) about 85% and 64% of their sales in Tamilnadu are under captive installations. (Source: Directory of Indian Wind Power – 2005, Section 5.13 & 5.14)

Project proponents since do not have major captive electricity requirement within Tamilnadu, selected to go for grid sale. For grid sale option, project proponent could have gone to other States where tariff is higher that Tamilnadu such as Maharashtra, Rajasthan, Karnataka, Andhra Pradesh etc. However, for urge of sustainable development of Tamilnadu State from where proponent belongs, they decided to set the project activity in Tamilnadu.

Evacuation of Power:

The problem of power evacuation in Tamilnadu is prevalent. Grid availability is hugely affected due to evacuation troubles. In some cases, wind turbines are even asked to back down during months conducive for generation. The reason given for such orders is due to peak performance by thermal stations leading to high frequency in grid which doesn't allow export from WTGs. The sites of Tirunelveli and Coimbatore are most affected. During last week of May'2006, the wind turbine operators were told to shut down the turbines for a period of nine to twenty hours a day. It shall be noted that season starting from May till September is most conducive for wind power generation. The supporting evidence can be seen from recent news articles.
(Refer: http://www.thehindubusinessline.com/2006/05/31/stories/2006053103621900.htm. Also Annex 6).

Evacuation is also affected by lack of infrastructure. According to a recent news paper article (http://www.thehindubusinessline.com/2006/04/19/stories/2006041903440900.htm) the situation is still grim, some districts reported decline of about 11% in power generation, mainly attributed to poor infrastructure of feeder/transmission networks. In effect, the capacity utilization factor of wind farms is further reduced.

Third Party Sale:

TNERC has also not allowed the investors to sell the generated electricity to other HT customers, which is permitted in many states like Maharashtra, Rajasthan & Madhya Pradesh so that in case if the return on investment is not found viable enough, the investor may switch over to third party sale of electricity.

As discussed in above sections the project activity faces many barriers to its implementation and hence is not a business as usual scenario. However CDM benefits would enable the project proponent, to overcome these barriers.

B.6 Emission reductions:

B.6.1 Explanation of methodological choices:

Baseline Estimation:

Baseline methodology for project category *I.D* has been detailed in paragraphs 7-11 of the approved small scale methodology *AMS I.D.* (Version 12, date: EB 33) Paragraph 9 of the approved methodology applies to this project activity, which states that:

For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use Simple OM and the Average OM calculations must be considered.

OR

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

Baseline emission reductions have been estimated using combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

Central Authority of India (CEA), Ministry of Power, Government of India now provides the database for the grid emission factor of various regional grids in India. The estimation of the Grid Emission Factors by CEA is based on the approved methodology ACM0002, Version 06 (Refer pg. no. 17, 19 of CO_2 Baseline Database Version 2, dated- June 2007).

As per ACM0002 Grid emission coefficient is calculated as Combined Margin (CM) which is the combination of Operation Margin (OM) and Build Margin (BM) factors according to the following three steps:

Step 1: Calculation of OM ($EF_{OM,y}$)

For calculation of operating margin four options are available:

(a) Simple operating margin;
(b) Simple adjusted operating margin;
(c) Dispatch data analysis operating margin;
(d) Average operating margin

CO_2 Baseline Database Version 2, Date-June 2007, published by Central Electricity Authority (hereafter CEA Database) has been referred for the values of OM. According to methodology ACM0002, dispatch data analysis should be the first choice but for projects in India dispatch data analysis cannot be used because of unavailability of data as per CEA Database (Ref Page no. 5- footnote). Hence, Simple OM has been used. Also the low-cost/must run resources constitute less than 50% (only 26.96 % for SR -Average of five years, as shown in table below) of the total grid generation of Southern Grid in average of the five most recent years.

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

	2001-02	**2002-03**	**2003-04**	**2004-05**	**2005-06**
North	25.7%	26.1%	28.1%	26.8%	28.1%
East	13.4%	7.5%	10.3%	10.5%	7.2%
South	25.5%	18.3%	16.2%	21.6%	27.0%
West	8.5%	8.2%	9.1%	8.8%	12.0%
North-East	41.7%	45.8%	41.9%	55.5%	52.7%
India	**18.9%**	**16.3%**	**17.1%**	**18.0%**	**20.1%**
Average of five years for SR					**21.72 %**

Table reference- CEA Baseline Database, Version 2

Calculation of operating margin emission factor for the region based on simple OM

OM values have been taken from CEA Database as discussed above. Latest version i.e. Version 6 of the approved methodology ACM0002 has been used in the CEA Baseline Database for the calculation of operating margin. Calculation of OM has been done as per the equation (2) detailed in page no. 6 Step 1(a) of the methodology ACM 0002.

Operating Margin emission factor (Southern Region) in tCO_2/GWh	
Year	**Simple OM (SR)**
2003-2004	1000
2004-2005	1000
2005-2006	1010
Average of 3 years	1003

Table reference- CEA Baseline Database, Version 2

Note: As per the methodology (ACM0002) the calculation of OM has been done *ex ante* based on the most recent 3 years for which data is available at the time of PDD submission.

Step 2: Calculation of build margin factor ($EF_{BM, y}$) for the region (ex ante):

BM values have been taken from CEA Database. Latest version i.e. Version 6 of the approved methodology ACM0002 has been used in the CEA Database for the calculation of Build margin. Calculation of BM has been done as per the equation (9) detailed in page no. 9 Step 2 of the methodology ACM 0002.

Calculation of BM has been done *ex ante* in the database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. (Refer para 2 page no. 5 -'Build Margin' of CEA Database).

