

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

CONTENTS

- A. General description of the small scale project activity
- B. Application of a baseline and monitoring methodology
- C. Duration of the project activity / crediting period
- D. Environmental impacts
- E. Stakeholders' comments

Annexes

- Annex 1: Contact information on participants in the proposed small scale project activity
- Annex 2: Information regarding public funding
- Annex 3: Baseline information
- Annex 4: Monitoring Information

CDM – Executive Board

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	<ul style="list-style-type: none">• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document.• As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at http://cdm.unfccc.int/Reference/Documents.
03	22 December 2006	<ul style="list-style-type: none">• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

CDM – Executive Board

SECTION A. General description of small-scale project activity**A.1 Title of the small-scale project activity:**

>>

13.75 MW wind power project at Bellary & Davangere district in the state Karnataka, India

Document Version: 01

Date of completion of document: 02/09/2009

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

>>

Ramgad Minerals & Mining Limited and P. Venganna Setty & Brothers, are designed to construct 13.75 MW wind based power project (“Project”) at Bellary and Davangere districts in the state of Karnataka, India. The project activity comprises of installation and operation of 11 numbers of Wind Turbine Generators (WTGs), with each WTG having a capacity of 1250 kW. All WTGs are connected to Southern grid and the generated electricity is sold to Gulbarga Electricity Supply Company Limited (“GESCOM”) and Bangalore Electricity Supply Company Limited (“BESCOM”) in accordance with the Power Purchase Agreement (“PPA”). Suzlon Energy Limited (“Suzlon”) is the equipments supplier and Suzlon Infrastructure Services Limited (“SISL”) will be the operation and maintenance contractor for the project activity.

The project activity assists the sustainable growth of Karnataka state by providing clean and green electricity to Southern grid. The project leads to reduce greenhouse gas emissions because it displaces electricity which would have otherwise generated from various sources dominated by fossil fuel fired power projects connected to Southern grid.

Details of the WTGs installed under the proposed CDM project activity are provided in the table below.

Sr. No.	Name of Investor	WTG Capacity (kW)	WTG Location No.	WTG Location		
				Village	Taluka	District
1	Ramgad Minerals & Mining Limited	1250	K- 92	Bagli	Harapanahalli	Davangere
2		1250	K- 93	Bagli	Harapanahalli	Davangere
3		1250	K- 826	Sogi	Hadagali	Bellary
4		1250	K- 829	Sogi	Hadagali	Bellary
5		1250	K- 832	Kanivehalli	Harapanahalli	Davangere
6		1250	K- 837	Chigeteri	Harapanahalli	Davangere
7		1250	K- 838	Chigeteri	Harapanahalli	Davangere
8		1250	K- 839	Chigeteri	Harapanahalli	Davangere
9		1250	K- 842	Nichapura	Harapanahalli	Davangere
10	P. Venganna Setty & Brothers	1250	K- 827	Sogi	H Hadagali	Bellary
11		1250	K- 836	Chigateri	Harapanahalli	Davangere

CDM – Executive Board

Due to the present low proportion of renewable energy as compared to the proportion of fossil fuel based grid power in India, the Government of India (GOI) under the Ministry of New and Renewable Energy (MNRE) proposes to increase the renewable power base within the country. According to the National Electricity Policy 2005¹, the progressive share of electricity from non-conventional sources would need to be increased and such purchase by distribution companies shall be through competitive bidding process.

In the 11th five year plan (from 2007 – 2012), the GOI has proposed a physical target of 15,000 MW with an outlay of Rs.3, 925 crore for grid interactive/ distributed renewable power generation. The total investment required would be about Rs. 60,000 crore, which amounts to leveraging 15.5 times the proposed budgetary support. This includes 1,000 MW targeted from distributed renewable power systems (DRPS) with an outlay of Rs. 2,100 crore, and Rs. 25 crore for performance testing. The detailed break-up is given below:

S. No.	Programme Component	Physical Target (MW)	Proposed Outlay (Rs in crore)
1	Wind power	10,500	75*
2	Small hydro	1,400	700
3	Co-Generation	1200	600
	Biomass power	500	200
4	Urban waste to energy	200	150
5	Industrial waste to energy	200	75
	Sub-total (A)	14,000	1,800
6	Solar power(grid-interactive/DRPS)	50	200**
7	DRPS(excluding Solar)	950	1,900
	Sub-Total (B)	1,000	2,100
8	Performance testing	-	25
	Grand Total	15,000	3,925
* For Demonstration projects in states where there is sizable potential but no commercial activity has commenced			
**Subsidy limited to Rs 50,000 per household			

Source: *XIth Plan Proposals for New and Renewable Energy, MNRE, GOI, December 2006*(Reference: http://planningcommission.gov.in/aboutus/committee/wrkgrp11/wg11_renewable.pdf, please refer section 3.9 on page 22)

Thus, it is evident that by setting up such policies, the Government is trying to accelerate investment into the grid connected renewable energy generation sector and thereby decrease the high carbon intensive power generation within the country. The renewable resources therefore cause no negative impact on the surrounding environment contributing to environmental well-being.

The proposed CDM project activity assists in the sustainable development of the Country, and the State of Karnataka by increasing availability of clean power, reducing dependency on fossil fuels, reducing local air pollution, providing emission free clean electricity, contribute to the development of supporting infrastructure such as road network and providing employment to rural youth both during the construction phase and in support services during entire lifetime of the project.

¹ <http://pib.nic.in/archieve/others/2005/nep20050209.pdf> (please refer point 15 on page 4 and point 26 on page 5 of the report)

CDM – Executive Board

A.3. Project participants:

>>

The proposed CDM project has been implemented and is owned by Ramgad Minerals & Mining Limited and P. Venganna Setty & Brothers. P. Venganna Setty & Brothers has authorised to Ramgad Minerals & Mining Limited to act as Project Participant for their wind power project. Ramgad Minerals & Mining Limited is a private entity. Presently there is no Annex 1 participant in the project activity and Ramgad Minerals & Mining Limited is the sole participant.

Name of Party involved (*) ((host) indicates a host party)	Private and/or public entity (ies) Project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/ No)
Government of India (a host party)	Ramgad Minerals & Mining Limited (a private entity)	No

A.4. Technical description of the small-scale project activity:**A.4.1. Location of the small-scale project activity:**

>>

A.4.1.1. Host Party(ies):

>>

Government of India

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

>>

Southern Region / Karnataka State

A.4.1.3. City/Town/Community etc:

>>

Village: Sogi, Chigeteri, Kanivehalli, Bagli, Nichapura

Taluka: H Hadagali & Harpanahalli

District: Bellary & Davangere

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

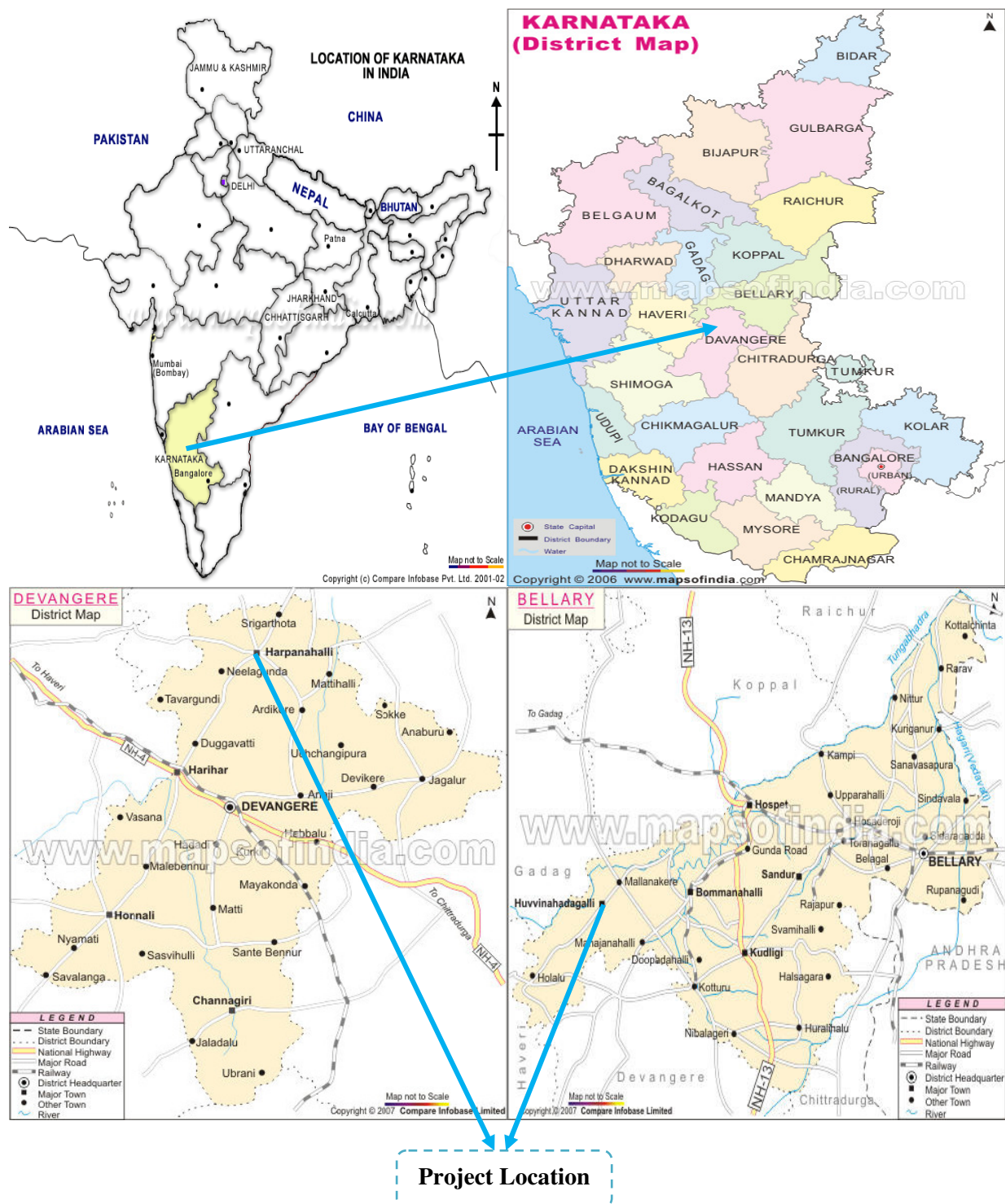
>>

The details of physical location including unique identification of the proposed CDM project activity are set out in the table below:

Sr. No	WTG Capacity (kW)	WTG Location No.	WTG Unique Identification No.	Latitude	Longitude
1	1250	K- 92	RMML- 1	N 14° 50' 49.2"	E 76° 00' 45.5"
2	1250	K- 93	RMML- 2	N 14° 50' 44.3"	E 76° 00' 50.1"
3	1250	K- 826	RMML- 3	N 14° 56' 09.9"	E 75° 57' 04.0"
4	1250	K- 829	RMML- 4	N 14° 55' 50.1"	E 75° 57' 31.2"
5	1250	K- 832	RMML- 5	N 14° 52' 35.4"	E 76° 00' 19.7"
6	1250	K- 837	RMML- 6	N 14° 48' 51.0"	E 76° 02' 43.4"

CDM – Executive Board

7	1250	K- 838	RMML- 7	N 14° 48' 11.0"	E 76° 03' 10.8"
8	1250	K- 839	RMML- 8	N 14° 47' 56.5"	E 76° 03' 28.9"
9	1250	K- 842	RMML- 9	N 14° 48' 02.5"	E 76° 03' 25.6"
10	1250	K- 827	PVS- 1	N 14° 56' 05.0"	E 75° 57' 27.5"
11	1250	K- 836	PVS- 2	N 14° 49' 23.6"	E 76° 02' 19.0"



CDM – Executive Board

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

>>

The proposed CDM project activity will generate power using wind energy, which is a renewable source of energy. The proposed CDM project activity qualifies for the simplified modalities and procedures for the small scale CDM project activities as the electricity generation capacity of this project is 13.75 MW, which is less than the maximum qualifying capacity of 15 MW. The project activity utilizes the wind potential for power generation and exports the generated electricity to Southern grid.

The type and category of the project activity as per Appendix B to the simplified modalities and procedures for small-scale CDM project activities is as under:

Project Type: I - Renewable Energy Projects

Project Category: I.D. - Grid connected renewable electricity generation

Reference: AMS- I.D., Version 15², Scope: 01, EB 50 (Annex 29)

Technology/measures of the small-scale project activity are as follows:

Under the project activity, 11 numbers of 1250 kW Suzlon make Wind Turbine Generator machines have been installed. The technical specifications of the WTGs are as mentioned in the table below:

Technical Specifications of installed WTGs in the project activity

Sr. No.	Item	Description
1	Make	SUZLON
2	Model	S 64_1.25 MW_50Hz
	ROTOR	
3	Diameter	64 m
4	No of Rotor Blade	3
5	Orientation	Upwind
6	Rotational Speed	13.5 to 20.3 rpm
7	Rotational direction	Clockwise
8	Rotor blade material	Epoxy Bonded Fiber Glass
9	Swept area	3,217 m ²
10	Hub height	65 m Lattice/ 74.5 m Tubular Tower
11	Regulation	Active Pitch Regulation
	Operational data	
12	Cut in wind speed	3.5 m/s
13	Rated wind speed	14 m/s
14	Cut off wind speed	25 m/s
	Gearbox	
15	Type	One planetary stage/Two helical Stages
16	Gear ratio	1:74.9
17	Nominal load	1,390 KW

² http://cdm.unfccc.int/EB/050/eb50_repan29.pdf

CDM – Executive Board

18	Type of cooling	Forced oil cooling lubrication system
Generator		
19	Type	Induction Generator (Asynchronous),,
20	Rotational speed	1,006/1,506 rpm
21	Rated output	300/1250 KW
22	Rated voltage	690 VAC (Phase to Phase)
23	Frequency	50Hz
24	Insulation	Class H
25	Enclosure class	IP 56
26	Cooling system	Air cooled
Operating brakes		
27	Aerodynamic brake	Pitch/Full Blade
Yaw drive		
28	Method of operation	Yaw gears with four Motors
29	Bearing type	Slide bearing with gear ring & automatic greasing system

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

>>

Years	Estimated Annual Emission Reductions (tonnes of CO ₂ e)
2010	30,941
2011	30,941
2012	30,941
2013	30,941
2014	30,941
2015	30,941
2016	30,941
2017	30,941
2018	30,941
2019	30,941
Total Estimated Reductions (tonnes of CO ₂ e)	309,410
Total Number of Crediting Years	10
Annual average over the crediting period of estimated reductions (tonnes of CO ₂ e)	30,941

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

>>

There is no public funding involved in this project activity.

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

>>

CDM – Executive Board

According to paragraph 2 of Appendix C³ to the Simplified Modalities and Procedures for Small-Scale CDM project activities (FCCC/CP/2002/7/Add.3), a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

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

The project activity is not a de-bundled component of a large scale activity as there is no other small scale CDM project activity or an application registered by Ramgad Minerals & Mining Limited and P. Venganna Setty & Brothers, in the same project category in last two years with in 1 km of the project boundary of the proposed small scale project activity.

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

>>

The methodology applicable to this project activity is “Grid connected Renewable Electricity Generation – AMS- I.D.”, Version 15, Scope 1 (30 October 2009).

Reference: Annex 29 of EB-50, http://cdm.unfccc.int/EB/050/eb50_repan29.pdf

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

>>

In accordance with Appendix B of the simplified modalities and procedures for small-scale CDM project activities, the project category is categorized as Type – I. D., Version 15, Sectoral Scope 1, “Grid connected renewable electricity generation”. Category I. D. is applicable to projects that use renewable energy technologies that supply electricity to the grid.

The applicability criteria of the above methodology in the context of the proposed CDM project are as follows:

Technology /Measure as per AMS-I.D. (Version 15)	Measure of the proposed CDM project
This category comprises renewable energy generation units, such as photo voltaics, hydro, tidal/wave, wind, geothermal and renewable biomass, that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least	The proposed CDM project is a renewable power generation unit which uses wind as the source of energy supplementing the power needs of the Southern grid with clean wind power which otherwise is fed by fossil fuel

³ <http://cdm.unfccc.int/Panels/meth/meth3anc.pdf>

CDM – Executive Board

one fossil fuel fired generating unit.	based power plants. Thus, the proposed CDM project displaces electricity by renewable means (through wind power) that would otherwise have been generated through fossil fuel sources connected to Southern grid.
<p>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <ul style="list-style-type: none"> • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m². 	The project activity is not a Hydro power project. Hence this measure is not applicable.
If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	There is neither a non-renewable component added, nor co-firing is required for the proposed CDM project activity. At any given point of time, the capacity of the said project activity shall not exceed 15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	No such system is present in the project activity.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units	The project activity does not involve any addition to existing renewable energy generation unit and total installed capacity will remain at 13.75 MW throughout the entire crediting period.
Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	Not Applicable, this project activity is not a retrofit or modification of an existing facility.

