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

CONTENTS

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

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Title : Wind Power Project of Hindustan Platinum in Maharashtra

Version : 08

Date : 11/05/2012

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

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Hindustan Platinum Pvt Ltd (HPPL) established in 1961. It is a manufacturer of precious metals products having industrial applications across a broad spectrum of industries. HPPL had started investing in wind power and its first project at Jaisalmer is already registered as CDM project activity (UNFCCC Ref No.-0310). Details of the same can be obtained at http://cdm.unfccc.int/Projects/DB/DNV-CUK1143050217.74/view

HPPL has decided to invest further into renewable energy sector by setting up new Wind Turbine Generators (WTGs) in year 2008.Based on this decision HPPL (now onwards referred as Project Participant/ PP) has invested in setting up of 2 nos. of 1650 kW WTGs at Revangoan (Bhud) village of Khanapur Taluka of Sangli District in Maharashtra state in India. Details of the site are as below,

Table - 1: Site Details

Sr. No.	Tower No.	Gat No.	Model No.	Capacity of each turbine	Commissioned On
1.	R – 8	722	V 82	1650 kW	31/03/2008
2.	R – 22	297	V 82	1650 kW	31/03/2008

The technology used for the project activity is supplied by well established firm - Vestas Wind Technology India Private Limited, which is 100% subsidiary of VESTAS A/S Denmark. Both the WTGs used in the project activity are V 82 type WTGs with nominal power capacity 1650 kW. The main features of the WTG are given in Table - 4. Power generated is exported to North, East, West, North-East (NEWNE) grid of India.

Purpose of the project activity:

The main purpose of the project activity is to generate electrical energy through sustainable means - using wind power resources and to reduce the dependence on fossil fuels for energy requirements. The Project

Proponent (PP) has signed a power purchase agreement (PPA) with "The Maharashtra State Electricity Distribution Company Limited" (MSEDCL) and exports the electricity to the local grid. The project displaces electricity from the NEWNE grid thereby helping in significant reduction of GHG emissions. Apart from generation of renewable electricity, the project has also been conceived for the following:

- To enhance the propagation of commercialization of wind turbines in the region.
- Contribute to the sustainable development of the region.
- To reduce the prevalent regulatory risks for this project through revenues from the CDM.

Contribution of project activity to sustainable development:

The four pillars of the sustainable development have been addressed as follows:

1. Social well-being:

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

2. Economic well-being:

The generated electricity is fed into the NEWNE grid through local grid, thereby improving power availability local grid, which will provide new opportunities for industries and economic activities to be setup in the area thereby resulting in greater local employment, ultimately leading to overall development. The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

3. Environmental well-being:

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

4. Technological well-being:

The project activity leads to the promotion of 1650 kW WTGs into the region, demonstrating the success of large capacity wind turbines. Power generation from this WTGs are exported to grid through nearest substation thus increasing energy availability and improving quality of power under the service area of the substation. Hence, the project leads to technological well-being.

A.3. Project participants:

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Name of Party Involved (*) ((host) indicates a host party)	Private and/or Public entity (ies) Project Participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as Project Participant
India (Host)	M/s Hindustan Platinum Pvt. Ltd. (Private Entity)	No