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						34,340
East						17,567
South						28,158
West						35,425
North-East						1,793
India						117,283

Build Margin emission factor (Southern Region) in tCO_2/GWh	
Year	**BM (SR)**
2005-2006	710

Table reference- CEA Baseline Database, Version 2

Note: Details of power plants considered for BM calculation has been given in Annex- 3
Step 3: Grid emission coefficient ($EF_{grid,y}$)

The Grid emission coefficient is calculated as the weighted average of the operating margin emission factor ($EF_{OM,\ simple,\ y}$) and the build margin emission factor ($EF_{BM,\ y}$), where the weights W_{OM} and W_{BM} for wind projects, by default, are $W_{OM} = 0.75$ & $W_{BM} = 0.25$). (As per ACM0002)

Southern Region:

$$\begin{aligned} \mathbf{EF_{grid,y}} &= \mathbf{0.75\ EF_{OM,y} + 0.25\ EF_{BM,y}} \\ &= 0.75 * 1003 + 0.25 * 710 \\ &= 752.25 + 177.5 \\ &= 929.75\ tCO_2/GWh \end{aligned}$$

Further multiplication of electricity generated in kWh with grid emission coefficient will give the estimated value of baseline emission as given below.

Baseline emissions ($BE_{electricity,\ y}$) = Grid Emission Coefficient x Power generated
(tCO_2) (tCO_2/GWh) (GWh)

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

(Copy this table for each data and parameter)

Data / Parameter:	Operating margin emission factor
Data unit:	tCO_2/ GWh
Description:	CO_2 operating margin emission factor for the Southern Region Grid 2004-2005
Source of data used:	CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 2, Date: June, 2007) http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	1003 tons of CO_2 / GWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Central Electricity Authority of India prepares the data.
Any comment:	This database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the Central Electricity Authority and hence considered authentic. As the calculation of baseline emission has been done *ex ante* its value will remain fixed for the entire crediting period.

Data / Parameter:	Build margin emission factor
Data unit:	tCO_2/ GWh
Description:	CO_2 build margin emission factor for the Southern Region Grid 2004-2005
Source of data used:	CO_2 Baseline Database for the Indian Power Sector, User Guide (Version 2, Date: June, 2007)

	http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm
Value applied:	710 tons of CO_2 / GWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Central Electricity Authority of India prepares the data.
Any comment:	This database is an official publication of Government of India for the purpose of CDM baselines. It is based on most recent data available to the Central Electricity Authority and hence considered authentic. As the calculation of baseline emission has been done *ex ante* its value will remain fixed for the entire crediting period

Data / Parameter:	$\mathbf{EF_{grid,y}}$
Data unit:	tCO_2/MWh
Description:	$\mathbf{EF_{grid,y}}$ is the Grid Emission Coefficient calculated in a transparent and conservative manner as Combined Margin (CM) which is the combination of Operation Margin (OM) and Build Margin (BM) (OM & BM have been calculated ex-ante)
Source of data used:	Calculated as under $\mathbf{EF_{grid,y} = 0.75\ EF_{OM,y} + 0.25\ EF_{BM,y}}$ $= 0.75 * 1003 + 0.25 * 710$ $= 752.25 + 177.5$ $= 929.75\ tCO_2/GWh$ Values of OM and BM were taken from CO_2 Baseline Database for the Indian Power Sector, User Guide, Version 2. CEA
Value applied:	0.92975 tCO_2/MWh or 929.75 tCO_2/GWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	The $\mathbf{EF_{grid,y}}$ calculation is based on the guidelines in ACM0002 (Version 06)
Any comment:	The values are for the year 2005-06

B.6.3 Ex-ante calculation of emission reductions:

Emission Reduction Calculation:

- **Baseline emissions are given as:**

$$\mathbf{BE_{electricity,\,y} = EG_y * EF_{grid,\,y}}$$

Where,

EGy = Net quantity of electricity supplied to the manufacturing facility by the project during the year y in MWh, and
$EF_{grid, y}$ = CO_2 baseline emission factor for the electricity displaced due to the project activity during the year y (tCO_2/MWh).

- **CO_2 baseline emission factor ($EF_{grid, y}$)[7]:**

$EF_{grid, y}$= 929.75 tCO_2/GWh (Refer section B.6.1)

- **Net quality of electricity supplied by the project (EG_y):**

Bundle I	**:**	**Ramraj Handlooms**

Site	=	Azhagiapandipuram Village
Installed capacity of turbine	=	0.75 MW
Total no. of turbines	=	01
PLF	=	27.46 %
(PLF as per TNERC amendment to tariff order 15.5.2006)		
Net electricity generation	=	1.80 Gwh / yr.

Bundle II	**:**	**Ramraj Handlooms**

Site	=	Uthupalayam village
Installed capacity of turbine	=	0.75 MW
Total no. of turbines	=	01
PLF	=	25.90 %
(PLF as per TNERC amendment to tariff order 15.5.2006)		
Net electricity generation	=	1.70 Gwh/yr

Note: Sub bundle I& II has not completed its one year of operation hence the generation has been accounted as per PLF given by TNERC tariff order)

Bundle III	**:**	**Ramraj Handlooms**

Site	=	Kurungulam village
Installed capacity of turbine	=	0.85 MW
Total no. of turbines	=	01
PLF	=	21.48 %
Net electricity generated	=	1.6 GWh (As per previous year generation)

Bundle IV	**:**	**N. Sumati**

Site	=	Sellakarachal village

[7] Please refer CO_2 Baseline Database for the Indian Power Sector, User Guide (Draft, Version 2, Date: June, 2007) http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm

Installed capacity of turbine	=	0.25 MW
Total no. of machines	=	01
PLF	=	19.63 %
Net electricity generation	=	0.43 GWh/yr (As per previous year generation)

Bundle IV	**:**	**Thiru. K. R. Nagarajan**

Site	=	Sellakaerachal village
Installed capacity of turbines	=	0.25 MW
Total no. of turbines	=	01
PLF	=	18.54 %
Net Electricity Generated	=	0.406 GWh (As per previous year generation)

Total installed capacity = 2.85 MW
Total power generation by all the turbines = 5.936 GWh/yr

✓ **Total baseline emission reductions in tCO_2 =**

Baseline emissions ($BE_{electricity,y}$) = CO_2 baseline emission factor x Power generated
(tCO_2) (tCO_2/GWh) (GWh)