As is therefore evident, the proposed CDM project meets all the applicability criteria set out under the selected small scale methodology and hence the project category is applicable to this project.

CDM – Executive Board

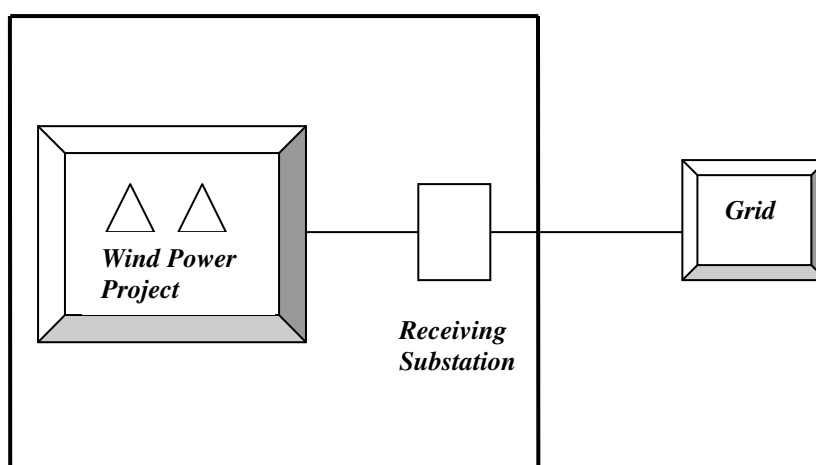
B.3. Description of the project boundary:

>>

In accordance with the approved small scale methodology I.D., the boundary of the proposed CDM project will be the physical boundary of the commissioned wind turbine generator machines located at Sogi village of H.Hadagali taluka at Bellary district and Chigateri, Kanivehalli, Bagli and Nichapura villages of Harpanahalli taluka at Davangere district in Karnataka state.

As per AMS- I.D./Version 15/Sectoral Scope 1/EB 50 (30 October 2009), the physical, geographical site of the renewable generation source delineates the project boundary. Thus, the project boundary for the proposed CDM project delineates the WTG installations, the metering equipment for each WTG and corresponding substation that acts as a node between generation point and grid. However, the grid is not a part of project boundary.

The project boundary is diagrammatically represented in the figure below:

Project Boundary*Diagrammatic Representation of Project Boundary***B.4. Description of baseline and its development:**

>>

The project category applicable to the proposed CDM project is AMS- I.D. Accordingly, the energy baseline being considered is as directed in paragraph 10 of the AMS- I.D./Version 15, that provides that the baseline emission is the product of electrical energy baseline $EG_{BL,y}$ expressed in kWh electricity produced by the renewable generating unit multiplied by an emission:

$$BE_y = EG_{BL,y} * EF_{CO_2}^4 \text{-----} (1)$$

Where:

BE_y	Baseline Emissions in year y; tCO ₂
$EG_{BL,y}$	Energy baseline in year y; kWh
EF_{CO_2}	Emission Factor in year y; tCO ₂ e/MWh

⁴ http://cdm.unfccc.int/EB/050/eb50_repan29.pdf (please refer para 10 on page 2)

CDM – Executive Board

As per paragraph 11 of the AMS- I.D./Version 15, The Emission Factor (EF_{CO2}) can be calculated in a transparent and conservative manner as follows:

- (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system".

OR

- (b) The weighted average emissions (in kg CO₂e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The applicable methodology also states that, calculations must be based on data from an official source (where available) and made publicly available. With the purpose of providing a ready reference for the emission coefficients to be used in CDM projects, the Government of India, has published, "CO₂ Baseline Database for the Indian Power Sector", Version 4.0, October 2008. This database is an official publication of the Government of India for the purpose of CDM baselines. It is based on the most recent data available with the Central Electricity Authority (CEA), Government of India.

The project participant selected **Combined Margin (CM)** *ex ante* approach to calculate emission coefficient (measured in tCO₂e/MWh or kgCO₂e/kWh) based on the publicly available data from official source.

Step 1: Calculate the operating margin emission factor according to the simple OM method

As per 'Tool to calculate the emission factor for an electricity system', the simple OM method (option a) can only be used if low cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The percentage shares of generation from low cost/must run power plants for the 5 most recent years in the Southern grid is as follows:

2003-04	2004-05	2005-06	2006-07	2007-08
16.2%	21.6%	27.0%	28.3%	27.1%

Source: CO₂ Baseline Database for the Indian Power Sector (Version 2.0 & 4.0)

Percentages of total grid generation by low cost/must run power plants (on the basis of average of five most recent years) = 24.04 %

Thus the simple OM method can be used to calculate the operating margin emission factor, as low cost/must run resources constitute less than 50% of total grid generation.

Applying 'Tool to calculate the emission factor for an electricity system', the project participant choose an *ex ante* option for calculation of the operating margin emission factor (EF_{grid,OM,y}) with a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

CDM – Executive Board

As per ‘Tool to calculate the emission factor for an electricity system’, Option B (“Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit”) is used to calculate simple OM emission factor. Where Option B is used, the simple OM emission factor is calculated based on the electricity generation of each power unit and an emission factor for each power unit, as follows:

$$EF_{\text{grid,OMsimple},y} = \Sigma (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}$$

Where:

- $EF_{\text{grid,OMsimple},y}$ Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)
 $EG_{m,y}$ Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
 $EF_{EL,m,y}$ CO₂ emission factor of power unit m in year y (tCO₂/MWh)
 m All power units serving the grid in year y except low-cost / must-run power units
 y Either the three most recent years for which data is available at the time of submission of the CDM PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

The CO₂ emission factor ($EF_{EL,m,y}$) data for simple OM, available under the CEA database⁵ (Version 4.0) for the last three years is as follows.

CO₂ emission factor for simple OM (tCO₂/MWh) (incl. Imports)			
Grid	2005-06	2006-07	2007-08
NEWNE	1.0195	1.0083	0.9992
South	1.0057	0.9991	0.9906
India	1.0166	1.0063	0.9973

The net electricity generation ($EG_{m,y}$) data, available under the CEA database⁶ (Version 4.0), of all generating power plants (not including low-cost / must-run power plants / units) for the last three year is as follows:

Net Generation (MWh) (incl. Imports)			
Grid	2005-06	2006-07	2007-08
NEWNE	364,124,000	384,597,000	409,834,000
South	100,978,000	109,116,000	114,702,000
India	465,102,000	493,713,000	524,536,000

Thus, as can be seen from the above tables, the 3 years generation-weighted OM average for the most recent three years available at the time of PDD validation, i.e. 2005-06, 2006-07, 2007-08 for Southern grid is:

$$EF_{\text{grid,OMsimple},y} = \Sigma (EG_{m,y} \times EF_{EL,m,y}) / \Sigma EG_{m,y}$$

⁵ http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

⁶ http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

CDM – Executive Board

$$= \frac{(100,978,000 * 1.0057 + 109,116,000 * 0.9991 + 114,702,000 * 0.9906)}{(100,978,000 + 109,116,000 + 114,702,000)} \text{ tCO}_2\text{e/MWh}$$

$$= \mathbf{0.9981 \text{ tCO}_2\text{e/MWh}}$$

Step 2: Calculate the build margin emission factor

Applying ‘Tool to calculate the emission factor for an electricity system’, the build margin emission factor ($EF_{\text{grid,BM},y}$) for the year 2007-08, applicable for the project is **0.7133** tCO₂/MWh from the CEA database⁷ (Version 4.0).

