CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

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Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

>>
125 MW Wind Power Project in Karnataka, India, Version 03, March 2006

A.2. Description of the project activity:

>>
MSPL Limited, a part of the Baldota Group is a proactive business entity and firmly believes that, effective and efficient generation of green power, coupled with responsible environmental considerations as a corporate, is vital to maintain a competitive edge. This has been a guiding factor towards their initiative in the conceptualization and installation of the 125.15 MW Wind Power Project (Project Activity). MSPL, with a view of being in line with the sustainable development priorities of India, is promoting this Project Activity to generate a sizable green power through tapping of wind energy in the existing barren land available in the state of Karnataka, which is deficit in energy and peaking power. To be competitive in the open market economy of India, the Baldota group is developing this project under the Clean Development Mechanism (CDM) of the United Nations Framework Convention for Climate Change, which would appropriately reduce the power generation using Coal / other fossil fuels, helping in significant reduction of GHG emissions and also responsible for sustainable economic growth and conservation of environment through use of wind as a renewable source.

The Project activity proposes to generate 125.15 MW equivalent of clean electricity with efficient utilization of the available Wind Energy through adoption of an efficient and modern technology. The project activity will displace energy (which are mostly generated in thermal power plants) and also delay any planned expansion of the grid generation capacity by its equivalent size, which contributes to sustainable development and conservation of environment through use of wind, a renewable resource. The power produced by this project activity is sold to the ESCOMS in the state. Green power of approximately 303.3 Million Units (MU) per annum would be fed to the KPTCL grid (A part of the southern regional grid)

The Project activity by MSPL Limited, RMMP Limited and PVS & Brothers is promoted by the Baldota Group. As per the agreement between MSPL Limited, RMMP Limited and PVS & Brothers, MSPL Limited would have the ownership rights for the project activity and would be the sole transaction entity with the Executive Board of the United Nations Framework Convention for Climate Change.

The 125 MW Wind Power Project comprises of 83 No.'s, 17 No.'s & 7 No.'s of Wind Energy Generators (WEG's) each of capacities 1250 KW, 950 KW & 750 KW respectively. The project activity has been planned and executed in two phases, with capacities of 27.65 MW and 97.50 MW in Phase 1 & Phase 2 respectively. The plan and WEG allocations of the two phases are described below in Tables 1 and 2.

Table 1: Phase 1

S.No	Company	No of WEG's	Capacity (KW)	Make
1	MSPL	7 x 750 KW	5250	NEG Micon
		17 x 950 KW	16150	NEG Micon
		5 x 1250 KW	6250	Suzlon
		Total	27650 KW	

Table 2: Phase 2

S.No	Company	No of WEG's	Capacity (KW)	Make
1	MSPL	41 x 1250 KW	51250	Suzlon
2	RMMPL	31 x 1250 KW	38750	Suzlon
3	PVS	06 x 1250 KW	7500	Suzlon
		Total	97500 KW	

Project's Contribution towards 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 of this magnitude, as conceptualized by this project activity demonstrates the viability of larger 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 threatens 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;

A.3. Project participants:

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Name of Party involved	Private and /or Public entity Project Participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host Country)	**MSPL Limited** **(Project Promoter)** **Private Entity**	**No**

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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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:

>> Chitradurga, Bellary and Davangere districts

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

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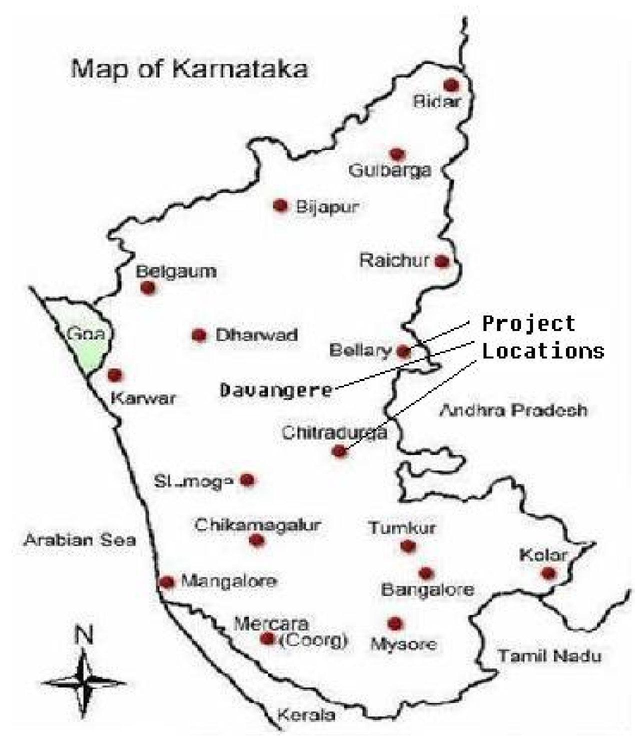
The project sites are located at Sogi, Jogimatti and Jajikalgudda respectively in the districts of Bellary, Chitradurga and Davangere in the Indian state of Karnataka. Bellary, Chitradurga and Davangere are approximately at 300, 200 and 317 kms from Bangalore, the capital city of Karnataka. The sites of Sogi, Jogimatti and Jajikalgudda are located at a latitude and longitude of around $14^0$10' N – $14^0$55' N and $75^0$59' E and $76^0$22' E respectively. They are at 850, 1120 and 750 meters respectively from the mean sea level. These sites have 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 of Tropical Meteorology and Karnataka Renewable Energy Development Limited. The feasibility of these sites for wind power production has been established by reputed consultants (Garrard Hassan, UK). The location of the project sites in the state map of Karnataka (India) is shown below:



A.4.2. Category(ies) of project activity:

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The project activity is considered under UNFCCC - CDM category "Zero emissions - grid-connected electricity generation from renewable sources" that generates electricity in excess of 15 GWh per year (limit for small scale project). As per the scope of the project activity enlisted in the 'list of sectoral scopes and related approved baseline and monitoring methodologies' (version 04), the project activity may be principally categorized in Scope Number 1, Sectoral Scope – Energy industries (renewable/non-renewable sources).

A.4.3. Technology to be employed by the project activity:

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The project activity employs state-of-art Horizontal axis wind turbines. The WEG's comprising the project activity generate clean green power which is then exported to the nearest receiving station of KPTCL (220/66/11 KV substation at Chitradurga). The plant is grid connected and houses the metering, switch gear and other protection equipment. Power Purchase Agreements have been signed with KPTCL for a term of 20 years, extendable by another term of 10 years.

The technology providers would provide all necessary operational training for the plant personnel and maintenance service during the operation of the project activity. Wind Turbine Generators are manufactured as per stringent European quality standards in accordance with Indian climatic conditions. All the WEG's are three bladed stall regulated Wind Turbine Generators.

Phase – 1 – Salient features of WEG's:

- Improved Efficiency
- Microprocessor based DANCONTROL
- Less wear and tear of Gearbox
- Lower Peak Loading
- Robust Construction
- Simple and efficient interface with distribution
- Automatic adjustment of blade angles
- Rapid Synchronisation
- Lesser Harmonic distortion
- Approved by MNES
- Lower percentage of yawing error
- Four point contact ball bearing type Yawing mechanism

Phase – 2 – Salient features of WEG's:

- ISO 9001 Certificate for Design and Manufacture; ISO 9002 for Installation & Commissioning and for Operation & Maintenance.
- Approved by MNES
- Type certified by Germanischer Lloyd, Germany – World's most prestigious organisation for Wind Mill Certification.
- Higher quality with reliable components.
- Specially designed for India's harsh climatic conditions prevailing at remote locations.
- Improved Power factor.
- Carefully devised electrical system to withstand erratic grid connections.
- Epoxy coated tubular tower
- Integrated Power transmission mechanism.
- High Performance Rotor blades.
- Dual speed asynchronous generator.
- Microprocessor based fully automatic control system with user friendly operation and central monitoring system.
- Four Levels of Safety systems.
- Microprocessor controlled high efficiency soft start.
- Active Yaw gear drive with polyamide slide bearings incorporating hydraulic yaw brakes.
- Specially designed pitching with mechanical brakes.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

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The primary objective of the project activity is to generate 125.15 MW of clean power, using wind as the source. As the project activity uses wind energy for power generation there would be no direct on site / off site as well as indirect on site / off site emissions leading to zero net GHG on-site emissions.

The project activity contributes towards conserving fossil fuels and reducing the deficit in power supply in the state grid. Also, it diversifies the generation mix and is in line with the state and sectoral policy to develop renewable energy based power generation. The project is additional and not a Business As Usual scenario because:

- The project faces financial and technical barriers (demonstrated in section B).
- The revenue from CER sales is vital for the sustainability of the project.
- There has been no prior similar project activity in the wind energy sector, implemented previously or currently underway not only in the state of Karnataka, but the entire country, with respect to the aspect of size and magnitude of the project, usage of higher end technology and the level of investment involved, which makes the MSPL project activity a clear trendsetter(as elaborated in detail in Section B)
- As MSPL has implemented the project activity over and above the state & sectoral requirements, it is evident that the GHG emission reductions achieved by the project are additional to those directed by governmental policies and regulations.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

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Operating Years	CO_2 Emission Reductions (tones of CO_2)
2004-05	56,247
2005-06	275,129
2006-07	275,129
2007-08	275,129
2008-09	275,129
2009-10	275,129
2010-11	275,129
2011-12	275,129
2012-13	275,129
2013-14	275,129
Total emission reductions (tCO_2e)	2,532,408
Total number of crediting years	Ten years
Annual average over the crediting period of emission reductions (tCO_2e)	253,240

The project activity accounts for 2,532,408 tCO2e of emission reductions over the crediting period of 10 years.

A.4.5. Public funding of the project activity:

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There is no Public funding available for this project.

SECTION B. Application of a baseline methodology

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

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ACM0002 - "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".

Reference is taken from the available UNFCCC document available for approved consolidated baseline methodology ACM0002, Version 04, 28th November 2005.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

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The chosen "ACM0002: Consolidated methodology for grid-connected electricity generation from renewable sources" is justified as:

- The MSPL project activity involves an electricity capacity addition of a renewable source providing power to the grid. The MSPL project activity is wind based renewable energy source, zero emission power project connected to the Karnataka Power Transmission Corporation Limited gird, which is a part of the Southern Regional Grid. Though KPTCL is vested with the functions of transmission of power in the entire State of Karnataka., to be conservative and transparent in a multilayered dispatch system in India, MSPL has chosen Southern Regional grid for the baseline scenario;

- The geographic and system boundaries for the relevant electricity grid can be clearly identifed; and

- The project activity will displace fossil fuel based electricity that would otherwise be provided by the operation and expansion of the southern regional grid; the extent of the grid can be clearly identified and sufficient information on the characteristics of the Southern Regional grid is available.

B.2. Description of how the methodology is applied in the context of the project activity:

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As per the Approved consolidated baseline methodology "ACM0002 – Consolidated baseline methodology for grid-connected electricity generation from renewable sources"; MSPL is required to:

(i) Establish additionality as per "Tool for the demonstration and assessment of additionality". Information/data related to industry practice and other regulatory and project related documents have been used to establish the additionality of the MSPL project activity. Details of demonstration of additionality are a part of Section B.3.

(ii) The consolidated baseline methodology ACM0002 describes stepwise on how to apply the methodology to a specific project. The following section presents an overview of the steps followed and the key information and data used in calculating the baseline emission factor and the baseline emissions of the MSPL project activity, as per the guidance provided in ACM0002. The baseline emissions and the emission reductions from MSPL project activity are estimated based on the quantum of electricity to be exported by the MSPL project activity and the **Baseline Emission Factor (BEF)** of the chosen Southern Regional grid is calculated as a **combined margin (CM)**, consisting of the combination of **operating margin (OM)** and build **margin (BM)** factors according to the three steps given below.

Step 1 – Calculation of the Operating Margin emission factor ($EF_{OM,y}$)

The Operating Margin emission factor(s) ($EF_{OM,y}$) is calculated based on one of the four following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

The baseline adopted for the project activity, which is the Southern Regional Grid was found to be dominated by fossil fuel based power plants. The low operating cost and must run resources which typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation constituted 23.63 %, which is less than 50% of the total grid generation and the data in the Table B-1 illustrates the same.