So,

$BE_{electricity,y}$ = 5.936 * 929.75 = 5518.996 tCO_2/yr

Where, $EF_{grid,y}$ = 929.75 tCO_2/GWh

- **Emission Reduction:**

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

$ER_y = BE_y - PE_y$

Where:

ER_y = the emission reductions of the project activity during the year y in tons of CO_2.
BE_y = the baseline emissions due to the displacement of electricity during the year y in tons of CO_2
PE_y = the project emissions during the year y in tons of CO_2

Since, the project emissions for this project (**PE_y**) is zero,

$ER_y = BE_y$ = 5518.996 tons of CO_2/year

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

Year	Estimation of Project Activity	Total Baseline Emissions	Estimation of Leakage	Estimation of Emission Reduction

	Emission Reduction (tonnes CO_2e /yr.)	**(tonnes CO_2e /yr.)**	**(tonnes CO_2e / yr.)**	**(tonnes CO_2e /yr.)**
2008-09	0	5518.996	0	5518.996
2009-10	0	5518.996	0	5518.996
2010-11	0	5518.996	0	5518.996
2011-12	0	5518.996	0	5518.996
2012-13	0	5518.996	0	5518.996
2013-14	0	5518.996	0	5518.996
2014-15	0	5518.996	0	5518.996
2015-16	0	5518.996	0	5518.996
2016-17	0	5518.996	0	5518.996
2017-18	0	5518.996	0	5518.996
Total	**0**	55189.96	**0**	55189.96

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	Energy
Data unit:	KWh
Description:	Net electricity supplied to the Southern region electricity grid.
Source of data to be used:	Invoice- electricity sell to regional electricity board
Value of data	--
Description of measurement methods and procedures to be applied:	The data can be very accurately measured. The meters (tri vector meter) installed measure mentioned variable on a continuous basis. Every month these meter readings will be recorded by plant personnel, these records will be archived for crosschecking yearly figures.
QA/QC procedures to be applied:	The data can be very accurately measured. The meters installed on sub stations (grid interconnection point) will be used to measure mentioned variables on a continuous basis. Every month these meter readings will be recorded by plant personnel, these records will be archived for crosschecking yearly figures. The meters at the sub station will be two-way meters and will be in custody of State Electricity Utility. SEB officials will take the readings (joint meter reading) in these meters and the same reading may be used to determine the net power wheeled to the user and determine the extent of mitigation of GHG over a period of time
Any comment:	

B.7.2 Description of the monitoring plan:

The project activity essentially involves generation of electricity from wind, the employed WTG can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. Thus no special ways and means are required to monitor leakage from the project activity.

- The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility.

- The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue.
- The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.
- The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state power utility. Machines for sale to utility will be connected to the feeder.
- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.
- The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WTGs. Each WTG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (SCADA). The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

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

Routine Maintenance Services:

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

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

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

Management Services:

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

Technical Services:

a) Visual inspection of the WTGs and all parts thereof.
b) Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

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

Completion Date: 04 October 2007.

Name of person/entity determining the baseline: M/s Ramraj Group of Companies and their consultant.

Organization:	M/s Ramraj Handlooms
Street/P. O. Box:	Senguptapuram 1st street, Mangalam Road
Building:	Ramraj-V-Tower
City:	Tirupur (District -Coimbatore)
State/Region:	Tamilnadu
Postfix/ZIP:	641 604
Country:	India
Telephone:	0421-2248147, 2248148, 2248149
Fax:	0421-2205148
E-Mail:	ramrajcotton@eth.net
URL:	www.ramrajcotton.com
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Nagrajan
Middle Name:	R.
First Name:	K.
Department:	Management
Mobile:	Not Available
Direct Fax:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	Not Available

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:

26-02-05 (Based on TNEB Approval letter for 2 x 0.25 MW machines)

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

20 years.

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

C.2.1. Renewable crediting period

Not opted.

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

Not applicable.

C.2.1.2. Length of the first crediting period:

Not applicable.

C.2.2. Fixed crediting period:

Opted for.

C.2.2.1. Starting date:

The starting date of the crediting period shall be 01/02/2008 or a date not earlier than the date of registration.

C.2.2.2. Length:

10 years, 0 months.

SECTION D. Environmental impacts

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

Wind energy projects are considered environmentally safe and as per Host party- India no EIA is required.

There are no negative environmental effects envisaged for the project. These wind turbines are situated on a hillock and during construction no trees were uprooted; also there are no effects on any endangered species in the region. Wind turbines are considered as zero GHG emitting projects, so there will be no pollution caused by this project. However during construction phase some pollution may have been caused by vehicle coming to plant location. But as the project is operational now there are no major effects on the environment post start-up.

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:

There are no negative environmental effects envisaged for the project.

SECTION E. Stakeholders' comments

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

The project promoter identified local communities, farmers, and villagers, as the stakeholders with an interest in the CDM activities. The meeting was conducted separately for all the four sites. Accordingly, issued letters to all the respective stakeholders requesting to attend meeting or depute representatives at respective venues:

The agenda of the meeting was fixed as follows:

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

The stakeholder's view is Ramraj Group in its own small way is contributing positively to local economy & development.

E.2 Summary of the comments received:

Stakeholders had no objections from installations of WTGs instead they have openly said that wind power projects helped to them by…

- Additional revenue generated thro' land / lease to outsiders like contractors & their employees.
- Job opportunities for day -to - day maintenance and security of WTGs
- Development of roads.
- No any adverse impact on rains, agriculture.

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

The stakeholders have given positive feedback and thus no measures were required to be taken.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	M/s Ramraj Handlooms
Street/P.O.Box:	Senguptapuram 1ST street, Mangalam Road
Building:	Ramraj-V-Tower
City:	Tirupur (District -Coimbatore)
State/Region:	Tamilnadu
Postfix/ZIP:	641 604
Country:	India
Telephone:	0421-2248147, 2248148, 2248149
FAX:	0421-2205148
E-Mail:	ramrajcotton@eth.net
URL:	www.ramrajcotton.com
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Nagrajan
Middle Name:	R.
First Name:	K.
Department:	Management
Mobile:	Not Available
Direct Fax:	Not Available
Direct Tel:	Not Available
Personal E-Mail:	Not Available

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

- The project has not received any public funding and Official Development Assistance (ODA).
- This is a unilateral project.