Step 3: Calculate the combined margin emissions factor

The combined margin emission factor ($EF_{\text{grid,CM},y}$) or baseline emission factor (EF_{CO_2}) is calculated as follows:

$$EF_{\text{grid,CM},y} = EF_{\text{grid,OM},y} * w_{\text{OM}} + EF_{\text{grid,BM},y} * w_{\text{BM}}$$

Where:

$EF_{\text{grid,BM},y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{\text{grid,OM},y}$	Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
w_{OM}	Weighting of operating margin emissions factor (%)
w_{BM}	Weighting of build margin emissions factor (%)
(where $w_{\text{OM}} + w_{\text{BM}} = 1$)	

The “Tool to calculate the emission factor for an electricity system” requires that for intermittent sources for power generation like wind as in the case of proposed CDM project the following weights to be used for calculating the emission factor for Combined Margin.

$$w_{\text{OM}} = 0.75$$

$$w_{\text{BM}} = 0.25$$

Using the values of emission factors for OM and BM, provided in the official database and as computed above; and the weights provided above, the value of the emission factor for the combined margin has been determined to be:

$$= 0.9981 * 0.75 + 0.7133 * 0.25 \text{ tCO}_2\text{e/MWh}$$

$$= \mathbf{0.9269 \text{ tCO}_2\text{e/MWh}}$$

Project activity emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to AMS I.D. (Version 15), there will be no project emissions in the project activity (PE_y = 0).

⁷ http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver4.pdf

CDM – Executive Board

Leakage

As per AMS I.D. (Version 15), no leakage has been considered for the calculation of emission factor (LEy = 0).

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

>>

The new wind turbine generators installed in the proposed CDM project, substitute the baseline consumption of fossil fuel operated power plants connected to Southern grid, with cleaner zero green house gas emitting wind power plant. Thus, more carbon intensive fossil fuels are substituted with zero carbon intensive sources of energy by the operation of the proposed CDM power plant.

Investment in wind power projects in the state of Karnataka is not mandatory. There are no national or local laws or regulations that mandate this investment i.e. setting up of wind power projects, to be undertaken. Setting up of wind power projects in Karnataka state is a voluntary activity.

As wind power projects are considered to be only marginally viable, thus, in absence of CDM benefits the proposed CDM project would not have attracted investment for the project investors. The CDM benefits that it would get as a result of the proposed CDM activity provided the additional incentives, and the required motivation to go ahead with the investment activity. Thus CDM benefits played a key role in the creation of the power generation facilities under the proposed CDM project.

According to the Attachment A of Appendix B of the Simplified Modalities and Procedures for Small Scale CDM project activities (Version 07, 28th November 2005)⁸, the project participants are required to demonstrate that the project activity is additional and would not have occurred due to **at least one** of the following barriers:

- (a) Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions;
- (b) Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions;
- (c) Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions;
- (d) Other barriers: Without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

The project participant selected **Investment barrier** to demonstrate in a conservative and transparent manner that the proposed CDM project activity is financial unattractive.

Investment Barrier

⁸ http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentA.pdf

CDM – Executive Board

The project investors, with an intention to strengthen an environmentally responsible brand image to its clients and understanding the seriousness of the issue of global warming, and with the knowledge that wind power projects are a means of generating zero carbon intensive power, has taken the decision to invest in this project. The project investors carried out the financial analysis of the project and it was found to be only marginally viable. An investment analysis of the investment proposition in the proposed CDM project activity was carried out by the project investors with the Internal Rate of Return (IRR) of the project as the financial indicator. The 'Internal Rate of Return' is one of the known financial indicators used by banks, financial institutions, investors and project developers for making investment decisions.

As per Para 11, Guidance on the Assessment of Investment Analysis (Version 02), Annex 45, EB 41 Report, in cases where a benchmark approach is used, the applied benchmark shall be appropriate to the type of IRR calculated. Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR. The tool for demonstration and assessment of additionality [para-5, sub step 2(b)] also states that in such cases (where the project has more than one potential developer), the benchmark shall be based on parameters that are standard in the market, considering the specific characteristics of the project type. Therefore, the project participant has not used company or project specific parameters for setting up a benchmark (such as company WACC, project and company specific interest rates, etc.).

The Prime Lending Rate (PLR) published by the Reserve Bank of India (RBI) has been selected as an applicable benchmark for the proposed CDM project activity. The PLR is the benchmark interest rate at which commercial banks in India lend to their most credit worthy customers. The RBI publishes the average PLR of the five major nationalized banks in India in its weekly publication. Typically, projects in India would be borrowing debt at a rate equal to the PLR. Hence, for any project to be financially attractive, the IRR of the project must be equal or higher than the rate of borrowing on debt (i.e. PLR).

The PLR in the range of 13.75 % - 14.00 %⁹, was quoted by the RBI at the time of taking the investment decision for the project activity. As the PLR varies between 13.75 %- 14.00 %, the project participant has considered **13.75 %** (lowest of the 13.75%-14.00% PLR range) as the appropriate benchmark to assess the investment proposition in the proposed CDM project activity.

Key Assumption for Financial Analysis

Sub Project- 1: The following assumptions, used for the determination of *post-tax* Project IRR, are made by Ramgad Minerals & Mining Limited for their **11.25 MW** wind power project at the time of investment decision:

Assumptions/Considerations	Input Value	Unit	Basis
Installed Capacity	11.25	MW	Board Note Estimated by WTG Supplier using WASP tool
Number of 1.25 MW units	9	No.	
Projected Generation	27,450	MWh / Year	

⁹ <http://www.rbi.org.in/scripts/WSSView.aspx?Id=12950>

CDM – Executive Board

Project Commissioning Date	25-Mar-09	dd/mm/yy	As per the Proposal given by WTG Supplier
Capacity Utilization Factor (CUF)	27.85%	%	Calculated
Auxiliary Consumption	0.5%	%	KERC Order
Project Capital Cost	584,294	Thousand Rs.	As per the Proposal given by WTG Supplier
Power Tariff for first 10 years	3.40	Rs./ kWh	KERC Order/PPA
Power Tariff from 11 th to 20 th year	Operating Cost + 16% ROE	Rs. / kWh	KERC Order
CER Price (USD)	15	Euro/CER	Prevailing Market Rate
Exchange Rate	63.44	Rs./Euro	Euro exchange rate as on 01/09/2008 ¹⁰
CER Price (INR)	951.6	Rs./CER	Calculated
Emission Factor	0.9269	tCO ₂ e/MWh	CO ₂ baseline database from CEA, Version 4.0
Start date for fixed crediting period	1-May-2010	dd/mm/yy	PDD
O & M Expenses as % of Capital Cost	1.56%	For 2 nd year	As per the Proposal given by WTG Supplier
Annual Escalation in O & M Expenses	5%	per annum from 3 rd year onwards	As per the Proposal given by WTG Supplier
Administrative Overheads	2.0%	of revenues	As per company standards
Insurance Expenses	0.2%	of Capital Cost	As per the Proposal given by WTG Supplier
Income Tax Rate	33.99%	%	Income tax act
Minimum Alternate Tax	11.33%	of Book Profits	Income tax act
Depreciation Rate as per IT act (WDV)	80%	%	Income tax act
Depreciation Rate (St. Line)	4.75%	%	Companies Act
Salvage Value	5.00%	%	As per standard practice
Life of the project	20	Years	WTG Life

Project IRR (post tax) without CDM revenues for Sub Project- 1:

The *post-tax* Project IRR (without CDM revenues) is 10.15%, which is lesser than the benchmark (PLR) of 13.75%.

Project IRR (post tax) with CDM revenues for Sub Project- 1:

Realizing that the monetary benefits due to CDM will improve the Project IRR of the project, the financial analysis was repeated with CDM benefits as an additional source of revenue. The project IRR

¹⁰ <http://www.x-rates.com/cgi-bin/hlookup.cgi>

CDM – Executive Board

of the investment proposition with CDM benefits as additional revenue stream was found to be 13.52%. Although the Project IRR with CDM benefits was still not in the acceptable range it was decided to implement the project as a CDM project activity as the benefits from CDM have been able to reduce the viability gap to a large extent.

Sensitivity Analysis for 11.75 MW wind power project of Ramgad Minerals & Mining Limited (Sub Project- 1)

The results of the sensitivity analysis carried out in the range of +10% to -10% are provided in the Table below:

Consideration	Range of Sensitivity	Net Electricity Generation	Project Capital Cost	Rate of annual escalation of O & M cost from 3 rd year onwards	Results of Project IRR (without CDM revenue)	Results of Project IRR (with CDM revenue)
	(%)	MWh	(Thousand Rs.)	(%)	(%)	(%)
Project Scenario	Base Case	27,450	584,294	5	10.15	13.52
Variation in Net Electricity Generation	+10%	30,195			11.56	15.12
	-10%	24,705			8.70	11.86
Variation in Project Capital Cost	+10%		642,723		8.32	10.52
	-10%		525,864		12.34	15.90
Variation in Rate of Annual Escalation in O & M Cost	+10%			5.5	10.12	13.50
	-10%			4.5	10.18	13.54

Sensitivity Analysis for Tariff for Sub Project-1:

Tariff for the project is fixed for the first 10 year period and is not subject to any variations. Tariff for the next 10 years is determined based on tariff principles followed by the KEREC. In order to be conservative we have carried out a sensitivity of the IRR by considering tariff of Rs.3.40 per unit beyond the 10th year. The Project IRR (without CDM revenue) considering tariff of Rs. 3.40 per unit is 12.02% which is lower than the benchmark.