As per the methodology, 'Dispatch Data Analysis' (1c) is the first methodological choice. However, this method is not selected for OM emission factor calculations, as the share of low cost / must run resources of the selected grid over the past five years (2000-01 to 2004-05) has been found to be 23.63%, which is less than 50% of the gross grid generation. This meets the condition as stipulated by the selected methodology, for using the simple OM method for calculating the operating margin emission factor as against the dispatch analysis method.

'Simple OM' (1a) method is applicable to project activity connected to the project electricity system (grid) where the low-cost/must run resources constitute less than 50% of the total grid generation in 1) average of the five most recent years, or 2) based on long-term normal for wind power production.

The Simple adjusted OM (1b) and Average OM (1d) methods are applicable to project activity connected to the project electricity system (grid) where the low-cost/must run resources constitute more than 50% of the total grid generation. To select the appropriate methodology for determining the Operating Margin emission factor ($EF_{OM,y}$) for the MSPL project activity, MSPL conducted a baseline study, wherein the power generation data for all Power sources in the project electricity system were collected from government/non-government organisations and from authentic sources and then analysed.

Amongst the 'Simple OM' (1a), 'Simple adjusted OM' (1b) and 'Average OM' (1d) methods to calculate the Baseline Emission Factor of the chosen grid, MSPL has therefore chosen and adopted the 'Simple OM' (1a) method.

The Simple OM emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MU) of all generating sources serving the project electricity system, not including low-operating cost and must-run power plants. The generation data for various power generating stations constituting the Southern Regional grid, that have been used in calculating the baseline emissions for the most recent three years are presented in Annex 3:

Table B-1: Power Generation mix of Southern Region for the past five years

Power generation Mix of Southern Region for five years					
Energy Source	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**
Total Power Generation (MU)	130371.1	133480.4	137321.71	142812.00	150372.74
Total Thermal Power Generation	83291.59	84031.63	92053.19	95898.00	97448.01
Total Low Cost Power Generation	37098.75	34984.16	26959.92	26740.00	37766.21
Thermal % of Total grid generation	63.89	62.95	67.03	67.15	64.80
Low Cost % of Total grid generation	**28.46**	**26.21**	**19.63**	**18.72**	**25.12**
% of Low Cost generation out of Total grid generation - Average of the five most recent years					**23.63**

The Simple OM emission factor can be calculated using either of the two data vintages for years(s) *y*:

• A 3-year average, based on the most recent statistics available at the time of PDD submission, or the year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex post monitoring.

MSPL has calculated the OM emission factor as per the 3-year average of Simple OM calculated based on the most recent statistics available at the time of PDD submission. The following Table B-2 presents the key information and data used to determine the Simple OM emission factor:

Table B-2: Key Information used for calculating simple Operating Margin emission factor

Calculation of Baseline Emission factor for Southern Region

	2001-02		2002-03		2003-04	
Sector	MU	%	MU	%	MU	%
Thermal Based	84031.63	62.95	92053.19	67.03	95898	67.15
Gas Based	10329.45	7.74	13950.1	10.16	16949	11.87
Diesel Based	4135.12	3.10	4358.5	3.17	3225	2.26
Hydro-State	26260.42	19.67	18286.79	13.32	16630	11.64
Nuclear Based	5243.83	3.93	4390	3.20	4700	3.29
IPP-Co-Generation+BIOMASS	2023.82	1.52	2676.32	1.95	1910	1.34
IPP-Wind	1456.09	1.09	1606.81	1.17	3500	2.45
Total	133480.4	100.00	137321.7	100.00	142812.0	100.00
Total generation excluding Low-cost power generation	98496.20	73.79	110361.79	80.37	116072.00	81.28
Generation by Coal and Lignite out of Total Generation excluding Low-cost power generation	84031.63	62.95	92053.19	67.03	95898.00	67.15
Generation by Gas out of Total Generation excluding Low-cost power generation	10329.45	7.74	13950.10	10.16	16949.00	11.87
Generation by Diesel out of Total Generation excluding Low-cost power generation	4135.12	3.10	4358.50	3.17	3225.00	2.26
Estimation of Baseline Emission Factor (tCO_2/MU)						
Simple Operating Margin						
Fuel 1 : Coal (Steam Stations)						
Avg. Calorific Value of Coal used (kcal/kg)		4845.0		4171.0		3820.0
Coal consumption (tons/yr)		53107000		65997000		52985000
Emission Factor for Coal-IPCC standard value (tonne CO2/TJ)		96.1		96.1		96.1
Oxidation Factor of Coal-IPCC standard value		0.98		0.98		0.98
COEF of Coal (tonneCO2/ton of coal)		1.91		1.64		1.51
Emissions per year (tCO2)		101460728.10		108546745.94		79812097.76
Fuel 2 : Furnace Oil (Steam Stations)						
Avg. Calorific Value of fuel used (kCal/kg)		10497		10726		10365
Fuel consumption (tons/yr)		115103.7		103163.46		50275.21
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99

COEF of Gas(tonneCO2/ton of Oil)		3.19		3.26		3.15
Emissions per year (tCO2)		367270.60		336353.06		158399.89
Fuel 3 : Diesel Oil (Steam Stations)						
Avg. Calorific Value of fuel used (kCal/kg)		10293		9760		10186
Fuel consumption (tons/yr)		5821.65		7145.95		28076.35
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		74.07		74.07		74.07
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Fuel(tonneCO2/ton of fuel)		3.16		3.00		3.13
Emissions per year (tCO2)		18397.05		21412.63		87802.02
Fuel 4 : LSHS (Steam Stations)						
Avg. Calorific Value of fuel used (kCal/kg)		10457		10524		10302
Fuel consumption (tons/yr)		7321.6		5361.84		4672.8
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Fuel(tonneCO2/ton of gas)		3.18		3.20		3.13
Emissions per year (tCO2)		23272.59		17152.46		14632.90
Fuel 5 : Gas (Steam Stations)						
Avg. Calorific Value of Gas used (kCal/M3)		NA		NA		2000
Gas consumption (M3/yr)		0.00		0		1932274000.00
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)		56.10		56.10		56.10
Oxidation Factor of Gas-IPCC standard value		0.995		0.995		0.995
COEF of Gas(kgCO2/M3 of gas)		NA		NA		0.47
Emissions per year (tCO2)		0.00		0.00		903206.01
Fuel 6 : Naphtha (Gas Stations)						
Avg. Calorific Value of Fuel used (TJ/kt)		45.01		45.01		45.01
Fuel consumption (tons/yr)		149197.41		322854.84		478596.51
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.995		0.995		0.995
COEF of Fuel(tonneCO2/ton of Fuel)		3.284		3.284		3.284
Emissions per year (tCO2)		489997.65		1060327.52		1571818.00
Fuel 7 : HSD (Gas Stations)						

Avg. Calorific Value of Fuel used (kCal/kg)		10293		9760		10186
Fuel consumption (tons/yr)		4614.65		233853.7		192933.85
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		74.07		74.07		74.07
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of fuel(tonneCO2/ton of Fuel)		3.160		2.996		3.127
Emissions per year (tCO2)		14582.80		700735.68		603354.10
Fuel 8 : Natural Gas (Gas Stations)						
Avg. Calorific Value of Gas used (TJ/Million M3)		37.98		37.98		37.98
Estimated Gas consumption (Million M3/yr)		3230		3130		2010
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)		56.10		56.10		56.10
Oxidation Factor of Gas-IPCC standard value		0.995		0.995		0.995
COEF of Gas(tonneCO2/Million M3 of gas)		2120.024		2120.024		2120.024
Emissions per year (tCO2)		6847678.25		6635675.82		4261248.69
Fuel 9 : Diesel (Diesel Stations)						
Avg. Calorific Value of Fuel used (kCal/kg)		10293		9760		10186
Diesel consumption (tons/yr)		648561.05		736047.3		12667.55
Emission Factor for Diesel-IPCC standard value (tonne CO2/TJ)		74.07		74.07		74.07
Oxidation Factor of Diesel-IPCC standard value		0.99		0.99		0.99
COEF of Diesel (tonneCO2/ton of diesel)		3.16		3.00		3.13
Emissions per year (tCO2)		2049523.97		2205543.90		39614.71
Fuel 10 : LSHS (Diesel Stations)						
Avg. Calorific Value of Fuel used (kCal/kg)		10457		10524		10302
Fuel consumption (tons/yr)		0		0		569756.88
Emission Factor for Fuel-IPCC standard value (tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Fuel (tonneCO2/ton of Fuel)		3.18		3.20		3.13
Emissions per year (tCO2)		0.00		0.00		1784197.02
Fuel 11 : Lignite						
Avg. Efficiency of power generation with lignite as a fuel, %		30		30		30
Avg. Calorific Value of Lignite used (kCal/kg)		2625		2686		2737
Estimated lignite consumption		17318250		17738000		20755000

(tons/yr)						
Emission Factor for Lignite-IPCC standard value (tonne CO2/TJ)		101.18		101.18		101.18
Oxidation Factor of Lignite-IPCC standard value		0.98		0.98		0.98
COEF of Lignite (tonneCO2/ton of lignite)		1.09		1.12		1.14
Emissions per year (tCO2)		18873997.43		19780680.95		23584578.25
EF (OM Simple, excluding imports from other grids), tCO2/MU		1321.32		1262.25		971.99
EF (OM Simple), tCO2/MU		1321.32		1262.25		971.99
Average EF (OM Simple), tCO2/MU						1185.19

Step 2 - Calculate the Build Margin emission factor ($EF_{BM,y}$)

The Build Margin emission factor ($EF_{BM,y}$) is calculated as the generation-weighted average emission factor (tCO_2/MU) of a sample of power plants. The methodology suggests the project proponent to choose one of the two options available to calculate the Build Margin emission factor $EF_{BM,y}$

<u>Option 1:</u>

Calculate the Build Margin emission factor $EF_{BM,y}$ *ex ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either:

(a) The five power plants that have been built most recently, or

(b) The power plants capacity additions in the electricity system that comprise 20% of the system generation (in MU) and that have been built most recently.

Project participants should use from these two options that sample group that comprises the larger annual generation.

<u>Option 2:</u>

For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually ex post for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated ex-ante, as described in Option 1 above. The sample group m consists of either

(a) the five power plants that have been built most recently, or

(b) the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MU) and that have been built most recently.

Project participants should use from these two options the sample group that comprises the larger annual generation.

MSPL has adopted the Option 1, which requires the project participant to calculate the Build Margin emission factor $EF_{BM,y}$ ex ante based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m should consist of either:

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

Project participants are required to use from these two options the sample group that comprises the larger annual generation. As per the baseline information data the option (b) comprises the larger annual generation. Therefore for the MSPL project activity the sample group m consists of (b) the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MU) and that have been built most recently. Power plant capacity additions registered as CDM project activities are excluded from the sample group.