Annex 3

BASELINE INFORMATION

Baseline Estimation:

Baseline methodology for project category *I.D* has been detailed in paragraphs 7-11 of the approved small scale methodology *AMS I.D*. (Version 12, date: EB 33) Paragraph 9 of the approved methodology applies to this project activity, which states that:

For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use Simple OM and the Average OM calculations must be considered.

OR

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

Baseline emission reductions have been estimated using combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

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As per ACM0002 Grid emission coefficient **($EF_{grid,y}$)** is calculated as Combined Margin (CM) which is the combination of Operation Margin (OM) and Build Margin (BM) factors according to the following three steps:

Step 1: Calculation of OM ($EF_{OM,y}$)

For calculation of operating margin four options are available:

(a) Simple operating margin;
(b) Simple adjusted operating margin;
(c) Dispatch data analysis operating margin;
(d) Average operating margin

CO_2 Baseline Database Version 2, Date-June 2007, published by Central Electricity Authority (hereafter CEA Database) has been referred for the values of OM. According to methodology ACM0002, dispatch data analysis should be the first choice but for projects in India dispatch data analysis cannot be used because of unavailability of data as per CEA Database (Ref Page no. 5- footnote). Hence, Simple OM has been used. Also the low-cost/must run resources constitute less than 50% (only 26.96 % for SR -Average of five years, as shown in table below) of the total grid generation of Southern Grid in average of the five most recent years.

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

	2001-02	2002-03	2003-04	2004-05	2005-06
North	25.7%	26.1%	28.1%	26.8%	28.1%
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South	25.5%	18.3%	16.2%	21.6%	27.0%
West	8.5%	8.2%	9.1%	8.8%	12.0%
North-East	41.7%	45.8%	41.9%	55.5%	52.7%
India	**18.9%**	**16.3%**	**17.1%**	**18.0%**	**20.1%**
Average of five years for SR					**21.72 %**

Table reference- CEA Baseline Database, Version 2

Calculation of operating margin emission factor for the region based on simple OM

OM values have been taken from CEA Database as discussed above. Latest version i.e. Version 6 of the approved methodology ACM0002 has been used in the CEA Baseline Database for the calculation of operating margin. Calculation of OM has been done as per the equation (2) detailed in page no. 6 Step 1(a) of the methodology ACM 0002.

Operating Margin emission factor (Southern Region) in tCO_2/GWh

Year	**Simple OM (SR)**
2003-2004	1000
2004-2005	1000
2005-2006	1010
Average of 3 years	1003

Table reference- CEA Baseline Database, Version 2

Note: As per the methodology (ACM0002) the calculation of OM has been done *ex ante* based on the most recent 3 years for which data is available at the time of PDD submission.

Step 2: Calculation of build margin factor ($EF_{BM,y}$) for the region (ex ante):

BM values have been taken from CEA Database. Latest version i.e. Version 6 of the approved methodology ACM0002 has been used in the CEA Database for the calculation of Build margin. Calculation of BM has been done as per the equation (9) detailed in page no. 9 Step 2 of the methodology ACM 0002.

Calculation of BM has been done *ex ante* in the database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. (Refer para 2 page no. 5 -'Build Margin' of CEA Database).

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						34,340
East						17,567
South						28,158
West						35,425
North-East						1,793
India						117,283

Build Margin emission factor (Southern Region) in tCO_2/GWh	
Year	**BM (SR)**
2005-2006	710

Table reference- CEA Baseline Database, Version 2

Step 3: Baseline emission factor ($EF_{grid,y}$)

The Grid emission coefficient is calculated as the weighted average of the operating margin emission factor ($EF_{OM,\ simple,\ y}$) and the build margin emission factor ($EF_{BM,\ y}$), where the weights W_{OM} and W_{BM} for wind projects, by default, are $W_{OM} = 0.75$ & $W_{BM} = 0.25$). (As per ACM0002)

<u>Southern Region</u>:

$$
\begin{aligned}
\mathbf{EF_{grid,y}} &= \mathbf{0.75\ EF_{OM,y} + 0.25\ EF_{BM,y}} \\
&= 0.75*1003 + 0.25*710 \\
&= 752.25 + 177.5 \\
&= 929.75\ tCO_2/GWh
\end{aligned}
$$

Further multiplication of electricity generated in kWh with grid emission coefficient will give the estimated value of baseline emission as given below.

➢ **Net quality of electricity supplied by the project (EGy):**

Bundle I	:	**Ramraj Handlooms**

Site = Azhagiapandipuram Village
Installed capacity of turbine = 0.75 MW
Total no. of turbines = 01
PLF = 27.46 %
(PLF as per TNERC amendment to tariff order 15.5.2006)
Net electricity generation = 1.80 Gwh / yr.

Bundle II	:	**Ramraj Handlooms**

Site = Uthupalayam village
Installed capacity of turbine = 0.75 MW
Total no. of turbines = 01

PLF = 25.90 %
(PLF as per TNERC amendment to tariff order 15.5.2006)
Net electricity generation = 1.70 Gwh/yr

Note: Sub bundle I& II has not completed its one year of operation hence the generation has been accounted as per PLF given by TNERC tariff order)

Bundle III	**:**	**Ramraj Handlooms**

Site = Kurungulam village
Installed capacity of turbine = 0.85 MW
Total no. of turbines = 01
PLF = 21.48 %
Net electricity generated = 1.6 GWh
As per previous year generation

Bundle IV	**:**	**N. Sumati**

Site = Sellakarachal village
Installed capacity of turbine = 0.25 MW
Total no. of machines = 01
PLF = 19.63 %
Net electricity generation = 0.43 GWh/yr
As per previous year generation