Sub Project- 2: The following assumptions, used for the determination of *post-tax* Project IRR, are made by P. Venganna Setty & Brothers for their **2.5 MW** wind power project at the time of investment decision:

Assumptions/Considerations	Input Value	Unit	Basis
Installed Capacity	2.5	MW	Board Note Estimated by WTG Supplier using WAsP
Number of 1.25 MW units	2	No.	
Projected Generation	6,100	MWh / Year	

CDM – Executive Board

Project Commissioning Date	25-Mar-09	dd/mm/yy	tool As per the Proposal given by WTG Supplier Calculated
Capacity Utilization Factor (CUF)	27.85%	%	
Auxiliary Consumption	0.5%	%	KERC Order
Project Capital Cost	129,843	Thousand Rs.	As per the Proposal given by WTG Supplier
Power Tariff for first 10 years	3.40	Rs./ kWh	KERC Order/PPA
Power Tariff from 11 th to 20 th year	Operating Cost + 16% ROE	Rs. / kWh	KERC Order
CER Price (USD)	15	Euro/CER	Prevailing Market Rate
Exchange Rate	63.44	Rs./Euro	Euro exchange rate as on 01/09/2008 ¹¹
CER Price (INR)	951.6	Rs./CER	Calculated
Emission Factor	0.9269	tCO ₂ e/MWh	CO ₂ baseline database from CEA, Version 4.0
Start date for fixed crediting period	1-May-2010	dd/mm/yy	PDD
O & M Expenses as % of Capital Cost	1.56%	For 2 nd year	As per the Proposal given by WTG Supplier
Annual Escalation in O & M Expenses	5%	per annum from 3 rd year onwards	As per the Proposal given by WTG Supplier
Administrative Overheads	2.0%	of revenues	As per company standards
Insurance Expenses	0.2%	of Capital Cost	As per the Proposal given by WTG Supplier
Income Tax Rate	33.99%	%	Income tax act
Minimum Alternate Tax	11.33%	of Book Profits	Income tax act
Depreciation Rate as per IT act (WDV)	80%	%	Income tax act
Depreciation Rate (St. Line)	4.75%	%	Companies Act
Salvage Value	5.00%	%	As per standard practice
Life of the project	20	Years	WTG Life

Project IRR (post tax) without CDM revenues for Sub Project-2:

The *post-tax* Project IRR (without CDM revenues) is 10.15%, which is lesser than the benchmark (PLR) of 13.75%.

Project IRR (post tax) with CDM revenues for Sub Project-2:

¹¹ <http://www.x-rates.com/cgi-bin/hlookup.cgi>

CDM – Executive Board

Realizing that the monetary benefits due to CDM will improve the Project IRR of the project, the financial analysis was repeated with CDM benefits as an additional source of revenue. The project IRR of the investment proposition with CDM benefits as additional revenue stream was found to be 13.52%. Although the Project IRR with CDM benefits was still not in the acceptable range it was decided to implement the project as a CDM project activity as the benefits from CDM have been able to reduce the viability gap to a large extent.

Sensitivity Analysis for 2.5 MW wind power project of P. Venganna Setty & Brothers (Sub Project- 2)

The results of the sensitivity analysis carried out in the range of +10% to -10% are provided in the Table below:

Consideration	Range of Sensitivity	Net Electricity Generation	Project Capital Cost	Rate of annual escalation of O & M cost from 3 rd year onwards	Results of Project IRR (without CDM revenue)	Results of Project IRR (with CDM revenue)
	(%)	MWh	(Thousand Rs.)	(%)	(%)	(%)
Project Scenario	Base Case	6,100	129,843	5	10.15	13.52
Variation in Net Electricity Generation	+10%	6,710			11.56	15.12
	-10%	54,90			8.70	11.86
Variation in Project Capital Cost	+10%		142,827		8.32	10.52
	-10%		116,859		12.34	15.90
Variation in Rate of Annual Escalation in O & M Cost	+10%			5.5	10.12	13.50
	-10%			4.5	10.18	13.54

Sensitivity Analysis for Tariff for Sub Project-2:

Tariff for this sub project is also fixed for the first 10 year period and is not subject to any variations. Tariff for the next 10 years is determined based on tariff principles followed by the KERC. In order to be conservative we have carried out a sensitivity of the IRR by considering tariff of Rs.3.40 per unit beyond the 10th year. The project IRR (without CDM revenue) considering tariff of Rs. 3.40 per unit is 12.02% which is lower than the benchmark.

It can be seen from above tables that an increase in Net Electricity Generation by 10%, a decrease in the Project Cost by 10% and a decrease in the rate of yearly escalation of O & M Cost by 10%, the Project IRR (without CDM revenue) for both Sub Project- 1 and Sub Project- 2 still remain below the benchmark. The Project IRR (without CDM revenue) for both Sub Project- 1 and Sub Project- 2 also remain below the benchmark considering fixed tariff for life of the project. However, these scenarios are not possible for the project activity.

CDM – Executive Board

As it is evident by this sensitivity analysis, even with reasonable variations in the value of the considerations used for the investment analysis, the investment proposition in the proposed CDM project activity remains unattractive in the absence of the CDM benefits. It is the CDM benefits which make the investment proposition in the proposed CDM project activity attractive enough for the project participant to go ahead with the project. Hence, it can be justifiably concluded that the CDM revenue that the project activity would obtain through sale of the emission reductions, is very crucial to sustain the operations of the project activity.

Prior Consideration of CDM

The project participant, during their decision to invest in the project, had seriously considered CDM as a source of additional revenue (in their board meeting dated 2nd September 2008) for investing in the project. The board resolution clearly states that the additional revenue from CDM would mitigate the financial barriers which are associated with the implementation and operation of the project. Apart from this, there are several other initiatives have been taken by the project participant to successfully and timely implement this project as a CDM project activity.

The chronological timeline featuring the main activities to establish and commission the proposed CDM project activity are detailed in the following table:

S. No.	Activity/Event	Date	Documents/Emails
1.	Initial Proposal from WTG Supplier (Suzlon) for development of this wind power project including CDM revenue	27 August 2008	Copy of the Proposal from Suzlon
2.	Decision to invest in the project activity and considering it as a CDM initiative	02 September 2008	Certified true copy of the Board Resolution
3.	Purchase order placed by P. Venganna Setty & Brothers for supply of 2 nos. of 1250 kW Suzlon make WTGs	25 September 2008	Copy of Purchase Order for 2 WTGs
4.	Purchase order placed by Ramgad Minerals & Mining Limited for supply of 7 nos. of 1250 kW Suzlon make WTGs	13 January 2009	Copy of Purchase Order for 7 WTGs
5.	Purchase order placed by Ramgad Minerals & Mining Limited for supply of 2 nos. of 1250 kW Suzlon make WTGs	5 May 2009	Copy of Purchase Order for 2 WTGs
6.	Letter for intimating UNFCCC (CDM-EB) on progress of the project activity in line with the guideline suggested in Paragraph B- New Project Activity, Point No.2 of Annex 46 of EB-46	16 February 2009	Copy of Letter to UNFCCC
7.	Letters for intimating DNA on progress of the project activity in line with the guideline suggested in Paragraph B- New Project Activity, Point No.2 of Annex 46 of EB-46	24 March 2009	Copy of Letter to DNA
6.	Request for proposal for CDM consultancy	14 March 2009	Copy of E-mail

CDM – Executive Board

7.	Initial Proposal from Deloitte for CDM consultancy to the project	24 March 2009	Copy of E-mail
8.	Discussion and Negotiation with Deloitte on the terms and conditions of the CDM consultancy Proposal	25 March 2009	Copy of E-mail
9.	Revised Proposal from Deloitte for CDM consultancy to the project	6 April 2009	Copy of E-mail
10.	Signing of the final contract with Deloitte for CDM consultancy	6 April 2009	Copy of Contract
11.	Invitation for Local Stakeholder Consultation through a local Newspaper	5 June 2009	Copy of Newspaper “Sanjay Vani”
12.	Local Stakeholder Consultation held at project site	21 June 2009	Documents related to Local Stakeholders Consultation
13.	First draft PDD submitted to the project participant by Deloitte	23 September 2009	Copy of E-mail
14.	Correspondence between the project participant and DOEs for taking up CDM validation services for the project	28 March 2009	Copy of E-mails
15.	Contract awarded to DOE for carrying out CDM validation of the project	15 September 2009	Contract Signed with TUV-Nord

The above chronology of events clearly shows that the real and continuing action to secure CDM status for the project was taken right at the time of project start.