The following Table B-3 presents the key information and data used to determine the Simple BM emission factor:

Table B-3: Key information used for calculating Build Margin emission factor

Considering 20% of Gross Generation						
Sector						
Thermal Coal Based-State					1554.00	5.15
Thermal Coal Based-Central					7296.00	24.20
IPP-Coal Based					0	0.00
Lignite based power plant					4668	15.48
IPP-Gas (Naphtha) Based					8520	28.26
IPP-Diesel Based					422.32	1.40
Hydro-State					2200.70	7.30
Nuclear Based-Central					0.00	0.00
IPP-Co-Generation + biomass					3493.40	11.59
IPP-Wind					2000	6.63
Total					30154	100.00

Generation by Coal out of Total Generation					8850.00	29.35
Generation by Gas out of Total Generation					8520.06	28.26
Generation by Diesel out of Total Generation					422.32	1.40
Generation by lignite out of Total Generation					4668	15.48
Built Margin						
Fuel 1 : Coal						
Avg. efficiency of power generation with coal as a fuel, %						32.5
Avg. calorific value of coal used, kcal/kg						4069.4
Estimated coal consumption, tons/yr						5752500.0
Emission factor for Coal (IPCC),tonne CO2/TJ						96.1
Oxidation factor of coal (IPCC standard value)						0.98
COEF of coal (tonneCO2/ton of coal)						1.605
Fuel 2 : Gas						
Avg. Efficiency of power generation with gas as a fuel, %						45
Avg. Calorific Value of Gas used (TJ/Million M3)						37.98
Estimated Gas consumption (Million M3/yr)						1794.64
Emission Factor for Gas-IPCC standard value(tonne CO2/TJ)						56.10
Oxidation Factor of Gas-IPCC standard value						0.995
COEF of Gas(tonneCO2/Million M3 of gas)						2120.024
Fuel 3 : Diesel						
Avg. efficiency of power generation with diesel as a fuel, %						41.7
Avg. calorific value of diesel used, kcal/kg						10348
Estimated diesel consumption, tons/yr						84168.1
Emission factor for Diesel (as per standard IPCC value)						74.07
Oxidation factor of Diesel (IPCC standard value)						0.99
COEF of diesel tonneCO2/ton of diesel						3.18
Fuel 4 : Lignite						

Avg. efficiency of power generation with lignite as a fuel, %						29
Avg. calorific value of lignite used, kcal/kg						2683
Estimated lignite consumption, tons/yr						5085715
Emission factor for lignite (as per standard IPCC value)						101.18
Oxidation factor of lignite (IPCC standard value)						0.98
COEF of lignite tonneCO2/ton of lignite						1.11
EF (BM , excluding imports) (tCO2/MU)						629.01
EF (BM), tCO2/MU						629.0
Combined Margin Factor (Avg of OM & BM)						907.1
Baseline Emissions Factor (tCO2/MU)						907.1

Step 3 - Calculate the Electricity Baseline Emission Factor ($EF_{electricity, y}$)

The baseline emission factor $EF_{electricity, y}$ is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$), where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MU.

The most recent 3-years average of the Simple OM and the BM of the base year are considered and the same is presented in the table below.

Table B-4: Data used for Baseline Emission Factor

Parameters	Values (ton of CO_2/MU)	Remarks
Simple OM, $EF_{OM,simple}$	1185.19	Average of most recent 3-years values
BM, $EF_{BM,y}$ (ton of CO_2/MU)	629.0	Value of the base year i.e. 2004-2005
Southern Regional Baseline Emission Factor, EF_y	**907.1**	

Baseline emissions due to displacement of electricity by MSPL project activity

Baseline emissions (BE_y in tCO_2) due to displacement of grid-electricity are the product of the Baseline Emissions Factor ($EF_{,y}$ in tCO_2/MU) calculated in Step 3, times the electricity supplied by the MSPL project activity to the grid (EG_y in MU), over the crediting period as given below.

$$BE_y = EG_y \cdot EF_y$$

Electricity generation from the MSPL project activity

The total power generated by the MSPL project activity during the crediting period is based on the wind speed, turbine blade diameter and the operating days of power generation from the project activity per year. The MSPL project activity proposes to export 303.3 million units (Phase 1 & Phase 2 together) of electricity per annum to the grid. Therefore, a conventional energy equivalent of 3033 (approximate) million units for a period of 10 years would be conserved by the project activity and this electrical energy will displace an equivalent amount of electricity that would be generated by the KPTCL grid mix. Without MSPL project activity, the same energy load would have been taken up by power plants of the project electricity system – Southern Regional grid and equivalent CO_2 emissions would have been occurred due to fossil fuel combustion.

Project Emissions:

As per ACM0002, there are no project related emissions.

Leakage:

As per ACM0002 the main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation (for hydroelectric projects). Project participants do not need to consider these emission sources as leakage in applying this methodology. MSPL has not taken leakage into consideration, neither have they claimed any credits for the MSPL project activity on account of reducing these emissions below the level of the baseline scenario.

Emission Reductions:

The MSPL project activity reduces carbon dioxide through displacement of grid electricity generation with fossil fuel based power plants by renewable-wind electricity. The emission reduction ERy due to MSPL project activity during a given year y is calculated as the difference between baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly), as per the formulae given below:

$$ER_y = BE_y – PE_y - L_y$$

Where,

BEy = baseline emissions (please refer to ‘baseline emissions due to displacement of electricity’)

PEy = project emissions; PEy = 0 for mspl project activity.

Ly = emissions due to leakage. Ly = 0 for mspl project activity.

The total net emission reductions achieved from the project activity is presented in Section E.5 & E.6 of this PDD.

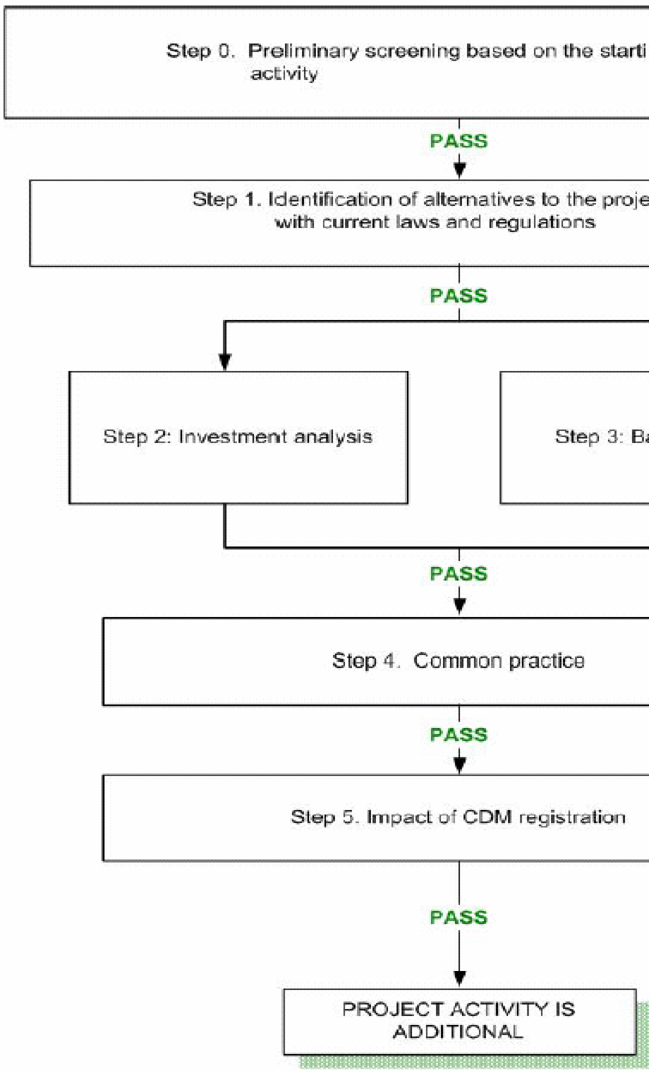
B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity:

>>

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. As per the selected methodology ACM0002, the project proponent is required to establish that the GHG reductions due to project activity are additional to those that would have occurred in absence of the MSPL project activity as per the 'Tool for the demonstration and assessment of additionality', as published in Annex-1 of the Executive Board (EB-16).

The flowchart provides a step-by-step approach to establishing additionality of the project activity as per CDM consolidated tool.

Flowchart: Additionality scheme



MSPL demonstrates the additionality of the project activity as follows:

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

MSPL wishes to have the crediting period starting prior to the registration of their project activity. MSPL is required to

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

The MSPL project activity was started in December 2003 (Phase–1) and August 2004 (Phase–2) and the operation in March - July 2004 (Phase – 1) and March - June 2005 (Phase – 2) respectively, which falls between 1st Jan 2000 and the date of the registration of the first CDM project activity. MSPL would provide the documentary evidence of the same to the validator.

MSPL has prepared all documentation necessary for registration of the CDM project activity in line with ACM0002 and proposes to get the MSPL project activity registered with UNFCCC before December 31, 2005.

b) Provide evidence that the incentive from the CDM was seriously considered in the decision to proceed with the project activity.

MSPL was aware that the project activity is a GHG Abatement project, which could avail financial benefits under CDM if the project activity was found to be additional wherein the anthropogenic emission of greenhouse gases by sources are reduced below those that would have occurred in absence of the registered CDM project. Moreover, prior to the planning, MSPL was well aware of the uncertainties involved in the project initiative considering the size of the project and amount of investment involved and the sustainability aspect of the power tariff rate from KPTCL. However, the MSPL management had gained regular updates and awareness and were abreast on the CDM global initiatives and developments through attending various seminars, workshops and conferences and by interaction with various consultants and financial institutions.

Expecting to negate the financial risks associated with the project activity with the help of CDM funding, MSPL, during the financial planning, had given due consideration and have taken into account the potential CER revenue to be accrued by the project activity through CDM in the decision

to proceed with the project activity. The evidence of the same would be provided through official documentation. In order to arrive at the decision to proceed with the implementation of the project activity, MSPL management conducted an investment analysis with the CDM revenue estimates as one of the cash in flows that would be made available after sale of the emission reductions.

With the CDM revenue as one of the annual cash inflows, the MSPL project activity would be financially attractive for the project investors. The MSPL management also noted that the CDM revenue computations were based on rough estimates. On this basis, the MSPL's top management decided to recommend the project activity to the Board of Directors for approval. The MSPL project activity papers were enclosed along with the Board Agenda for the Board Meeting conducted on 31st March 2004. The MSPL project activity received approval and the approval was documented in the Minutes of the Board Meeting.

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

In sub-step 1a and 1b, MSPL is required to identify realistic and credible alternative(s) that were available to MSPL or similar project developers that provide output or services comparable with the MSPL project activity. These alternatives are required to be in compliance with all applicable legal and regulatory requirements.

MSPL identified the different potential alternative(s) to the project activity.

The following paragraphs illustrate the alternatives:

Alternative 1- Implementation of the MSPL project activity not undertaken as a CDM project activity;

In this alternative, MSPL project activity is connected to the Southern Regional grid and therefore it displaces an equivalent amount of electricity of the grid mix of Southern Regional grid.

Since the MSPL project activity has no project emissions this alternative would not generate carbon dioxide. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline. MSPL may implement the project activity to generate and sell power to KPTCL. This alternative may be a part of the baseline. However this alternative is financially less attractive as compared to the 10.75% Weighted Average Cost of Capital (WACC) of the project activity, which was computed based on the investors' required return on capital. The investment analysis has been conducted as per Step 2: Investment analysis of the "Tool for the demonstration and assessment of additionality". The objective of MSPL in setting up of the project activity is not in

generating power for its own captive requirement, as this is obvious from the fact that the entire power generated from the project activity is exported to the Southern Regional grid. Being proactive and with a view of being in line with the sustainable development priorities of India,

MSPL's primary & sole objective in promoting the project activity is to generate sizable green power through tapping of the wind energy in the existing barren land available in the state of Karnataka, which is power deficit. Therefore, from the above it is clear that, in the absence of the project activity, MSPL would not have undertaken any other alternatives like Fossil Fuel-fired power station or a hydel project. From the above, it naturally implies that the only other alternative available is Alternative 2.

Alternative 2- No MSPL project activity; Continuation of current situation

In this alternative, MSPL project activity is not implemented resulting in the continued current grid mix of KPTCL. There is no displacement of electricity of the grid mix of Southern Regional grid.

In Alternative 2 *i.e.* in absence of MSPL project activity, an equivalent amount of electricity would be generated by the power plants comprising the regional grid mix. An equivalent amount of carbon dioxide would be generated at the thermal power generation end. This alternative is in compliance with all applicable legal and regulatory requirements and may be a part of the baseline. This scenario was the status quo of the existing facility before CDM project implementation.

Step 2 Investment analysis OR Step 3 Barrier analysis

MSPL proceeds to establish the project activity additionality by conducting the Step 2: Investment Analysis as per ACM0002. To conduct the investment analysis, MSPL is required to use the following sub-steps:

Sub-step 2a Determine appropriate analysis method

The MSPL project activity exports electricity to KPTCL as per the Power Purchase Agreement. One of the revenue streams of the MSPL project activity is through sale of electricity to KPTCL. Therefore Option I – Simple cost analysis would not be an appropriate analysis method.