Bundle IV	**:**	**Thiru. K. R. Nagarajan**

Site = Sellakaerachal village
Installed capacity of turbines = 0.25 MW
Total no. of turbines = 01
PLF = 18.54 %
Net Electricity Generated = 0.406 GWh (As per previous year generation)
As per previous year generation

Total installed capacity = 2.85 MW
Total power generation by all the turbines = 5.936 GWh/yr

Total baseline emission reductions in tCO_2 =

Baseline emissions ($BE_{electricity, y}$) = CO_2 baseline emission factor x Power generated
(tCO_2) (tCO_2/GWh) (GWh)

So,

$BE_{electricity, y}$ = 5.936 * 929.75 = 5518.996 tCO_2/yr

Where, $EF_{grid, y}$ = 929.75 tCO_2/GWh

- **Emission Reduction:**

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

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

Where:

ER_y = the emission reductions of the project activity during the year y in tons of CO_2.
BE_y = the baseline emissions due to the displacement of electricity during the year y in tons of CO_2
PE_y = the project emissions during the year y in tons of CO_2

Since, the project emissions for this project (**PEy**) is zero,

$$\mathbf{ER_y = BE_y = 5518.996 \text{ tons of } CO_2/\text{year}}$$

Power Plants included in BM Calculation:

NAME	UNIT_ NO	DT_ COMM	CAPACITY MW AS ON 31/03/2006	REGION	STATE	SECTOR	SYSTEM	TYPE	FUEL 1	FUEL 2	2005-06 Net Generation GWh
KONDAPALLI GT	1	22-Jun-00	112	SR	ANDHRA PRADESH	PVT	KONDAPALI	THERMAL	GAS	NAPT	676
KONDAPALLI GT	2	22-Jun-00	112	SR	ANDHRA PRADESH	PVT	KONDAPALI	THERMAL	GAS	NAPT	676
KONDAPALLI GT	3	22-Jun-00	126	SR	ANDHRA PRADESH	PVT	KONDAPALI	THERMAL	GAS	NAPT	760
BELLARY DG	1	20-Sep-00	25.2	SR	KARNATAKA	PVT	BELLARY	THERMAL	DISL	n/a	17
KAIGA	1	26-Sep-00	220	SR	KARNATAKA	CENTER	NPC	NUCLEAR	NUCLEAR		1,129
SAMALPATTI DG	1	23-Jan-01	105.7	SR	TAMIL NADU	PVT	SAMALPATI	THERMAL	DISL	n/a	333
KUTTIADI EXTN.	4	27-Jan-01	50	SR	KERALA	STATE	KSEB	HYDRO			205
KOVILKALAPPAL	1	5-Feb-01	107	SR	TAMIL NADU	STATE	TNEB	THERMAL	GAS	n/a	534
SHARAVATHY TAIL RACE	1	20-Feb-01	60	SR	KARNATAKA	STATE	KPCL	HYDRO			139
P.NALLUR CCGT	1	22-Feb-01	330.5	SR	TAMIL NADU	PVT	PPNPG	THERMAL	GAS	NAPT	424
SRISAILAM LBPH	1	30-Mar-01	150	SR	ANDHRA PRADESH	STATE	APGENCO	HYDRO			370
BELGAUM DG	1	31-Mar-01	27.1	SR	KARNATAKA	PVT	TATA PCL	THERMAL	DISL	n/a	44
BELGAUM DG	2	31-Mar-01	27.1	SR	KARNATAKA	PVT	TATA PCL	THERMAL	DISL	n/a	44
BELGAUM DG	3	31-Mar-01	27.1	SR	KARNATAKA	PVT	TATA PCL	THERMAL	DISL	n/a	44
SHARAVATHY TAIL RACE	2	15-May-01	60	SR	KARNATAKA	STATE	KPCL	HYDRO			139
JOG	1	15-May-01	13.2	SR	KARNATAKA	STATE	KEB	HYDRO			22
KUTHUNGAL	1	1-Jun-01	7	SR	KERALA	PVT	INDSIL	HYDRO			16
KUTHUNGAL	2	1-Jun-01	7	SR	KERALA	PVT	INDSIL	HYDRO			16
KUTHUNGAL	3	1-Jun-01	7	SR	KERALA	PVT	INDSIL	HYDRO			16

NAME	UNIT_NO	DT_COMM	CAPACITY MW AS ON 31/03/2006	REGION	STATE	SECTOR	SYSTEM	TYPE	FUEL 1	FUEL 2	2005-06 Net Generation GWh
TANIR BAVI	1	8-Jun-01	42.5	SR	KARNATAKA	PVT	GMR ENERG	THERMAL	GAS	NAPT	47
TANIR BAVI	2	8-Jun-01	42.5	SR	KARNATAKA	PVT	GMR ENERG	THERMAL	GAS	NAPT	47
TANIR BAVI	3	8-Jun-01	42.5	SR	KARNATAKA	PVT	GMR ENERG	THERMAL	GAS	NAPT	47
TANIR BAVI	4	8-Jun-01	42.5	SR	KARNATAKA	PVT	GMR ENERG	THERMAL	GAS	NAPT	47
TANIR BAVI	5	8-Jun-01	50	SR	KARNATAKA	PVT	GMR ENERG	THERMAL	GAS	NAPT	55
SAMAYANALLUR DG	1	22-Sep-01	106	SR	TAMIL NADU	PVT	MADURAI P	THERMAL	DISL	OIL	328
LVS POWER DG	1	18-Oct-01	18.4	SR	ANDHRA PRADESH	PVT	LVS POWER	THERMAL	DISL	n/a	0
LVS POWER DG	2	18-Oct-01	18.4	SR	ANDHRA PRADESH	PVT	LVS POWER	THERMAL	DISL	n/a	0
SHARAVATHY TAIL RACE	3	1-Nov-01	60	SR	KARNATAKA	STATE	KPCL	HYDRO			139
SRISAILAM LBPH	2	12-Nov-01	150	SR	ANDHRA PRADESH	STATE	APGENCO	HYDRO			370
PALLIVASAL	2	16-Nov-01	5	SR	KERALA	STATE	KSEB	HYDRO			32
PALLIVASAL	1	19-Nov-01	5	SR	KERALA	STATE	KSEB	HYDRO			32
PALLIVASAL	3	20-Nov-01	5	SR	KERALA	STATE	KSEB	HYDRO			32
PANNIAR	2	20-Nov-01	15	SR	KERALA	STATE	KSEB	HYDRO			80
SENGULAM	4	30-Nov-01	12	SR	KERALA	STATE	KSEB	HYDRO			47
SENGULAM	3	5-Dec-01	12	SR	KERALA	STATE	KSEB	HYDRO			47
PEDDAPURAM CCGT	1	26-Jan-02	220	SR	ANDHRA PRADESH	PVT	REL	THERMAL	GAS	n/a	842
SIMHADRI	1	22-Feb-02	500	SR	ANDHRA PRADESH	CENTER	NTPC	THERMAL	COAL	OIL	3,588
SRISAILAM LBPH	5	28-Mar-02	150	SR	ANDHRA PRADESH	STATE	APGENCO	HYDRO			370