B.6. Emission reductions:**B.6.1. Explanation of methodological choices:**

>>

The project activity meets the eligibility criteria to use simplified modalities and procedure for small scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. The total installed capacity of the project is 13.75 MW, which is less than the limit of 15 MW prescribed for small scale project. Moreover, being a renewable energy project, the project emissions are zero. The baseline and monitoring methodology being used for the project is AMS- I.D. Accordingly the emission reductions for the project will be determined.

Historically, the Indian power system was divided into five independent regional grids, namely Northern, Eastern, Western, Southern, and North-Eastern. Each grid covered several states (see Table below). Since August 2006, however, all regional grids except the Southern Grid have been integrated and are operating in synchronous mode, i.e. at same frequency. Consequently, the Northern, Eastern, Western and North-Eastern grids will be treated as a single grid and is being named as NEWNE grid in this document from financial year 2007-08 onwards for the purpose of this CO₂ Baseline Database. The Southern grid has also been planned to be synchronously operated with rest of all Indian Grid by early 12th Plan (2012-2017).

NEWNE Grid	Southern Grid
-------------------	----------------------

CDM – Executive Board

Northern	Eastern	Western	North-Eastern	Southern
Chandigarh	Bihar	Chhattisgarh	Arunachal Pradesh	Andhra Pradesh
Delhi	Jharkhand	Gujarat	Assam	Karnataka
Haryana	Orissa	Daman & Diu	Manipur	Kerala
Himachal Pradesh	West Bengal	Dadar and Nagar Haveli	Meghalaya	Tamil Nadu
Jammu & Kashmir	Sikkim	Madhya Pradesh	Mizoram	Pondicherry
Punjab	Andaman-Nicobar	Maharashtra	Nagaland	Lakshadweep
Rajasthan		Goa	Tripura	
Uttar Pradesh				
Uttarakhand				

Power generation and supply within the regional grid is managed by Regional Load Dispatch Centre (RLDC). The Regional Power Committees (RPCs) provide a common platform for discussion and solution to the regional problems relating to the grid. Each state in a regional grid meets its demand with its own generation facilities and also with allocation from power plants owned by the Central Sector such as NTPC and NHPC etc. Specific quotas are allocated to each state from the Central Sector power plants. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The regional grid thus represents the largest electricity grid where power plants can be dispatched without significant constraints and thus, represents the “project electricity system” for the Project. As the Project is connected to the Southern electricity grid, the Southern grid is the “project electricity system” and the entire Southern grid is considered as a single entity for estimation of the emissions in the baseline.

The monitoring is the part of the baseline methodology. As explained earlier, the baseline methodology AMS- I.D. (Version 15) is applicable to the project activity, also the monitoring protocol given in the methodology is applicable to the project activity as well. Accordingly, the emissions in the baseline scenario would be determined using the following formula:

$$BE_y = E_{GBL,y} * EFCO_2$$

Where:

BE_y	Baseline Emissions in year y; tCO ₂
$E_{GBL,y}$	Energy baseline in year y; kWh (Net electricity supplied by the project to the grid)
$EFCO_2$	Emission Factor in year y; tCO ₂ e/MWh (<i>ex-ante</i> Combined Margin Emissions Factor)

As wind power is a zero GHG emission technology, there will be no project emissions. Some power gets used for maintenance of the common facilities of the wind farm. During lean phases (when the WTGs are not generating power) some power gets drawn from the grid for maintenance of the common facilities. This aspect is taken care of as baseline emissions are computed on the net electricity supplied to the grid. For the purpose of determining the net electricity generated by the machines, tri vector meters are installed at the point of power transmission from each WTG to the grid, the readings of

CDM – Executive Board

which shall be regularly monitored and recorded by plant personnel as well as personnel of the state electricity utility.

Project Emissions (PEy)

Being a renewable and clean energy project, the project emissions (PEy) during operation are considered zero.

$$PEy = 0$$

Leakage (LEy)

Since there is no equipment is transferred from another project activity or that any existing equipment is transferred to another activity, leakage as per AMS- I.D. is taken as zero.

$$LEy = 0$$

Emission reductions are calculated as:

$$ERy = BEy - PEy - LEy$$

Considering the expected net electricity generation ($EG_{BL,y}$) by the project as 33,199 MWh (33,199,000 kWh) per year and taking combined margin emission factor (EF_{CO_2}) as 0.9269 tCO₂e/MWh (0.9269 kgCO₂e/kWh) for the generation mix (derived using the data from the Central Electricity Authority “CO₂ Baseline Database for the Indian Power Sector”, Version 4.0, October 2008 and procedure detailed in the ‘Tool to calculate the emission factor for an electricity system’), and considering $PEy = 0$, $LEy = 0$; the project activity is expected to reduce **30,941** tCO₂e annually.

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

>>

Data / Parameter:	W_{OM}
Data unit:	Fraction
Description:	Weight of Operating Margin Emission Factor in the emission factor used for the proposed CDM project activity
Source of data used:	Tool to calculate emission factor for an electricity system, Version 01.1, as per the EB 35, Annex 12.
Value applied:	0.75
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is in accordance with the latest version of the applicable methodology, AMS-I.D. – Grid Connected Renewable Electricity Generation,
Any comment:	

Data / Parameter:	W_{BM}
Data unit:	Fraction
Description:	Weight of Built Margin Emission Factor in the emission factor used for the proposed CDM project activity
Source of data used:	Tool to calculate emission factor for an electricity system, Version 01.1, as per the EB 35, Annex 12.
Value applied:	0.25

CDM – Executive Board

Justification of the choice of data or description of measurement methods and procedures actually applied :	This is in accordance with the latest version of the applicable methodology, AMS-I.D. – Grid Connected Renewable Electricity Generation,
Any comment:	

Data / Parameter:	EF _{OM,y}
Data unit:	tCO ₂ /MWh
Description:	Operating Margin Emission Factor for Southern grid in year y
Source of data used:	“CO ₂ Baseline Database for the Indian Power Sector”, User Guide, Version 4.0 dated October 2008, released by the Central Electricity Authority, Ministry of Power, Government of India
Value applied:	0.9981
justification of the choice of data or description of measurement methods and procedures actually applied :	The “CO ₂ Baseline Database for the Indian Power Sector”, User Guide, Version 4.0 dated October 2008, released by the Central Electricity Authority, Ministry of Power, Government of India, is the official database for statistics on the power sector in India in the various grids. It has been specially created to meet the data requirements for emission factors for the CDM project activities in the country. The database is used in accordance with the requirements in the applicable methodology stated as, “Calculations must be based on data from an official source and made publicly available”
Any comment:	The data is used in conjunction with ex ante option of the ‘Tool to calculate the emission factor for an electricity system’ released as Annex 12 of the EB 35 Report

Data / Parameter:	EF _{BM,y}
Data unit:	tCO ₂ /MWh
Description:	Build Margin Emission Factor for Southern grid in year y
Source of data used:	“CO ₂ Baseline Database for the Indian Power Sector”, User Guide, Version 4.0 dated October 2008, released by the Central Electricity Authority, Ministry of Power, Government of India
Value applied:	0.7133
Justification of the choice of data or description of measurement methods and procedures actually applied :	The “CO ₂ Baseline Database for the Indian Power Sector”, User Guide, Version 4.0 dated October 2008, released by the Central Electricity Authority, Ministry of Power, Government of India, is the official database for statistics on the power sector in India in the various grids. It has been specially created to meet the data requirements for emission factors for the CDM project activities in the country. The database is used in accordance with the requirements in the applicable methodology stated as, “Calculations must be based on data from an official source and made publicly available”
Any comment:	