Amongst the other two options – investment comparison analysis (Option II) and benchmark analysis (Option III) MSPL has adopted the benchmark analysis wherein the weighted average cost of capital (WACC) of the MSPL project activity serves as a benchmark to assess the financial attractiveness of the project activity. Option III assesses if the project's returns are sufficient for MSPL and other investors to make the initial investment and further bear the associated costs of successfully operating the MSPL project activity over the crediting period of the project.

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

The MSPL project activity has a high initial capital cost with no high capital investment for the alternative 2 - the continuation of the current situation of the regional grid mix. MSPL conducted an investment analysis of the MSPL project activity with the Internal Rate of Return as the financial indicator. 'Internal Rate of Return' is one of the known financial indicators used by banks, financial institutions and project developers for making investment decisions.

MSPL calculated the project activity's internal rate of return (IRR[1]) and compared it with the WACC of the project activity. Since MSPL had to use several sources in order to raise the capital necessary to implement the project activity, and each of these sources expected different returns, the WACC was calculated as a weighted average of the different returns to be paid to these sources. The 10.75 % WACC of the MSPL project activity was based on the capital investment and the rate of return of each of the investors.

Sub-step 2c – Calculation and comparison of financial indicators

The financial internal rate of return of the MSPL project activity without CDM revenues is 7.36 % which is much lower than the 10.75 % weighted average cost of capital for the MSPL project activity as required by the investors. The financial internal rate of return of the MSPL project activity without CDM revenues was calculated based on the following aspects:

1. Annual export to KPTCL – 303.3 MU
2. Power tariff rate of KPTCL – Phase 1: INR 3.10 per unit with an annual escalation rate of 5%.
   Phase 2: INR 3.40 per unit throughout the crediting Period
3. IRR is computed from the year 2003-2013. The period of 2003-2013 has been selected based on the validity of the Power Purchase Agreement between KPTCL and MSPL.

The internal rate of return of the MSPL project activity with CDM revenues is 7.87 %. Therefore the project activity would only be financially viable if the project activity attains CDM revenue through sale of the emission reductions. The financial internal rate of return of the MSPL project activity with CDM revenues was calculated based on the following aspects:

1. Annual export to KPTCL – 303.3 MU
2. Power tariff rate of KPTCL – Phase 1: INR 3.10 per unit with an annual escalation rate of 5%.
   Phase 2: INR 3.40 per unit throughout the crediting Period

[1] Based on Pre-tax financial Internal Rates of Return of the project over the crediting period (10 years)

3. Annual CER generated – 2,532,408 tCO_2e
4. Exchange rate - 1EURO equivalent to INR 56/-
5. Conservative CER price per ton of CO_2 equivalent.

All financial data used to arrive at the internal rate of return of the MSPL project activity with and without CDM revenues would be provided to the DOE in the process of Validation.

Sub-step 2d. Sensitivity analysis:

The MSPL project activity was found to be sensitive to the following factors –

1. Annual export to KPTCL – 303.3 MU
2. OM Expenses

The sensitivity analysis was conducted for scenarios with variations in each one of the above-mentioned factors and for scenarios with variations in all the above-mentioned factors simultaneously in order to assess the financial attractiveness of the MSPL project activity under such circumstances.

Sl	Parameters	Variation	IRR	% Change	Comments
The financial internal rate of return of the MSPL project activity without CDM revenues					
1.	Annual Export to KPTCL	+10 %	8.12 %		The IRR of the MSPL project activity is still lower than the WACC benchmark; However the probability of a 10% increase in annual export to KPTCL is not probable. It is unlikely that the meteorological & wind conditions that are available in the MSPL project activity are able to sustain a 10% increase in the annual power generation.
		-10%	6.61 %		The IRR of the MSPL project activity is lower than the WACC benchmark.
2.	OM Expenses	+10%	7.23 %		The IRR of the MSPL project activity is lower than the WACC benchmark.
		-10%	7.50 %		The IRR of the MSPL project activity is still lower than the WACC benchmark. However it is unlikely that the OM expenses are reduced by 10% and this option may be discarded.
3	Combinations	1→+10% 2→-10%;	8.25 %		The IRR of the MSPL project activity is still lower than the WACC benchmark; however the probability of a 10% increase in annual export to KPTCL and a 10% reduction in OM expenses is not probable. It is unlikely that - the meteorological conditions that are available in the MSPL project activity are able to sustain a 10% increase in the annual power generation. - the OM expenses are reduced by 10%.
4	Combinations	1→-10% 2→+10%	6.47 %		The IRR of the MSPL project activity is lower than the WACC benchmark.

The results of the sensitivity analysis conducted confirm that the financial internal rate of return of the MSPL project activity without CDM revenues is much lower than the WACC benchmark for the MSPL project activity as required by the investors, under circumstances which could bring about variations in the critical factors used for the IRR computations in Step 2c. Hence, the conclusion that the 'MSPL project activity is financially non viable' is robust to reasonable variations in the critical assumption and the CDM revenue the MSPL project activity would obtain through sale of the emission reductions is very crucial to sustain the operations of the project activity.

Step 4. Common Practice Analysis

From the Step 2 Investment Analysis, we may conclude that Alternative 2 (No MSPL project activity; Continuation of current situation) is a status quo and does not have impediments that would prevent its implementation. However the Alternative 1 (Implementation of the MSPL project activity not undertaken as a CDM project activity) was found to be less financially attractive without CDM revenue, which would prevent MSPL from implementing the project activity as elaborated in the step 2 'Investment Analysis'.

MSPL is further required to conduct the common practice analysis as a credibility check to complement the investment analysis (Step 2). MSPL is required to identify and discuss the existing common practice through the following sub-steps:

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

Karnataka, the eighth largest State in India, is situated on the western edge of the Deccan plateau. Karnataka is facing a temporary power crunch, and in order to tide over the immediate power shortage the state has considered setting up diesel power generating units and laying a gas grid along the coastline from Mumbai High, to utilize natural gas to generate power. The state has also identified 150 locations where mini and micro hydro-electric projects can be set up. Plans have been initiated to harness wind energy too[2].

In keeping with the policy of liberalization set in motion since 1991, private investment for generation of power through thermal stations, mini and micro hydro - electric schemes, diesel power generation, etc are welcomed by the state.

- As shown in the Table-1 below, wind based power projects are set up in only ten states in India. As per the Ministry of Non-Conventional Energy Sources (MNES), out of the gross wind power generation potential of 6620 MW in Karnataka, only 209.2 MW has been installed as of just before the operation of the MSPL project activity (March 31, 2004). This is a potential realization of just

[2] http://www.karnataka.com/industry/power.shtml

3% and the grid penetration in Karnataka of as low as 2.40%. This is after 14 years of liberalization, wherein private sector participation was welcomed in the state.

- Also, as of March 31, 2004 (before the operation of the MSPL project activity), there were only 2 private windfarm project promoters with a total wind farm capacity of 15 MW or above in the state of Karnataka and exporting power to the KPTCL grid (MNES Sources) as per Table-2.
- Both the project activity of Enercon & Nuziveedu Seeds, with an installed WEG's each of 750 KW or below and a total installation capacity of below 30 MW, have sought for CDM revenue.
- The MSPL project activity is a clear trendsetter not only in the state of Karnataka but for the entire country with a single project of 125 MW capacity and the WEG's each with a higher end technology of close to 1200 KW per WEG.

Estimated Wind Power Potential in India (Table - 1)[3]

Sl.No	State	Gross Potential (MW)
1	Andhra Pradesh	8275
2	Gujarat	9675
3	Karnataka	6620 (Only 209.2 MW installed capacity as of 31/03/2004)
4	Kerala	875
5	Madhya Pradesh	5500
6	Maharashtra	3650
7	Orissa	1700
8	Rajasthan	5400
9	Tamil Nadu	3050
10	West Bengal	450
	Total	45195
Note: Gross potential is based on assuming 1% of land availability for wind power generation in potential areas.		

[3] Source: MNES

Table -2 - Private Windfarm Owners (1. & 2.) exporting power to the KPTCL Grid (15 MW or above) in the state of Karnataka as of March 31, 2004[4]

S.No.	Name of Project Developer	Total No. of WEG's	Capacity (KW)	Total (MW)	Has the proponent sought CDM revenue
1	Enercon (Windfarm) India Ltd.	49	600	29.4	Yes
2	Nuziveedu Seeds Ltd.	23	750	18.65	Yes
3	MSPL Limited	107	Higher end technology of close to1200 KW per WEG	125.1 (Trendsetter in the state of Karnataka with regard to the combination of size & technology)	MSPL Project Activity
MNES Sources					

From the above information (MNES Source), it is clear that, there has been no similar project activity in the wind energy sector in the state of Karnataka with a similar investment climate implemented previously or currently underway and therefore the MSPL project activity is not a common practice.

[4] Source : MNES

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

This has been explained in detail in the Sub-step 4a.

Step 5. Impact of CDM registration

The impacts of CDM registration include, access to CDM revenues, access to new technologies, institutional capacity building etc. Registering the project activity as a CDM activity provides a significant amount of revenue as one of the annual cash flows, expected after approval and registration. The financial viability of the MSPL project activity, the project's cash flow and hence its bankability would improve. The IRR (for 15 years) calculated over and above the crediting period with CDM revenue works out to 10.97 % which is above the WACC (10.75%) of the project. A 16% return on equity has been a typical benchmark in the electricity utility industry. The MSPL project activity's returns were lower than the required rate of return of the investors. (Refer to Investment Analysis). The CDM revenues will assist the investor in realizing returns commensurate the risks in development and operations of the project. It will also assist in offsetting the extra costs that the developer had to bear to facilitate the investments.

However, MSPL management took the decision of taking the investment risks and secured financing partially from bank funding and partially through internal accruals so as to invest in the CDM MSPL project activity after computing the proposed carbon financing. Besides the direct financing risk, MSPL is also shouldering the additional transaction costs such as preparing documents, supporting CDM initiatives and developing and maintaining Monitoring methodology to fulfill CDM requirements. MSPL is shouldering a significant market or financial risk by taking a pro-active approach in showing confidence in the Kyoto Protocol/CDM mechanism.

MSPL's decision to invest

- in the CDM project activity
- in additional transaction costs such as preparing documents, supporting CDM initiatives and developing and maintaining M&V protocol to fulfil CDM requirements

was guided by the anthropogenic greenhouse gas emission reductions the project activity would achieve and its associated carbon financing the project activity would receive through sale of CERs under the Clean Development Mechanism . The revenue from the CDM funds proves to be vital to project's feasibility and significantly improve the sustainability of the MSPL project activity.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

>>

As per the definition of project boundary of ACM0002, the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant (MSPL) is connected to.

Project Site

MSPL project activity boundary encompasses the physical and geographical site of the project activity site at the project location specified in Section A.4.1.4. This would include the wind turbine installation, pooling and KPTCL substations. The MSPL project activity evacuates the power to the state grid, which in turn is connected to the Southern Regional grid. Therefore, those power plants contributing to the Southern Regional grid are taken in the connected (project) electricity system for calculation of baseline emissions.

Connected (Project) electricity system - Power plants connected to the electricity system

For the purpose of determining the Built Margin (BM) and Operating Margin (OM) emission factor, as per ACM0002, a (regional) connected electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints.

Indian power grid system is divided into five regions namely Northern, North Eastern, Eastern, and Southern and Western Regions. The Southern Region consists of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Pondicherry and Lakshadweep. Each state has their own power generation plants (State Government owned) managed by respective State Electricity Boards / Corporations. In addition to the state govt. owned power generation plants, there are private owned power generation plants exporting power to KPTCL and central government (government of India) owned power generation plants managed by Government of India Enterprises like National Thermal Power Corporation Ltd., Nuclear Power Corporation Ltd *etc.*, Power generated by all central generation units is being fed to the grid (Southern Grid), which is accessible to all states forming part of the southern grid.