NAME	UNIT_ NO	DT_ COMM	CAPACITY MW AS ON 31/03/2006	REGION	STATE	SECTOR	SYSTEM	TYPE	FUEL 1	FUEL 2	2005-06 Net Generation GWh
SRISAILAM LBPH	3	29-Mar-02	150	SR	ANDHRA PRADESH	STATE	APGENCO	HYDRO			370
SHARAVATHY TAIL RACE	4	30-Mar-02	60	SR	KARNATAKA	STATE	KPCL	HYDRO			139
SIMHADRI	2	24-Aug-02	500	SR	ANDHRA PRADESH	CENTER	NTPC	THERMAL	COAL	OIL	3,716
NEYVELI TPS(Z)	1	11-Oct-02	250	SR	TAMIL NADU	PVT	TNEB	THERMAL	LIGN	OIL	1,347
NEYVELI FST EXT	1	21-Oct-02	210	SR	TAMIL NADU	CENTER	NLC	THERMAL	LIGN	OIL	1,398
JOG	8	30-Oct-02	21.6	SR	KARNATAKA	STATE	KEB	HYDRO			37
SRISAILAM LBPH	4	29-Nov-02	150	SR	ANDHRA PRADESH	STATE	APGENCO	HYDRO			370
RAICHUR	7	11-Dec-02	210	SR	KARNATAKA	STATE	KPCL	THERMAL	COAL	OIL	944
VALUTHUR GT	1	24-Dec-02	95	SR	TAMIL NADU	STATE	TNEB	THERMAL	GAS	n/a	658
MADHAVAMANTRI	1	31-Mar-03	1.5	SR	KARNATAKA	PVT	BHORUKA	HYDRO			8
MADHAVAMANTRI	2	31-Mar-03	1.5	SR	KARNATAKA	PVT	BHORUKA	HYDRO			8
MADHAVAMANTRI	3	31-Mar-03	1.5	SR	KARNATAKA	PVT	BHORUKA	HYDRO			8
NEYVELI FST EXT	2	22-Jul-03	210	SR	TAMIL NADU	CENTER	NLC	THERMAL	LIGN	OIL	1,405
SRISAILAM LBPH	6	4-Sep-03	150	SR	ANDHRA PRADESH	STATE	APGENCO	HYDRO			370
KUTTALAM GT	1	27-Nov-03	64	SR	TAMIL NADU	STATE	TNEB	THERMAL	GAS	n/a	393
CHEMBUKADAVU-II	1	25-Jan-04	1.25	SR	KERALA	STATE	KSEB	HYDRO			4
CHEMBUKADAVU-II	2	25-Jan-04	1.25	SR	KERALA	STATE	KSEB	HYDRO			4
CHEMBUKADAVU-II	3	25-Jan-04	1.25	SR	KERALA	STATE	KSEB	HYDRO			4
URUMI	1	25-Jan-04	1.25	SR	KERALA	STATE	KSEB	HYDRO			4
URUMI	2	25-Jan-04	1.25	SR	KERALA	STATE	KSEB	HYDRO			4
URUMI	3	25-Jan-04	1.25	SR	KERALA	STATE	KSEB	HYDRO			4

NAME	UNIT_ NO	DT_ COMM	CAPACITY MW AS ON 31/03/2006	REGION	STATE	SECTOR	SYSTEM	TYPE	FUEL 1	FUEL 2	2005-06 Net Generation GWh
KUTTALAM GT	2	24-Mar-04	36	SR	TAMIL NADU	STATE	TNEB	THERMAL	GAS	n/a	221
ALMATTI DAM	1	26-Mar-04	15	SR	KARNATAKA	STATE	KPCL	HYDRO			35
R_GUNDEM STPS	7	26-Sep-04	500	SR	ANDHRA PRADESH	CENTER	NTPC	THERMAL	COAL	OIL	3,518
ALMATTI DAM	2	4-Nov-04	55	SR	KARNATAKA	STATE	KPCL	HYDRO			128
ALMATTI DAM	3	13-Jan-05	55	SR	KARNATAKA	STATE	KPCL	HYDRO			128
KARUPPUR GT	1	19-Feb-05	70	SR	TAMIL NADU	PVT	ABAN	THERMAL	GAS	n/a	391
ALMATTI DAM	4	26-Mar-05	55	SR	KARNATAKA	STATE	KPCL	HYDRO			128
ALMATTI DAM	5	6-Jul-05	55	SR	KARNATAKA	STATE	KPCL	HYDRO			94
KARUPPUR GT	2	15-Jul-05	49.8	SR	TAMIL NADU	PVT	ABAN	THERMAL	GAS	n/a	197
ALMATTI DAM	6	10-Aug-05	55	SR	KARNATAKA	STATE	KPCL	HYDRO			82
PYKARA ALIMATE	1	11-Aug-05	50	SR	TAMIL NADU	STATE	TNEB	HYDRO			65
PYKARA ALIMATE	2	11-Aug-05	50	SR	TAMIL NADU	STATE	TNEB	HYDRO			65
PYKARA ALIMATE	3	5-Sep-05	50	SR	TAMIL NADU	STATE	TNEB	HYDRO			58
JEGURUPADU GT	5	9-Oct-05	140	SR	ANDHRA PRADESH	PVT	GVK IND	THERMAL	GAS	n/a	0
VALANTHARVI GT	1	29-Oct-05	38	SR	TAMIL NADU	STATE	ARKAY ENERGY	THERMAL	GAS	n/a	95
JEGURUPADU GT	6	11-Nov-05	80	SR	ANDHRA PRADESH	PVT	GVK IND	THERMAL	GAS	n/a	0
VEMAGIRI CCCP	1	13-Jan-06	233	SR	ANDHRA PRADESH	PVT	VEMAGIRI	THERMAL	GAS	n/a	5
Total											**28,158**