Data / Parameter:	EF _{CO2}
Data unit:	tCO ₂ /MWh
Description:	Combined Margin Emission factor for the proposed CDM project
Source of data	Computed using the following formula

CDM – Executive Board

used:	$EF_{CO2} = W_{OM} * EF_{OM,y} + W_{BM} * EF_{BM,y}$ http://cdm.unfccc.int/methodologies/SSCmethodologies/AppB_SSC_AttachmentA.pdf Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”
Value applied:	0.9269
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is in accordance with the latest version of the applicable methodology, AMS-I. D. – Grid Connected Renewable Electricity Generation, and the “Tool to calculate the Emission Factor for an Electricity System, Version 01.1, Annex 12 of EB 35 report.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

The calculations for $EG_{BL,y}$ (Energy baseline in year y *or* Net electricity supplied by the project to the grid in year y) in MWh are tabulated as below:

S. No.	Parameter	Formula Used	Value
1	Net electricity supplied to the grid or Energy baseline in a year ($EG_{BL,y}$)	$EG_{BL,y} = (EG_{export,y} - EG_{import,y})$	33,382 MWh
2	Emission Factor (EF_{CO2})	$W_{OM} * EF_{OM,y} + W_{BM} * EF_{BM,y}$	0.9269 tCO ₂ e/MWh

Where:

W_{OM} = Weight of Operating Margin Emission Factor in the emission factor used for the proposed CDM project activity

W_{BM} = Weight of Build Margin Emission Factor in the emission factor used for the proposed CDM project activity

$EF_{OM,y}$ = Operating Margin Emission Factor for Southern grid in year y

$EF_{BM,y}$ = Build Margin Emission Factor for Southern grid in year y

As per the methodology AMS- I.D., if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity, leakage is to be considered. However, in the proposed CDM project, the wind power project is a new project, therefore, no leakage has been considered.

The emissions in the baseline scenario would be determined using the following formula:

$$BE_y = EG_{BL,y} * EF_{CO2}$$

$$BE_y = 33,382 \text{ MWh} * 0.9269 \text{ tCO}_2\text{e/MWh}$$

$$BE_y = 30,941 \text{ tCO}_2\text{e}$$

CDM – Executive Board

Being a renewable and clean energy project, the project emissions (PEy) and Leakage (LEy) during operation are considered zero.

The emission reductions (ERy) are calculated as BEy-PEy-LEy. Thus, the emission reductions (ERy) from the project activity have been calculated as **30,941 tCO₂e / annum**.

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

>>

Year	Estimation of project activity emissions (tCO ₂ e)	Estimation of baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emission reductions (tCO ₂ e)
For Fixed Crediting Period				
2010	0	30,941	0	30,941
2011	0	30,941	0	30,941
2012	0	30,941	0	30,941
2013	0	30,941	0	30,941
2014	0	30,941	0	30,941
2015	0	30,941	0	30,941
2016	0	30,941	0	30,941
2017	0	30,941	0	30,941
2018	0	30,941	0	30,941
2019	0	30,941	0	30,941
Total (tonnes of CO₂e)	0	309,410	0	309,410

B.7 Application of a monitoring methodology and description of the monitoring plan:**B.7.1 Data and parameters monitored:**

>>

Data / Parameter:	EGBL _y (Energy baseline <i>OR</i> Net Electricity supplied to the grid by the project)
Data unit:	kWh
Description:	Energy baseline in year y <i>OR</i> Net electricity supplied to the grid by the project during the year y
Source of data to be used:	The quantity of net electricity supplied to the grid by the project will be picked from the Joint Meter Reading (JMR) certificate. The value for net electricity supplied to the grid will be cross verified from the monthly Proforma invoice sent by the GESCOM/BESCOM to the project participant (statements on payment towards power purchased).
Value of data	33,382,000 kWh/year The value will vary and will be obtained from monitoring the electricity generated by the wind power project during the particular year.
Description of measurement methods and procedures to be applied:	Electronic trivector energy meters of accuracy class 0.2 will be used. On a monthly basis, joint meter readings (JMRs) of the energy meters would be taken by representatives of the project promoters and the respective government authorities. WTG controller data may also be used for proportioning of

CDM – Executive Board

	electricity generation data as described in section B.7.2. The procedures for metering and meter reading will be as per the provisions of PPA. Refer Section B.7.2 of PDD for an illustration of the provisions for measurement methods.
QA/QC procedures to be applied:	Calibration of energy meters would be carried out on an annual basis. QA/QC procedures will be as implemented by GESCOM/BESCOM/KPTCL pursuant to the provisions of PPA. Refer Section B.7.2 of PDD for an illustration of the provisions for QA/QC procedures..
Any comment:	The data will be archived for the crediting period + 2 years by the project participant.

B.7.2 Description of the monitoring plan:
--

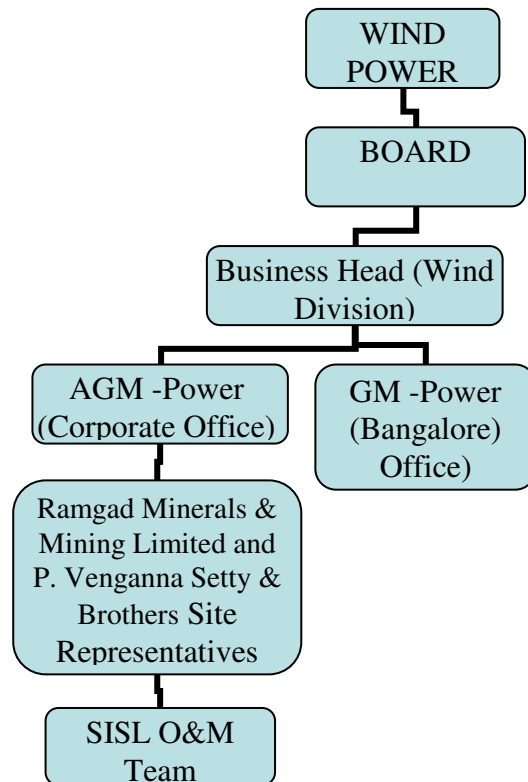
>>

The proposed CDM project leads to mitigation of GHG due to the substitution of generated power by fossil fuel based power projects connected to the Southern grid in the baseline with zero GHG emitting power by wind power project. The monitoring of the emission reductions would be carried out by measuring the net electricity supplied to the grid by the proposed CDM project using trivector energy meters.

The proposed CDM project activity has been implemented by Ramgad Minerals & Mining Limited and P. Venganna Setty & Brothers and an operations and maintenance (O&M) agreement has been signed with SISL for the project activity. SISL is an ISO 9001:2000 certified company. SISL has technically qualified site managers to ensure constant monitoring of the installed wind turbines.

The operational and management structure implemented by Ramgad Minerals & Mining Limited, P. Venganna Setty & Brothers and SISL is as follows:

CDM – Executive Board

**Training and maintenance requirements:**

Training on the wind turbine is an essential pre-requisite, to ensure necessary safety of man and wind turbine. Further, in order to maximize the output from the Wind Turbine Generators (WTGs), it is extremely essential, that the engineers and technicians understand the wind turbines and keep them in good health. In order to ensure that SISL's staff is deft at handling technical snags on top of the wind turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. SISL's training division provides need-based training to meet the training requirements of wind power projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

Monitoring Plan:

Metering & Metering Equipments: The electricity generation from the project activity would be monitored at six metering points with meter IDs: MRB-21, JJK-11, JJK-12, MRB-22, JJK-10 and MRB-19. Each of the six metering points consists of a main energy meter and a check energy meter. Metering equipment are electronic trivector meters of accuracy class 0.2. The individual WTGs are connected to the metering points as follows:

CDM – Executive Board

Project Promoter	Meter ID / RR No.	WTG Location Number(s)
Ramgad Minerals & Mining Limited	MRB-21	K-832
Ramgad Minerals & Mining Limited	JJK-11	K-837, K-838, K-839, K842
Ramgad Minerals & Mining Limited	JJK-12	K-92, K-93
Ramgad Minerals & Mining Limited	MRB-22	K-826, K-829
P. Venganna Setty & Brothers	JJK-10	K-836
P. Venganna Setty & Brothers	MRB-19	K-827

Meter Readings: The total energy exported from the project activity is recorded monthly in joint meter readings of energy meters, for which GESCOM/BESCOM/KPTCL officials as well as representatives of the project promoters (SISL being O&M contractor to the project) are present. A monthly generation report, namely the JMR statement (Form B), is prepared showing the net electricity generation calculated as units exported less units imported less transmission losses. For the calculation of emission reductions, net electricity generation data from JMR statements and Pro Forma Invoices (statements on payment towards power purchased) will be applied. For each month and for each metering point, the most conservative value between the JMR statement and the Pro Forma Invoice would be adopted.