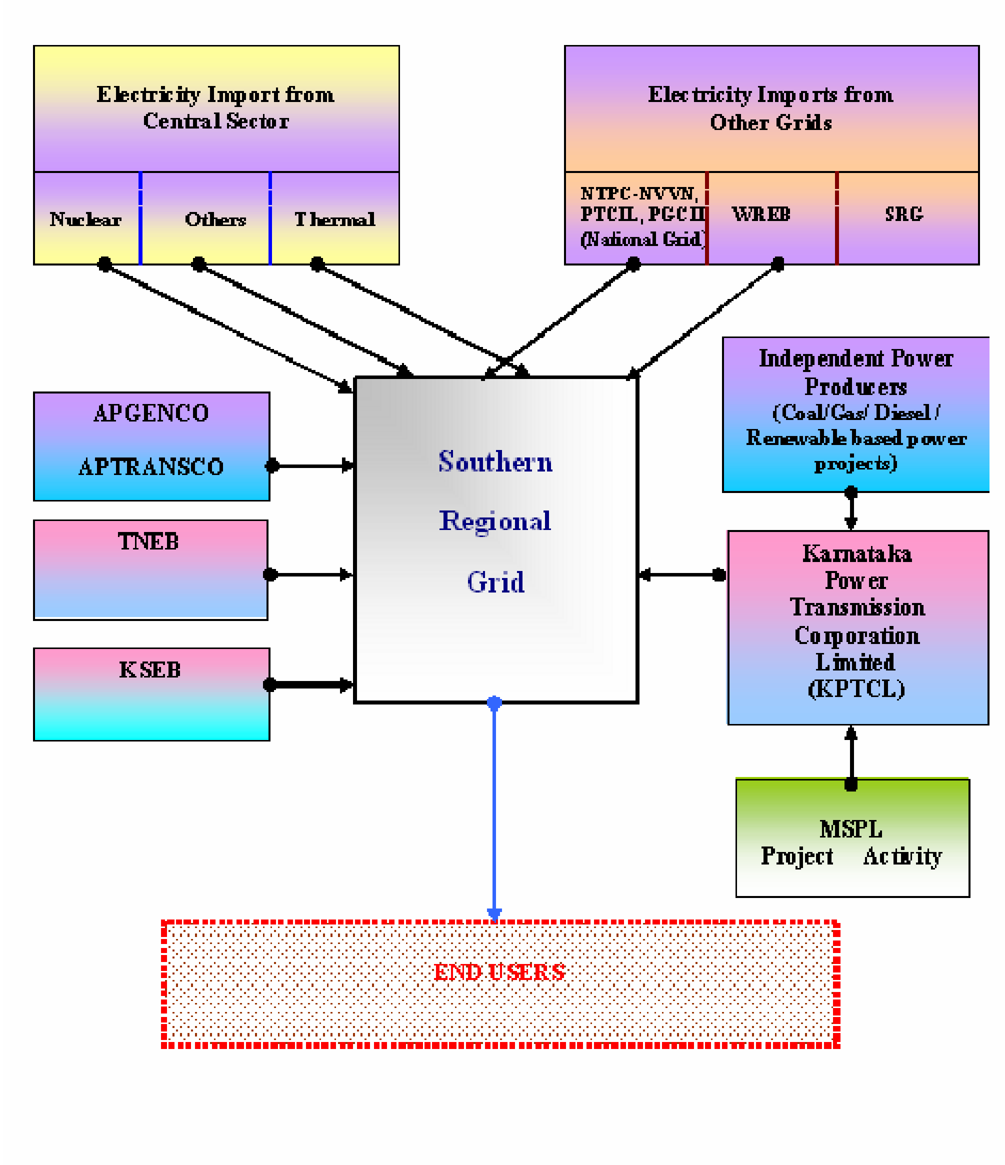
MSPL project activity is connected to the KPTCL grid, perhaps interconnected with the Southern Regional grid and the Southern Regional grid is selected as project electricity system due to following reasons:

(a) The state grid in many cases would be too narrow, given a significant electricity trade among states that might be affected, directly or indirectly by a CDM project activity.

(b) Further, in a layered dispatch system in India, the regional grid is the default to be considered for the baseline scenario (as stipulated by the selected methodology ACM0002)

The Current Delivery System of Karnataka is demonstrated below in Figure 1.

Figure 1 Flow Chart of Current Delivery System of Karnataka



B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

>>

Please refer to section B2 in conjugation with Annex 3: Baseline Information. The final draft of this baseline section was revised by MSPL and their associated experts in February 2006.

M/s. MSPL Limited

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Karnataka, India

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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:

>>
The MSPL project activity started in December 2003 (Phase–1) and August 2004 (Phase–2) and the power generation commenced in March - July 2004 (Phase – 1) and March - June 2005 (Phase – 2) respectively.

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

>>
The expected operational life time of the project activity is 20 years.

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

The project proponent opts for a fixed crediting period of 10 years.

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:

>>
Not Applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>> 22nd March 2004

C.2.2.2. Length:

>> 10 years

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

>>

Name of the Monitoring Methodology:

"Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources"

Reference is taken from the available UNFCCC document available for approved consolidated baseline methodology ACM0002, Version 04, 28th November 2005

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

>>

Since the project is a grid connected renewable energy project, emission reduction quantity totally depends on the units wheeled to the grid. The methodology covers the monitoring of units wheeled along with the other parameters affecting the power export and CO_2 emissions. Hence, this is the most suitable monitoring methodology applicable for the project.

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

>>

Not Applicable – as the project is a zero emission grid connected electricity generation from a renewable source

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

Not Applicable

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number	Data type	Data Variable	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment
1. EG_y	Electricity supplied to the grid by the project activity	MSPL records/ KPTCL records	MWh	Directly Measured	Hourly measurement and monthly recording	100%	Electronic	Crediting Period plus two years	
2. EF_y	CO_2 emission factor of the grid	KPTCL/CEA	tCO_2/ MWh	Calculated	Yearly	100%	Electronic	Crediting Period plus two years	Calculated as weighted sum of OM and BM

									emission factors as per Step 3 of ACM0002
3. $EF_{OM,,y}$	CO_2 operating margin emission factor of the grid	KPTCL/CEA	t CO_2/ MWh	Calculated	Once at the beginning of a crediting period	100%	Electronic	Crediting Period plus two years	Calculated as Step 1 of ACM0002
4. $EF_{BM,y}$	CO_2 build margin emission factor of the grid	KPTCL/CEA	t CO_2/ MWh	Calculated	Once at the beginning of a crediting period	100%	Electronic	Crediting Period plus two years	Calculated as Step 2 of ACM0002
5. $F_{i,j,y}$	Amount of fossil fuel i, consumed by each power source/ plant in year y	KPTCL/CEA	tons	Calculated	Once at the beginning of a crediting period	100%	Electronic	Crediting Period plus two years	Calculated based on the Total power generation, Average Net Calorific Value of the Fuel used

									and the Designed Station Heat Rate data of power plants of KPTCL grid
6. $COEF_{i,j,y}$	CO_2 emission factor of each fuel type i,	IPCC/local	t CO_2 / ton of fuel	Standard /Calculated	Once at the beginning of a crediting period	100%	Electronic	Crediting Period plus two years	Calculated based on the IPCC default value of the Emission Factor, Net Calorific Value and Oxidation Factor of the Fuel used by the power plants of KPTCL grid
7. $GEN_{j,y}$	Electricity delivered to the grid by	KPTCL/CEA	MWh/ annum	Measured	Once at the beginning	100%	Electronic	Crediting Period plus	Obtained from

	power source j in year y				of a crediting period			two years	authentic and latest local statistics.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

With reference to ACM0002, baseline emissions are estimated as under:

Calculation of electricity baseline emission factor:

An electricity baseline emission factor (EF_y) is calculated as a combined margin (*CM*), consisting of the combination of operating margin (*OM*) and build margin (*BM*) factors according to the following three steps. Calculations for this combined margin must be based on data from an official source and made publicly available.

STEP 1. Calculate the Operating Margin emission factor(s)

Out of four methods mentioned in the ACM0002, Simple OM approach has been chosen for calculations since in the Southern Regional grid mix, the low-cost/must run resources constitutes less than 50% of total grid generation. Simple OM factor is calculated as under.

$EF_{OM,simple,y}$ is calculated as the average of the most recent three years (2001-2002, 2002-2003 & 2003-2004) .

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \, x \, COEF_{i,j}}{\sum_{j} GEN_{j,y}}$$

where

$COEF_{i,j\,y}$ - Is the CO_2 emission coefficient of fuel i (t CO_2 / mass or volume unit of the fuel), calculated as given below and

$GEN_{j,y}$ - Is the electricity (MWh) delivered to the grid by source j

$_{i,j,y}$ - Is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y , calculated as given below

j - Refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports from the grid

The Fuel Consumption $F_{i,j,y}$ is obtained directly from Annual General Review reports published by the Central Electricity Authority.

The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \otimes EF_{CO2,i} \otimes OXID_i$$

where

NCV_i - Is the net calorific value (energy content) per mass or volume unit of a fuel i

$EF_{CO2,i}$ - Is the CO_2 emission factor per unit of energy of the fuel i

$OXID_i$ - Is the oxidation factor of the fuel

STEP 2: Calculate the Build Margin emission factor ($EF_{BM,y}$) as the generation-weighted average emission factor (t CO_2/MWh) of a sample of power plants m of the Southern Regional grid, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \, x \, COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

where

$F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ - Are analogous to the variables described for the simple OM method above for plants m.

The Build Margin emission factor $EF_{BM,y}$ is calculated ex ante based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently, since it comprises of larger annual power generation. (Refer Annex 3)

Further, power plant capacity additions registered as CDM project activities have been excluded from the sample group m of the Southern Regional grid mix.

STEP 3: Calculate the electricity baseline emission factor $EF_{electricity,y}$ as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

$$EF_y = W_{OM} \otimes EF_{OM,y} \oplus W_{BM} \otimes EF_{BM,y}$$

where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$), and $EF_{OM,Simple,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in t CO_2/MWh.

$$BE_y = EF_y \; x \; EG_y$$

where

BE_y - Are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

EG_y - Is the net quantity of electricity generated in the bagasse-based cogeneration plant due to the project activity during the year y in MWh

EF_y - Is the CO_2 baseline emission factor for the electricity displaced due to the project activity in during the year y in tons CO_2/MWh.

For this methodology, it is assumed that transmission and distribution losses in the electricity grid are not influenced significantly by the project activity. They are therefore neglected.