Annex 4

MONITORING INFORMATION

The project activity essentially involves generation of electricity from wind. The employed WTG can only convert wind energy into electrical energy and cannot use any other input fuel for electricity generation. Thus no special ways and means are required to monitor leakage from the project activity.

- The proposed project activity requires evacuation facilities for sale to grid and the evacuation facility is essentially maintained by the state power utility.
- The electricity generation measurements are required by the utility and the investors to assess electricity sales revenue.
- The project activity has therefore envisaged two independent measurements of generated electricity from the wind turbines.
- The primary recording of the electricity fed to the state utility grid will be carried out jointly at the incoming feeder of the state power utility. Machines for sale to utility will be connected to the feeder.
- The joint measurement will be carried out once in a month in presence of both parties (the developer's representative and officials of the state power utility). Both parties will sign the recorded reading.
- The secondary monitoring, which will provide a backup (fail-safe measure) in case the primary monitoring is not carried out, would be done at the individual WTGs. Each WTG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through a wireless Radio Frequency (RF) network (SCADA). The generation data of individual machine can be monitored as a real-time entity at CMS. The snapshot of generation on the last day of every calendar month will be kept as a record both in electronic as well as printed (paper) form.

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

Routine Maintenance Services:

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

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

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

Management Services:

d) Data logging in for power generation, grid availability, machine availability.
e) Preparation and submission of monthly performance report in agreed format.
f) Taking monthly meter reading jointly with utility of power generated at promoter's wind turbines and supplied to grid from the meter/s maintained by utility for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

Technical Services:

a) Visual inspection of the WTGs and all parts thereof.
b) Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

Annex 5

STATEWISE COMPARISION OF WIND POWER TARIFFS

Table : A comparison account of tariff among states is given below

Parameters (Date-Policy)	Maharashtra # (24.11.2003)	Rajasthan (25.10.2004)	TN (1.3.2002)	Karnataka@ (18.1.2005)	AP (20.3.2004)	MP (11.6.2004)	Kerala& (3.4.2002)
Sale of Power to SEB (Rs/u)	**Group III** Rs 3.50/u for the first year from DOC of project	Rs 2.91/u (Base year is FY 2004-05, Tariff is based on FY of COD)	Rs 2.70/u	Rs 3.40/u	Rs 3.37/u for FY 2004-05 w.e.f. 1.4.2004	*For Projects-DOC before 11/6/04:* **RS 2.87/U** *For Projects - DOC & purchase after 11/6/04:* **Year wise rates starting from 1st to 20th year** (mentioned below)	Rs 2.80/u (Base year as 2000-01)
Escalation for Sale of Power to SEB	Rs 0.15/u per year for 13 years from DOC of the project	Rs 0.05/u per year for first 10 years (i.e. FY of COD) and then thereafter no escalation.	No escalation/ year	No escalation/ year	Tariff (Rs 3.37/u) frozen for 5 years.	1st- 3.97 2nd - 3.80 3rd - 3.63 4th- 3.46 5th- 3.30 6th- 3.14 7th- 2.98 8th- 2.83 9th- 2.67 10th- 2.52 11th- 2.43 12th- 2.44 13th- 2.46 14th- 2.48 15th - 2.50 16th- 2.51 17th- 2.53 18th- 2.55 19th- 2.58 20th-2.60	5% escalation for every year upto 5 years of operation. Thereafter the rate will be mutually settled between KSEB and the Developer
Third Party Sale	Allowed	Allowed	Not Allowed	Allowed	Not Allowed	Guided by Open Access Regulations under Electricity Act 2003.	Not Allowed

Table : A comparison account of tariff among states is given below

Parameters (Date-Policy)	Maharashtra# (24.11.2003)	Rajasthan (25.10.2004)	TN (1.3.2002)	Karnataka@ (18.1.2005)	AP (20.3.2004)	MP (11.6.2004)	Kerala& (3.4.2002)
Sale of Power to SEB (Rs/u)	**Group III** Rs 3.50/u for the first year from DOC of project	Rs 2.91/u (Base year is FY 2004-05, Tariff is based on FY of COD)	Rs 2.70/u	Rs 3.40/u	Rs 3.37/u for FY 2004-05 w.e.f. 1.4.2004	*For Projects- DOC before 11/6/04:* **RS 2.87/U** *For Projects - DOC & purchase after 11/6/04:* **Year wise rates starting from 1st to 20th year** (mentioned below)	Rs 2.80/u (Base year as 2000-01)
Escalation for Sale of Power to SEB	Rs 0.15/u per year for 13 years from DOC of the project	Rs 0.05/u per year for first 10 years (i.e. FY of COD) and then thereafter no escalation.	No escalation/ year	No escalation/ year	Tariff (Rs 3.37/u) frozen for 5 years.	1st- 3.97 2nd - 3.80 3rd - 3.63 4th- 3.46 5th- 3.30 6th- 3.14 7th- 2.98 8th- 2.83 9th- 2.67 10th- 2.52 11th- 2.43 12th- 2.44 13th- 2.46 14th- 2.48 15th - 2.50 16th- 2.51 17th- 2.53 18th- 2.55 19th- 2.58 20th-2.60	5% escalation for every year upto 5 years of operation. Thereafter the rate will be mutually settled between KSEB and the Developer
Third Party Sale	Allowed	Allowed	Not Allowed	Allowed	Not Allowed	Guided by Open Access Regulations under Electricity Act 2003.	Not Allowed

Annex 6

PRESS RELEASES

THE HINDU Business Line
Financial Daily from THE HINDU group of publications
Wednesday, May 31, 2006

Industry & Economy - Non-conventional Energy
States - Tamil Nadu

TN windmills asked to back down turbines

Our Bureau

Peak generation from thermal stations leading to high frequency in grid

The May-September period is most conducive for generating wind power because wind speeds touch 11 to 20 m a second.