Quality control and Quality Assurance procedures:Calibration Procedures:

Six main meters and check meters are installed for monitoring the energy exported. Each meter will be jointly inspected and sealed by both parties (project promoter and GESCOM/BESCOM) and shall not be interfered with by either of the Party except in the presence of the other Party or its accredited representatives. The main and check meters shall be tested for accuracy every calendar year with reference to a portable standard meter. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The data registered by the main meter alone will be adopted for the purpose of calculation as long as the error in the main meter is within permissible limits. If during the annual accuracy tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the limits, the main meter reading shall be considered as usual. However, the check meter shall be calibrated immediately. If the main meter is found to be beyond the permissible limits of error, but corresponding check meter is within limits, then the check meter reading shall be adopted for that period. The main meter shall be calibrated immediately.

Apportioning Procedures:

The energy generated by the WTGs is also monitored through WTG controllers located at the individual WTGs. The electricity generation readings from the WTG controllers are noted daily by the operation & maintenance (O&M) personnel and recorded in log books. This data would be referred for determination of the apportioning ratio and corresponding apportioned net electricity generation, if any.

The monitoring period for the project activity may start from a date that does not coincide with the date of the initial reading of the respective JMR statement. For instance the monitoring period may start on the 20th of the month whereas the JMR Statement may report the net electricity generation data from the first of the month to the first of the next month. In such a scenario, the net electricity generation data from the start of the monitoring period to the first date of the next month (the apportioning period) would be determined as follows:

CDM – Executive Board

$$\frac{\text{Appportioned Net Electricity Generation}}{\text{Appportioning Ratio}} = \frac{\text{Net Electricity Generation as per JMR Statement}}{\text{Appportioning Ratio}} \times \text{Appportioning Ratio}$$

The apportioning ratio would be determined as the ratio of the electricity generation at the WTG controller (located at the individual WTGs) for the apportioning period to the electricity generation at the WTG controller for the entire period covered under the JMR statement. This procedure would only have to be followed for the first and last month of the monitoring period if the start and end dates do not coincide with the date of the joint meter readings of the energy meters.

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

>>

Date of completion of the application of the baseline and monitoring methodology: 02/09/2009

Name of responsible person (s)/ entity (ies) for application of the above:

Ramgad Minerals & Mining Limited (a project participant) and Deloitte Touche Tohmatsu India Private Limited (not a project participant)

SECTION C. Duration of the project activity / crediting period
C.1 Duration of the project activity:

The duration of the proposed CDM project activity is 20 years.

C.1.1. Starting date of the project activity:

>>

Starting date of the proposed CDM project activity is 25/09/2008, being date of placement of Purchase Order for the project activity.

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

>>

20 years 0 months

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

Fixed crediting period has been chosen for the proposed CDM project activity.

C.2.1. Renewable crediting period

Not opted for

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

>>

Not Applicable

C.2.1.2. Length of the first crediting period:

>>

CDM – Executive Board

Not Applicable

C.2.2. Fixed crediting period:

The fixed crediting period will be for ten years from the date of registration of the project.

C.2.2.1. Starting date:

>>

01/05/2010 or date of registration, whichever is later.

C.2.2.2. Length:

>>

10 years 0 months

SECTION D. Environmental impacts

>>

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

>>

Wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. In India, Environmental Impact Assessment (EIA) of wind power project is not an essential regulatory requirement, as it is not covered under the categories as described in EIA Notification of 1994 or the Amended Notification of 2006.

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

>>

Not Applicable

SECTION E. Stakeholders' comments

>>

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

>>

The stakeholders for the proposed CDM project activity were defined as the parties and individuals who are either affected or are perceived to be affected by the proposed CDM project activity. The project participant identified local communities, farmers, officials of Gram Panchayat, official of state utility, SISL (O&M contractor to the project) and Suzlon (being WTG supplier) as the most important stakeholders with an interest in the CDM activities.

The comments from local stakeholders were invited through a local stakeholder meeting conducted at project site on 21st June 2009. An advertisement was placed in a local Kannada newspaper titled "Sanjay Vani" on 5th June 2009 inviting the local stakeholders for the meeting.

Before the start of the meeting, the agenda of the meeting and the purpose was explained to the participants. A detailed presentation regarding climate change, Kyoto Protocol and CDM was made to

CDM – Executive Board

the stakeholders in order to familiarise them regarding the concept. Information regarding global environmental issues was also provided during the meeting. This was followed by a presentation on the proposed CDM project. The presentations were made in Kannad, the local language of the region to facilitate best understanding and also in English, graspable to the participants. The representatives of Ramgad Minerals & Mining Limited, P. Venganna Setty & Brothers, Suzlon and SISL explained the corporate sustainable and social activities that had been undertaken at the project site for the villagers. After the briefing / presentations, the stake holders were asked to provide their comments / suggestions for the proposed project.

E.2. Summary of the comments received:

>>

Some of the comments and queries raised by the Stakeholders are as follows:

- One of the stakeholders enquired regarding the effect of wind turbines on ground water level.
- One of the stakeholders asked about the capacity of the wind turbine.
- One of the stakeholders enquired regarding the effect of wind mills on rainfall pattern.

Some of the comments and queries raised by the project participant are as follows:

- Is there any Noise Pollution by running the Wind turbines?
- Is there any water draining, soil erosion due to Wind turbines?
- What developments took place after Wind Energy project came up in the area?
- How Wind Energy projects helped in improvement of Crops?
- During construction or erection any damages or accidents occurred?
- Does the project increase the employment opportunities?

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

>>

The following responses have been provided by the project participant in relation to the comments/queries raised by the stakeholders during the meeting:

- No, Wind turbines do not use any ground water for its process.
- Each WTG is of 1250 kW capacity.
- The questions were answered stating that there is lot of difference between the heights of installed Wind Energy turbine and clouds, which cause rain. There is no relation between Wind Energy turbine and rainfall. Rain is natural phenomenon and is not affected or stopped by wind turbine.

The following responses have been provided by the stakeholders in relation to the comments/queries raised by the project participant during the meeting:

- So far there is no idea. But as it is in hilltops and away from villages such nuisance may not happen.
- No, such incidence not occurred.
- There are number of developments did happen like Road, Transportation facilities. We use the road constructed at the project site and we also do take our domestic animals near the constructed site area where they can graze.
- By increase in voltage capacity and less load shedding results in increase in food grain production.

CDM – Executive Board

- Absolutely not. The project work is taken up very smoothly and run with more safety standards.
- The following facts have been given by the villagers:
 - During the construction stage, most of the labourers are appointed from near villages.
 - During operation stage, two technical staffs are from local community. All security staffs are local villagers. The drivers are local people. The canteen at project site is run by villages only.

The stakeholders present during the stakeholder meeting appreciated the initiatives taken by Ramgad Minerals & Mining Limited, P. Venganna Setty & Brothers and Suzlon to address the local and global environmental issues. They also appreciated the fact that the establishment of wind power projects has provided local level employment opportunities and social development.

CDM – Executive Board

Annex 1**CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY.**

Organization:	Ramgad Minerals & Mining Limited
Street/P.O.Box:	Abheraj Baldota Road
Building:	Baldota Enclave
City:	Hospet
State/Region:	Karnataka
Postfix/ZIP:	583203
Country:	India
Telephone:	+91-8394-232002, 232003
FAX:	+91-8394-232333, 232444
E-Mail:	
URL:	www.mspllimited.com
Represented by:	Manoj K Agrawal
Title:	Vice President (Materials)
Salutation:	Mr
Last Name:	Manoj
Middle Name:	K
First Name:	Agrawal
Department:	
Mobile:	+91-9972529138
Direct FAX:	+91-8394-232333, 232444
Direct tel:	+91-8394- 232002, 232003
Personal E-Mail:	manoj@mspllimited.com

CDM – Executive Board

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this project activity.

CDM – Executive Board

Annex 3

BASELINE INFORMATION

As discussed in Section B.4 of the PDD.

CDM – Executive Board

Annex 4

MONITORING INFORMATION

Please see Section B.7 of the PDD for the detailed information on monitoring plan for the project activity.