D. 2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

>>

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

>>

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

Not Applicable

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

>>

Formula used for estimation of the total net emission reductions due to the MSPL project activity during a given year *y* is as under.

$$ER_y = BE_y - PE_y - L_y$$

where

ER_y - Are the emissions reductions of the project activity during the year y in tons of CO_2

BE_y - Are the baseline emissions due to displacement of electricity during the year y in tons of CO_2

PE_y - Are the project emissions associated with MSPL

L_y - Are the emissions sources as leakage

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

>>

Data	Uncertainty level of data	Explain QA/QC procedures planned for these data, or why such procedures are not necessary
1. EG_y - Electricity supplied to the grid by the project activity	Low	Electricity meters are properly maintained with regular testing and calibration schedules developed as per the technical specification requirements to ensure accuracy.
2.EF_y - CO2 emission factor of the grid	Low	This is calculated based on the parameters 3. EFOM,y and 4. EFBM,y.
3. $EF_{OM,y}$ - CO2 operating margin emission factor of the grid	Low	This is calculated based on the parameters 5. Fi,j,y , 6. COEFi,j,y and 7. GENj,y..
4. $EF_{BM,y}$ - CO_2 build margin emission factor of the grid	Low	This is calculated based on the parameters 5. Fi,m,y , 6. COEFi,m,,y and 7. GENm,,y..
5. $F_{i,j,y}$ / $F_{i,m,y}$ - Amount of fossil fuel i, consumed by each power source/ plant in year y	Low	This is calculated based on the parameters 2. NCVi, 6. Ei,j/Ei,m and 7. GENm,,y..
6. $COEF_{i,j,y}$ / $COEF_{i,m,y}$ - CO2 emission factor of each fuel type i,	Low	Please refer to point 3.
7. $GEN_{j,y}$ / $GEN_{m,y}$ - Electricity delivered to the grid by power source j/m in year y	Low	This is based on authentic grid data.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

>>

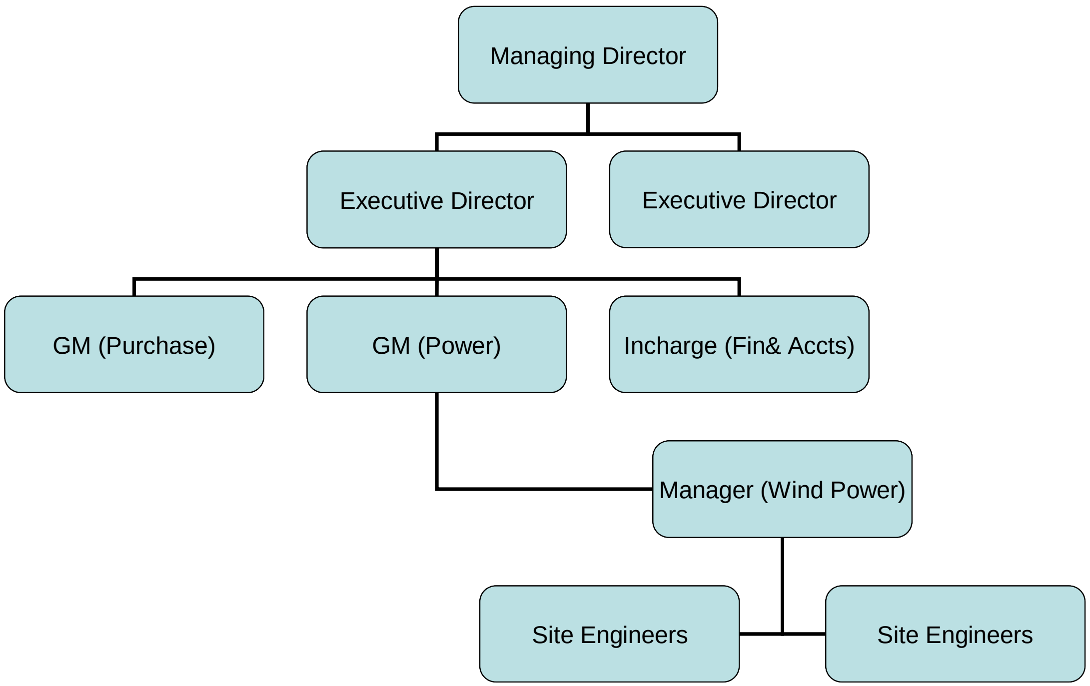
As emission reductions from the project are determined by the number of units exported to the grid, it is mandatory to have a monitoring system in place and ensure that the project activity produces and exports the rated power at the stipulated norms. The sole objective of having a monitoring system is to have a constant watch on the emission reductions.

MSPL has an operational and management structure in place that the project proponent would implement, which has set procedures and systems to monitor emission reductions and any leakage effects, if any, generated by the project activity. The same would be followed and has been described in detail in the "MSPL CDM Project Manual". The manual describes the best practices in industry and established procedures for monitoring emission reductions. A CDM team / committee comprising of persons from relevant departments would be constituted, who would be responsible for carrying out the procedures set by the manual.

The operation and maintenance is one of the most critical aspect of the project activity. Since the operation of the plant is not limited to the operation and maintenance aspects alone, it needs constant follow up with other agencies like State Electricity Board, Electrical Licensing Board etc., to recoup the production and to meet the specified standards respectively.

To ensure trouble free operations and efficient generations through all the wind turbines, MSPL Limited has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines. These agreements initially are valid for a period of ten years. The contractor, under the O&M contract with MSPL would be responsible for the operation and maintenance of the project activity for the entire crediting period.

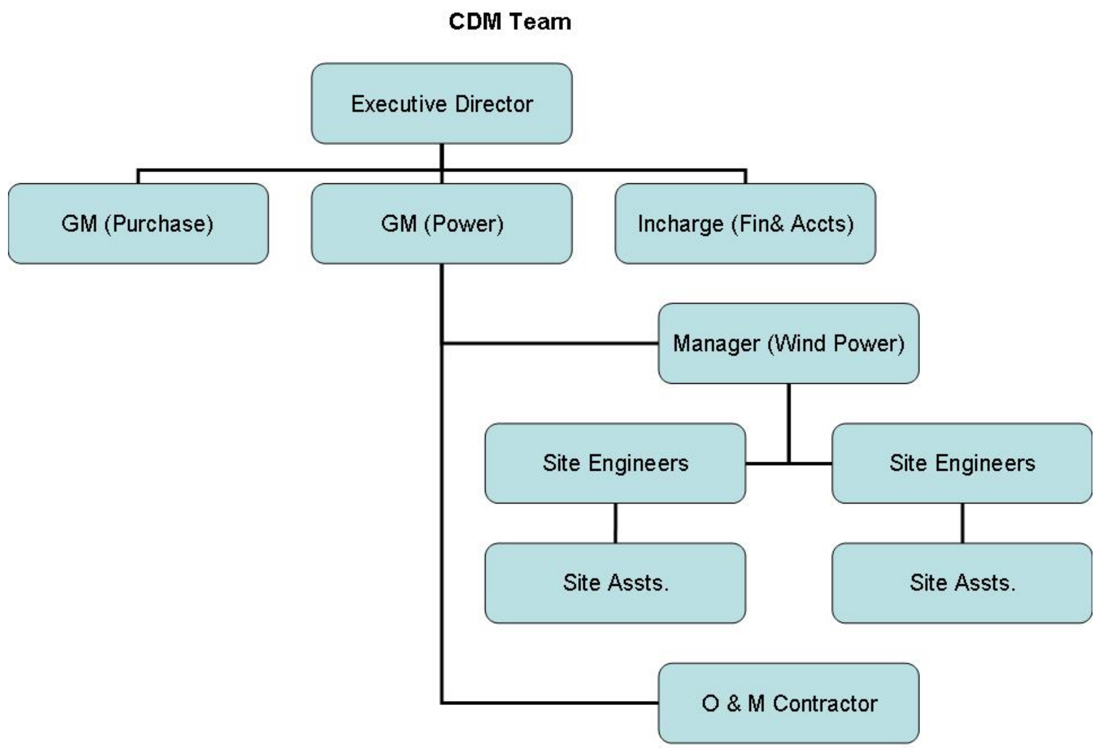
Besides, MSPL Limited has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power. The Project Management Structure is headed by the Managing Director himself and the structure is as follows.



The above team is responsible for all the activities related to the project. Site engineers are monitoring the daily routine activities and report the same to GM (Power) to Manager (Wind). GM (Power) is responsible for any breakdown and follow up with all the agencies, Government bodies and O & M contractor. He visits all the sites twice in a month and submits a monthly project report to the Executive Director. Executive Director briefs the Managing Director about the progress of the project, as and when required.

Further, to monitor the CDM activity, a team has been created under the leadership of the Executive Director which will track the generation, maintain records and pursue all other CDM related matters. This team will meet at least once in two months and review all the activities related with CDM.

The CDM team is as under:



The O & M contractor sends the daily generation report and the running hours of each turbine to GM (Power) and GM (Purchase). These reports are reconciled by the site representatives of MSPL Limited. In presence of MSPL representatives, KPTCL staff note the meter readings of all the turbines at the end of the month and generate a record for the power pumped into the grid. GM (Power) along with GM (Purchase) and Incharge (Finance & Accounts) evaluates the performance of the turbines and report to Executive Director.

Capacity Building measures would be imparted to the CDM team on maintenance procedures, calibration, monitoring and reporting aspects related to monitoring emission reductions. Internal audits, verifications and emergency preparedness are a significant part of the manual. The responsibility of monitoring different parameters and record keeping as per the set procedures would be undertaken by the O & M contractor along with the reviews on a regular basis by the project management to ensure conformance with the standards as described above. The procedures for project management have been reviewed and have been included in the MSPL CDM Project Manual. This manual has also clear linkages to the existing ISO 9001 management system procedures.

The O & M contractor operates and maintains the project activity through a full fledged trained service organization stationed at the site. The Service set up consists of site in-charge, service engineers, machine operators and security personnel. The number of personnel depends on the size of the site. The service engineers at site have been professionally trained. The machine operators communicate with the site office via a wireless network or alternatively by a cellular network. The turbines at site are connected to a Central Monitoring Station (CMS) located at site for 24/7 on-line, real-time surveillance of the machines. The service set up at site is equipped with motor cycles and other utility vehicles for immediate access to the machines. Essential spares are stocked at site stores apart from the other stocks kept at Central storage location. The service organization carries out the following activities:

Shall perform the following services in relation to the Equipment in accordance with

- → The O & M Manuals, the safety management plans and procedures and as per the manufacturers recommendations, where applicable or
- → In accordance with accepted industry practices

- Services involving Labour only:

➢ Routine Maintenance Services involving labour work

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 -

- → Tower Torquing
- → Blade Cleaning
- → Nacelle Torquing and Cleaning
- → Transformer Oil Filtration
- → Control Panel & LT Panel Maintenance
- → Site and Transformer Yard Maintenance

➢ Security Services

This service includes watch and ward and security of the wind farm and the equipment.

➢ Management Services

a) Data logging in for power generation, grid availability, machine availability.

b) Preparation and submission of monthly performance report in agreed format.

c) Taking monthly meter reading jointly with UTILITY, of power generated at Customer's Wind Farm and supplied to UTILITY Grid from the meter/s maintained by UTILITY for the purpose and co-ordinate to obtain necessary power credit report/ certificate.

- Technical Services
  - → Visual inspection of the WTGs and all parts thereof.
  - → Technical Assistance including checking of various technical, safety and operational parameters of the Equipment, trouble shooting and relevant technical services.

- Crane Services for attending Breakdown Repairs
  a. This involves providing Crane whenever required for attending Breakdown repairs.

- Maintenance & Repair Work involving Labour & Material

- I - Maintenance Work involving labour and materials

This involves labour as well as use of materials and consumables such as lubricants and oils, minor/ low value electrical and mechanical parts, etc. for preventive maintenance and upkeep of the Equipment including –

- → HT Line and Electrical Maintenance
- → Greasing of Rotor Bearings, Gear Box and Generator
- → Topping up of Gear Box, Hydraulic and Transformer Oil

- II - Breakdown Repair Work involving labour and materials

The Breakdown repair Work involve labour and use of components, spares and consumables in the event of any breakdown or suspected breakdown due to operational reasons in the Equipment or any part thereof. The breakdown shall be attended as soon as practically possible to put the Equipment back into operation. The breakdown repairs will cover cost of labour, spares/ materials and other works, which includes,

a) Spares repairs/replacement
b) Major breakdown as mentioned below -

b. Repairs/replacement of Generator and Motors
c. Repairs/replacement of Gear Box
d. Repairs/replacement of Transformers
e. Repairs/replacement of VCB
f. Repairs/replacement of Blades
g. Repairs/replacement of Controller and Control Panel
h. Repairs/replacement of Tower structure

c) Total replacement of oil in Gear Boxes and Transformers

d) Painting of Equipment

D.5 Name of person/entity determining the monitoring methodology:

>>

M/s. MSPL Limited

Nehru Cooperative Colony

Hospet - 583 203

Karnataka, India

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

>>

The calculation method for baseline and project emissions is consistent with the Approved Consolidated methodology ACM0002.

E.2. Estimated leakage:

>>

As the project activity is a wind based power generation project, there are no GHG emissions associated with the source. Therefore, no calculation is needed.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

>>

No significant leakage was identified with the project activity.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

>>

The MSPL project activity reduces carbon dioxide through displacement of grid electricity generation with fossil fuel based power plants by renewable-wind electricity. The emission reduction ERy due to MSPL project activity during a given year y is calculated as the difference between baseline emissions (BEy), project emissions (PEy) and emissions due to leakage (Ly), as per the formulae given below:

$$ER_y = BE_y – PE_y - L_y$$

where the

BEy = Baseline emissions (Please refer ‘Baseline emissions due to displacement of electricity’: Section B)

PEy = Project emissions; PEy = 0 for MSPL project activity.