Chennai , May 30

Wind power generators in Tamil Nadu feeding power to the State grid are facing problems once again, with the Tamil Nadu Electricity Board asking them to back down the turbines. This move has come at a time when the wind speed is at its highest in the State, according to sources in the wind power industry.

The sources say that the electricity board has resorted to this move because of peak generation from thermal stations, resulting in high frequency in the grid. The wind power industry faced a similar problem last year too during the peak season when the Tamil Nadu Electricity Board asked them to back down their machines due to evacuation problems.

Tamil Nadu has an installed capacity of 2,930 MW of wind power, of which 65 per cent is used for captive consumption and the remaining is sold to the State grid. According to the sources, the May-September period is most conducive for generating wind power because wind speeds touch 11 to 20 m a second.

Last year, the windmill owners represented to the TNEB after the severe evacuation problem they faced. The electricity board promised to improve evacuation infrastructure and also permit new sub stations.

In the last three to four days, according to the sources, TNEB has asked wind power generators to shut down their turbines for periods ranging from nine hours to 20 hours a day. The Tirunelveli region and Coimbatore district are major wind energy producing centres in Tamil Nadu.

This move comes even as the Tamil Nadu Electricity Regulatory Commission had reiterated, in a recent order, that wind power (along with other infirm power or non-conventional energy) would come under the "must run" category and would be outside the purview of merit order despatch.

Wind energy representatives felt that the TNEB could back down its thermal stations during this period as they are assured of good quality power from the windmills in the State. The TNEB could also sell this power to power-deficit States such as Andhra Pradesh and Maharashtra.

According to sources in the know, the TNEB asked the wind power generators to shut down their turbines when the frequency exceeded 50 cycles due to an overall increase in generation.

The Indian Wind Power Association, a representative body of those who have invested in wind power and turbine manufacturers, has asked the State Government and the TNEB to ensure that the wind turbines operated at their maximum capacity now. This would not only provide green power to the State and help it conserve coal (if thermal stations are backed down), but also help those who have invested in wind power to repay their bank loans.

THE HINDU Business Line
Financial Daily from THE HINDU group of publications
Wednesday, Apr 19, 2006

Home Page - Non-conventional Energy
Industry & Economy - Infrastructure
Web Extras - Power

Wind power capacity up 45% in 2005-06

N. Ramakrishnan

Tamil Nadu contributes bulk of capacity addition

Wind power woes
Evacuation continues *to be a problem; TNEB is addressing the issue.*
Tamil Nadu *Electricity Regulatory Commission urged to permit an independent analysis of the grid requirement in the State.*
Study needed *to finalise grid requirements in areas where large wind farms (about 150-200 MW installed capacity) are coming up.*

Chennai , April 18

Installed wind power capacity grew by 45 per cent during 2005-06 over the previous year, the same level of growth that was recorded in 2004-05, show preliminary figures provided by wind turbine manufacturers.

However, turbine manufacturers hope that uniformity and consistency in policy will come about across the country so that capacity addition takes place at a faster pace.

It is estimated that the total installed wind power capacity in the country will be 5,200 MW at the end of March

2006, against 3,595 MW at the end of the previous financial year - an addition of 1,605 MW.

As in the past, Tamil Nadu has contributed to a bulk of this capacity addition accounting for nearly 870 MW during last financial year.

Growth to continue

Mr. Ramesh Kymal, Managing Director, NEG Micon (India) Pvt Ltd, a wind turbine manufacturer, and Chairman, Indian Wind Turbine Manufacturers Association, is confident that the growth in capacity addition will continue this year too and accelerate in subsequent years. This is mainly because of the better turbines that are available in the market now, which not only guarantee higher plant load factors - 35-38 per cent - but also are efficient in low and medium wind regimes.

Evacuation

Mr. Kymal and other industry sources say that evacuation still continues to be a problem, especially in Tamil Nadu. The Tamil Nadu Electricity Board is trying to address this issue, they add.

Mr. U.B. Reddy, General Manager - Business Development and Operations, Enercon India, another turbine manufacturer, says that the turbine manufacturers have requested the Tamil Nadu Electricity Regulatory Commission to permit an independent analysis of the grid requirement in the State.

The association has said that it is prepared to sponsor this study by the Bangalore-based Power Research & Development Consultants Pvt Ltd, which has developed software for grid analysis.

According to him, such a study is needed to finalise the grid requirements in areas where large wind farms (about 150-200 MW installed capacity) are coming up, over the next five years.

This will help to plan ahead of the requirement so that evacuation does not become a problem.

Industry sources point out that there were local problems in Karnataka, with villagers blocking roads and interrupting work. This seems to have been sorted out to a large extent now.

The distribution companies in Karnataka have also started signing power purchase agreements now with investors in wind power, which is a positive development, according to the sources.

Wind power policy

As far as other States were concerned, the sources said wind power policy was due for a review in Maharashtra later this year and, hence, there was a rush for installations now.

Rajasthan, which is a small market for wind power, wheeling and transmission are the problem areas. There is potential for installing wind turbines in the desert region, where there is not much demand for power.

Those investing in wind power are being asked to pay Rs 17 lakh a MW for improving the grid and also construct sub-stations and connect them to the nearest high voltage evacuation point. All this has pushed up the cost by Rs 25 lakh-30 lakh a MW, the sources said.