Ly = Emissions due to Leakage. Ly = 0 for MSPL project activity, over the crediting period (10 years).

The project proponent does not claim carbon credits for emission reduction by any gas other than CO_2 – mentioned in the Annex A of the Kyoto Protocol. Also, the project has not been identified as a source of emission on of any of the other GHG’s. Therefore the anthropogenic emissions of the baseline are 2,532,408 tCO_2e per

year.

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

>>

The total emission reductions over the crediting period are 2,532,408 tCO_2e over the 10 year crediting period.

E.6. Table providing values obtained when applying formulae above:

>>

Following table indicates the baseline emissions, project emissions and emission reductions of each year of the crediting period. The project activity accounts for 2,532,408 tCO_2e of emission reductions over the crediting period of 10 years.

Year	Estimation of Baseline Emission Reductions tCO2e	Estimation of Project Emissions tCO2e	Estimation of Leakage tCO2e	Estimation of Total Emission Reductions tCO2e
2004-05	56,247	0	0	56,247
2005-06	275,129	0	0	275,129
2006-07	275,129	0	0	275,129
2007-08	275,129	0	0	275,129
2008-09	275,129	0	0	275,129
2009-10	275,129	0	0	275,129
2010-11	275,129	0	0	275,129
2011-12	275,129	0	0	275,129
2012-13	275,129	0	0	275,129
2013-14	275,129	0	0	275,129
Total	2,532,408	0	0	2,532,408

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

>>

Though this project activity does not fall under the purview of Environmental Impact Assessment notification of the Ministry of Environment and Forests -Government of India (as per the Environment Impact Assessment Notification S.O.60(E), dated 27/01/1994), due consideration has been given to environmental aspects. The Government of India has adopted an encouraging policy for private wind farms. MSPL already has an Environment Management system in place. All environmental related issues were identified and necessary steps to mitigate them have been put in place by the implementation of the Environmental Management system.

The company being conferred “National Environment Conservation” award by FIMI for the year 2000-2001, portrays the commitment and concern of the project promoter towards environment. As such, no significant impact is anticipated on the environmental front. However, certain foreseen impacts due to the project activity are described as under:

Construction Phase:

Impact on Land use

The land on which the project activity takes place is barren and unfertile. Prior to the project activity the land had no beneficial use. MSPL has bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people is involved in the course of the project activity.

Impact on Soil Use

The minor quantity of solid / liquid discharge, likely to be generated during the construction phase has no noticeable impact on soil use and the project proponent has made arrangements to dispose them in an environmentally acceptable manner.

Impact on Air Environment

Wind Power plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation. The source of emission that is anticipated is likely due to the exhaust released due to the running of the HEMV, during the movement of the construction material, which shall be properly maintained to minimize the smoke. The dust so generated during haulage shall be minimized by sprinkling of water.

Impact on Noise Environment

Personal protective equipments are provided to workers involved in the construction activity to mitigate the effects of noise pollution, but they have no impact on ambient noise level. The emissions involved in the

construction of the wind power plant and the gridlines are negligible as a percentage of the total power generated. Taking into consideration the project life cycle, the magnitude of the impacts during construction phase is negligible and exists for a temporary period of time till the end of construction phase. Therefore, it would not affect the environment considerably.

Operation and Maintenance Phase:

The coveted "National Safety Award" received by MSPL in 1987 shows the highest order of safety standards that the company maintains. Systematic and Scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on Land use

The project site is a barren land and unproductive area with no application and habitat. There are no migratory birds / endangered species in the region of project activity. Therefore, no harm on the ecological environment is envisaged.

Impact on Noise Environment

Noise is generated due to the movement of rotor blades. It has no direct effect on the population, as the area is less populated and noise generated will be attenuated by ambient conditions. Though noise is generated during the operation of Wind Turbine Generators, Considering the overall impact of the project in reducing GHG's, creation of employment etc., makes this effect negligible.

Socio-Economic Impacts

There is no inconvenience to the local community due to the transmission lines. The locals have benefited economically through land sales. The project activity helps the upliftment of skilled and unskilled manpower in the region. The project will be providing employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity improves employment rate and livelihood of local populace in the vicinity of the project. Moreover, the project generates eco-friendly, GHG free power which contributes to sustainable development of the region.

Conclusion

The net impact under environmental pollution category would be positive as all necessary abatement measures would be adopted and periodically monitored. The project activity does not have any major adverse impacts on environment during its construction or operational phase. The human interest parameters would show positive impacts due to increased job opportunities at the facility as well as other ancillary units coming up.

F.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 G. Stakeholders' comments

>>

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

>>

MSPL project activity, generating & exporting power to the KPTCL grid are located in the areas of Chitradurga, Davangere & Bellari districts of the state of Karnataka. MSPL communicated with the relevant stakeholders their plan to implement the project activity. Representatives of MSPL approached all the stakeholders, met them in person and explained to them about the MSPL CDM project activity, seeking their comments about the project and have completed the necessary consultation and documented their approval for the project. The information was provided to all the stakeholders in a manner they clearly understand who is consulting and why, the way in which decisions would be made and the type of consultation to be undertaken. All the consulted stakeholders have encouraged the project and provided full co-operation for its success.

The identified stakeholders are:

- Local Population,
- Urban Development Authority,
- NGO, bank, industries, hospitals & bank
- Designated National Authority, Government of India
- Ministry of Non Conventional Energy Sources, Government of India
- Karnataka Renewable Energy Development Limited
- Consultants
- Equipment Suppliers

Local elected body of representatives administering the local area:

The varied sections of the local population, village panchayat / NGO & local elected body of representatives administering the local area are a true representative of the local population in a democracy like India. Hence, their consents / permissions to set the project are necessary. MSPL has completed the necessary consultation and documented their approval for their project.

Local population comprises of the local people in and around the project area. The roles of the local people are as a beneficiary of the project. The construction and continuous operation included local manpower working at the plant site. Since the project activity provides good direct and indirect employment opportunities the local populace is encouraging and providing complete support. The project does not require any major displacement of any local population. Also, the installation of transmission lines would not create any inconvenience to the local population. In addition, the local population is also an indirect consumer of

the power that is supplied from the project. This is essentially because the power sold to the grid is expected to improve the stability in the local electricity network. Rather than causing any adverse social impacts on local population, the project would help them improve their quality of life. In summing up, the project activity has received complete support from the local populace.

Ministry of Non Conventional Energy Sources (MNES)

The government of India, through Ministry of Non-conventional Energy Sources (MNES), has been promoting energy conservation, demand side management and renewable energy projects including wind, small hydro and hydro / bio-mass power. MSPL's effort in implementing the wind power project is highly appreciated by them.

Designated National Authority - Ministry of Environment & Forest (MoEF), Government of India

The Ministry of Environment & Forests is the Designated National Authority in India. The government of India, through Ministry of Environment and Forests (MoEF) is encouraging project participants to take up such Climate Change initiatives. MSPL has submitted the Project Concept Note and Project Design Document to the MoEF for Host Country Approval and have obtained the same.

Consultants

Project consultants were involved in the pre contract and post contract project related activities like preparation of Detailed Project Report (DPR), preparation of basic and detailed engineering documents, preparation of tender documents, selection of vendors / suppliers, supervision of project implementation, successful commissioning and trial runs.

G.2. Summary of the comments received:

>>

Stakeholders' Involvement

As the MSPL project activity would be environmentally benign, all the stakeholders have proposed encouraging views and support the project as they are direct / indirect beneficiaries of the project activity.

Local population comprises of the local people in and around the project area from various sections of the society from industries, banks, hospitals, land owners, accountants, urban development authority, NGO & the general public. MSPL consulted the entire section of the society in the vicinity and have taken their opinion of the project and the letter issued by each of them is available with MSPL.

The roles of the local people are as a beneficiary of the project activity. In addition to this, it also includes local manpower. Since, the project activity has environmental benefits and would provide good direct employment opportunities the local populace has positive opinions about the project activity. The project activity did not result in any displacement of any local population. The project activity would not cause any adverse social impacts on local population rather would help in improving their quality of life.

In summing up, the project has not received any negative from the stakeholders concerned. All the stakeholders have appreciated and encouraged MSPL Limited for taking up this project activity.

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

>>

MSPL representatives met with various stakeholders including the local population and apprised them about the project activity and sought their support for the project activity. The comments received from the relevant stakeholders regarding the project activities were all in favour of the project activity and were in fact encouraging the implementation of the project activity.

They were commended for their voluntary action towards the project development, promotion of eco-friendly power generation and concern of the company towards environment and local population.

The project activity has received positive comments from both government and non-government parties.

As there were no negative comments from any of the concerned stakeholders, no corrective action was made. As per UNFCCC requirement, the Project Design Document will be published at the validator's web site for public comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Table 1.1: Project Proponent

Organization:	MSPL Limited
Street/P.O.Box:	
Building:	Nehru Cooperative Colony
City:	Hospet
State/Region:	Karnataka
Postfix/ZIP:	583203
Country:	India
Telephone:	08294 – 232003-06
FAX:	
E-Mail:	shirolkar@mspllimited.com
URL:	www.mspllimited.com
Represented by:	
Title:	General Manager - Operations
Salutation:	Mr
Last Name:	Shirolkar
Middle Name:	
First Name:	B.W
Department:	
Mobile:	+91-9945680159
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Public Funding is available to the project activity

Annex 3
BASELINE INFORMATION

Calculation of Baseline Emission factor for Southern Region

	2001-02		2002-03		2003-04	
Sector	MU	%	MU	%	MU	%
Thermal Based	84031.63	62.95	92053.19	67.03	95898	67.15
Gas Based	10329.45	7.74	13950.1	10.16	16949	11.87
Diesel Based	4135.12	3.10	4358.5	3.17	3225	2.26
Hydro-State	26260.42	19.67	18286.79	13.32	16630	11.64
Nuclear Based	5243.83	3.93	4390	3.20	4700	3.29
IPP-Co-Generation+BIOMASS	2023.82	1.52	2676.32	1.95	1910	1.34
IPP-Wind	1456.09	1.09	1606.81	1.17	3500	2.45
Total	133480.4	100.00	137321.7	100.00	142812.0	100.00
Total generation excluding Low-cost power generation	98496.20	73.79	110361.79	80.37	116072.00	81.28
Generation by Coal and Lignite out of Total Generation excluding Low-cost power generation	84031.63	62.95	92053.19	67.03	95898.00	67.15
Generation by Gas out of Total Generation excluding Low-cost power generation	10329.45	7.74	13950.10	10.16	16949.00	11.87
Generation by Diesel out of Total Generation excluding Low-cost power generation	4135.12	3.10	4358.50	3.17	3225.00	2.26
Estimation of Baseline Emission Factor (tCO_2/MU)						
Simple Operating Margin						
Fuel 1 : Coal (Steam Stations)						
Avg. Calorific Value of Coal used (kcal/kg)		4845.0		4171.0		3820.0
Coal consumption (tons/yr)		53107000		65997000		52985000
Emission Factor for Coal-IPCC standard value (tonne CO2/TJ)		96.1		96.1		96.1
Oxidation Factor of Coal-IPCC standard value		0.98		0.98		0.98
COEF of Coal (tonneCO2/ton of coal)		1.91		1.64		1.51
Emissions per year (tCO2)		101460728.10		108546745.94		79812097.76
Fuel 2 : Furnace Oil (Steam Stations)						
Avg. Calorific Value of fuel used (kCal/kg)		10497		10726		10365
Fuel consumption (tons/yr)		115103.7		103163.46		50275.21
Emission Factor for Fuel- IPCC		73.33		73.33		73.33

standard value(tonne CO2/TJ)						
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Gas(tonneCO2/ton of Oil)		3.19		3.26		3.15
Emissions per year (tCO2)		367270.60		336353.06		158399.89
Fuel 3 : Diesel Oil (Steam Stations)						
Avg. Calorific Value of fuel used (kCal/kg)		10293		9760		10186
Fuel consumption (tons/yr)		5821.65		7145.95		28076.35
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		74.07		74.07		74.07
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Fuel(tonneCO2/ton of fuel)		3.16		3.00		3.13
Emissions per year (tCO2)		18397.05		21412.63		87802.02
Fuel 4 : LSHS (Steam Stations)						
Avg. Calorific Value of fuel used (kCal/kg)		10457		10524		10302
Fuel consumption (tons/yr)		7321.6		5361.84		4672.8
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Fuel(tonneCO2/ton of gas)		3.18		3.20		3.13
Emissions per year (tCO2)		23272.59		17152.46		14632.90
Fuel 5 : Gas (Steam Stations)						
Avg. Calorific Value of Gas used (kCal/M3)		NA		NA		2000
Gas consumption (M3/yr)		0.00		0		1932274000.00
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)		56.10		56.10		56.10
Oxidation Factor of Gas-IPCC standard value		0.995		0.995		0.995
COEF of Gas(kgCO2/M3 of gas)		NA		NA		0.47
Emissions per year (tCO2)		0.00		0.00		903206.01
Fuel 6 : Naphtha (Gas Stations)						
Avg. Calorific Value of Fuel used (TJ/kt)		45.01		45.01		45.01
Fuel consumption (tons/yr)		149197.41		322854.84		478596.51
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.995		0.995		0.995
COEF of Fuel(tonneCO2/ton of Fuel)		3.284		3.284		3.284

Emissions per year (tCO2)		489997.65		1060327.52		1571818.00
Fuel 7 : HSD (Gas Stations)						
Avg. Calorific Value of Fuel used (kCal/kg)		10293		9760		10186
Fuel consumption (tons/yr)		4614.65		233853.7		192933.85
Emission Factor for Fuel- IPCC standard value(tonne CO2/TJ)		74.07		74.07		74.07
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of fuel(tonneCO2/ton of Fuel)		3.160		2.996		3.127
Emissions per year (tCO2)		14582.80		700735.68		603354.10
Fuel 8 : Natural Gas (Gas Stations)						
Avg. Calorific Value of Gas used (TJ/Million M3)		37.98		37.98		37.98
Estimated Gas consumption (Million M3/yr)		3230		3130		2010
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)		56.10		56.10		56.10
Oxidation Factor of Gas-IPCC standard value		0.995		0.995		0.995
COEF of Gas(tonneCO2/Million M3 of gas)		2120.024		2120.024		2120.024
Emissions per year (tCO2)		6847678.25		6635675.82		4261248.69
Fuel 9 : Diesel (Diesel Stations)						
Avg. Calorific Value of Fuel used (kCal/kg)		10293		9760		10186
Diesel consumption (tons/yr)		648561.05		736047.3		12667.55
Emission Factor for Diesel-IPCC standard value (tonne CO2/TJ)		74.07		74.07		74.07
Oxidation Factor of Diesel-IPCC standard value		0.99		0.99		0.99
COEF of Diesel (tonneCO2/ton of diesel)		3.16		3.00		3.13
Emissions per year (tCO2)		2049523.97		2205543.90		39614.71
Fuel 10 : LSHS (Diesel Stations)						
Avg. Calorific Value of Fuel used (kCal/kg)		10457		10524		10302
Fuel consumption (tons/yr)		0		0		569756.88
Emission Factor for Fuel-IPCC standard value (tonne CO2/TJ)		73.33		73.33		73.33
Oxidation Factor of Fuel-IPCC standard value		0.99		0.99		0.99
COEF of Fuel (tonneCO2/ton of Fuel)		3.18		3.20		3.13
Emissions per year (tCO2)		0.00		0.00		1784197.02
Fuel 11 : Lignite						
Avg. Efficiency of power generation with lignite as a fuel, %		30		30		30
Avg. Calorific Value of Lignite used (kCal/kg)		2625		2686		2737

Estimated lignite consumption (tons/yr)		17318250		17738000		20755000
Emission Factor for Lignite-IPCC standard value (tonne CO2/TJ)		101.18		101.18		101.18
Oxidation Factor of Lignite-IPCC standard value		0.98		0.98		0.98
COEF of Lignite (tonneCO2/ton of lignite)		1.09		1.12		1.14
Emissions per year (tCO2)		18873997.43		19780680.95		23584578.25
EF (OM Simple, excluding imports from other grids), tCO2/MU		1321.32		1262.25		971.99
EF (OM Simple), tCO2/MU		1321.32		1262.25		971.99
Average EF (OM Simple), tCO2/MU						1185.19

Combined Margin Calculation

Considering 20% of Gross Generation						
Sector						
Thermal Coal Based-State					1554.00	5.15
Thermal Coal Based-Central					7296.00	24.20
IPP-Coal Based					0	0.00
Lignite based power plant					4668	15.48
IPP-Gas (Naphtha) Based					8520	28.26
IPP-Diesel Based					422.32	1.40
Hydro-State					2200.70	7.30
Nuclear Based-Central					0.00	0.00
IPP-Co-Generation + biomass					3493.40	11.59
IPP-Wind					2000	6.63
Total					30154	100.00
Generation by Coal out of Total Generation					8850.00	29.35
Generation by Gas out of Total Generation					8520.06	28.26
Generation by Diesel out of Total Generation					422.32	1.40
Generation by lignite out of Total Generation					4668	15.48
Built Margin						
Fuel 1 : Coal						
Avg. efficiency of power generation with coal as a fuel, %						32.5
Avg. calorific value of coal used, kcal/kg						4069.4
Estimated coal consumption, tons/yr						5752500.0
Emission factor for Coal (IPCC),tonne CO2/TJ						96.1
Oxidation factor of coal (IPCC standard value)						0.98
COEF of coal (tonneCO2/ton						1.605

of coal)						
Fuel 2 : Gas						
Avg. Efficiency of power generation with gas as a fuel, %						45
Avg. Calorific Value of Gas used (TJ/Million M3)						37.98
Estimated Gas consumption (Million M3/yr)						1794.64
Emission Factor for Gas- IPCC standard value(tonne CO2/TJ)						56.10
Oxidation Factor of Gas-IPCC standard value						0.995
COEF of Gas(tonneCO2/Million M3 of gas)						2120.024
Fuel 3 : Diesel						
Avg. efficiency of power generation with diesel as a fuel, %						41.7
Avg. calorific value of diesel used, kcal/kg						10348
Estimated diesel consumption, tons/yr						84168.1
Emission factor for Diesel (as per standard IPCC value)						74.07
Oxidation factor of Diesel (IPCC standard value)						0.99
COEF of diesel tonneCO2/ton of diesel						3.18
Fuel 4 : Lignite						
Avg. efficiency of power generation with lignite as a fuel, %						29
Avg. calorific value of lignite used, kcal/kg						2683
Estimated lignite consumption, tons/yr						5085715
Emission factor for lignite (as per standard IPCC value)						101.18
Oxidation factor of lignite (IPCC standard value)						0.98
COEF of lignite tonneCO2/ton of lignite						1.11
EF (BM , excluding imports) (tCO2/MU)						629.01
EF (BM), tCO2/MU						629.0
Combined Margin Factor (Avg of OM & BM)						907.1
Baseline Emissions Factor (tCO2/MU)						907.1

Emission Factor	Unit (tCO_2/Million Unit)
Operating Margin (OM)	**1185.19**
Build Margin (OM)	**629.0**
Combined Margin Emission Factor (CM)	**907.1**

Power generation Mix of Southern Region for five years					
Energy Source	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**
Total Power Generation (MU)	130371.1	133480.4	137321.71	142812.00	150372.74
Total Thermal Power Generation	83291.59	84031.63	92053.19	95898.00	97448.01
Total Low Cost Power Generation	37098.75	34984.16	26959.92	26740.00	37766.21
Thermal % of Total grid generation	63.89	62.95	67.03	67.15	64.80
Low Cost % of Total grid generation	**28.46**	**26.21**	**19.63**	**18.72**	**25.12**
% of Low Cost generation out of Total grid generation - Average of the five most recent years					**23.63**

Annex 4

MONITORING PLAN

As emission reductions from the project are determined by the number of units exported to the grid, it is mandatory to have a monitoring system in place and ensure that the project activity produces and exports the rated power at the stipulated norms. The sole objective of having a monitoring system is to have a constant watch on the emission reductions.

The project activity is designed and capable of synchronising within a frequency range of 47.5 to 51.5 Hertz and Voltage between 72.6 KV and 57.75 KV and a Power factor between 0.85 lagging and 0.95 leading at the generator terminals. The monitoring will be a part of the Distributed Control System (DCS) and the instrumentation system is a microprocessor based one with the desired level of accuracy.

The delivered energy shall be metered by MSPL and KPTCL at the high voltage side of the step up transformer installed at the receiving station. Metering equipment shall be electronic trivector meters of accuracy 0.2% required for the project. The metering equipment shall be maintained in accordance with electricity standards and have the capability of recording half-hourly and monthly readings, which in turn are produced to KPTCL. The meters installed should be capable of recording and storing the parameters for a minimum period of 35 days with digital output. The monthly meter readings at the project sites and the receiving station shall be taken simultaneously and jointly by the parties on the first day of the following month at 12 Noon. The recorded metering data shall be downloaded through meter recording instrument.

At the conclusion of each meter reading, an appointed representative of MSPL and KPTCL will sign a document indicating the number of kilowatt-hours indicated by the meter. The Main and Energy check meters (export and import) transformers, and all associated instruments installed at the project shall be of 0.2% accuracy class. Each meter shall be jointly inspected and sealed on behalf of MSPL and KPTCL, in the presence of its authorised representatives. All the Main and Check meters shall be tested for accuracy every calendar quarter with reference to a portable standard meter which shall be of an accuracy class of 0.1%. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times.

ABBREVIATIONS

ACM	Approved Consolidated Methodology
BEF	Baseline emission factor
BM	Build Margin
BAU	Business as usual
CO_2	Carbon dioxide
CER	Carbon Emission Reductions
CEA	Central Electricity Authority
CDM	Clean development mechanism
CM	Combined Margin
CII	Confederation of Indian industry
COP	Conference of parties
DNA	Designated National Authority
DPR	Detailed Project Report
DCS	Distributed Control System
EIA	Environmental Impact Assessment
EB	Executive Board
ESCOM	Energy Supply Company
FIMI	Federation of Indian Mineral Industries
GHG	Green House Gas
HEMV	Heavy Earth Moving Vehicle
HCA	Host Country Approval
IPP	Independent Power Producer
IREDA	Indian renewable energy development agency
INR	Indian Rupees
IPCC	Inter Governmental Panel on Climate Change
IRR	Internal rate of return
ISO	International Standards Organiasation
KERC	Karnataka Electricity Regulatory Commission
KPCB	Karnataka Pollution Control Board
KPCL	Karnataka Power Corporation Limited
KPTCL	Karnataka Power Transmission Corporation Limited
KW	Kilowatt
MW	Mega watt

MWh	Megawatt hour
CH_4	Methane
MT	Metric tonnes
MU	Million Units
MoEF	Ministry of Environment and Forests
MNES	Ministry of non-conventional energy sources
NOx	Nitrogen Oxides
OM	Operating Margin
PVS	P. Venganna Setty and Brothers
PM	Particulate Matter
PF	Power Factor
PGCIL	Power Grid Corporation of India Limited
PPA	Power Purchase Agreement
PTCIL	Power Trading Corporation of India Limited
PCN	Project Concept Note
PDD	Project design document
RMMPL	Ramgad Minerals and Mining Private Limited
SREB	Southern Regional Electricity Board
SOx	Sulphur Oxides
tCO_{2e}	Tonnes of carbon dioxide equivalent
UNFCCC	United Nations Framework Convention on Climate Change
VVNL	Vishveswaraya Vidyuth Nigama Limited
WACC	Weighted Average Cost of Capital
WREB	Western Regional Electricity Board
WEG's	Wind Electric Generators
WPP	Wind Power Project
WTG's	Wind Turbine Generators

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