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

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

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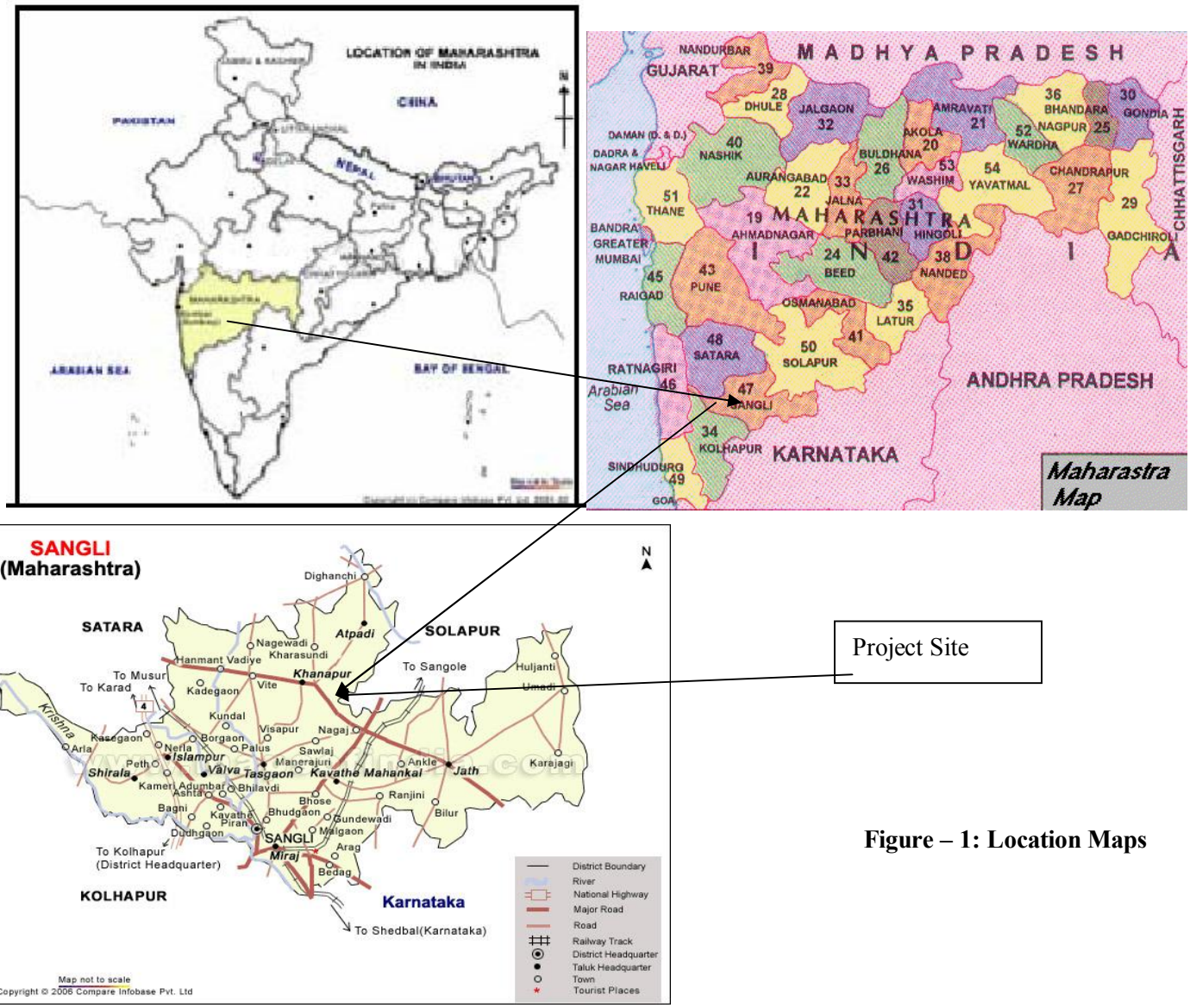

Figure – 1: Location Maps

CDM – Executive Board

A.4.1.1. Host Party(ies):

>>
India

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

>>
Maharashtra

A.4.1.3. City/Town/Community etc:

>>
Village: Revangoan (Bhud)

Taluka: Khanapur

District: Sangli - 642 154

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

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Table: 3 - Unique identification of Project Activity

Location No.	R - 8	R – 22
Village	Revangoan (Bhud)	Revangoan (Bhud)
Taluka	Khanapur	Khanapur
District	Sangli	Sangli
Latitude	17º 16' 48.7" N	17º 16' 27.1" N
Longitude	74º 38' 13.2" E	74º 38' 50.2" E
Gat No.	722	297

The project activity is located at Revangon village of Maharashtra state of India. The site is about 400 km from Mumbai and 200 km from Pune. The nearest railway station is Karad which is 45 km from the project site. The nearest airport is Pune which is 200 km from project site.

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

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

- **Type : I – Renewable Energy Projects**
- **Project Category : I.D. – Grid connected renewable electricity generation**

(Version 17: 17th June 2011)

The project activity involves setting up of a 3.3 MW greenfield wind power project. Power generated from the project would be supplied to the electricity grid which is majorly fossil-fuel based. In the absence of the project activity, the same fossil-fuel based electricity grid would become the baseline scenario. The same has been further developed in Section B.4 of the document.

Technology:

In wind energy generation, kinetic energy of wind is converted into mechanical energy and subsequently into electrical energy. Wind has considerable amount of kinetic energy when blowing at high speeds. This kinetic energy when passes through the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity. The technology is a clean technology since there are no GHG emissions associated with the electricity generation. The project installs Vestas Wind Technology India Pvt. Ltd. make WTGs. Details of the WTGs are as below,

Table- 4: Salient Features of Vestas V 82/1650

Sr. No.	Item	Description
1.	Make	Vestas Wind technology India Pvt Ltd.
2.	Model No.	V 82
Operational Conditions		
3.	Calculated Lifetime	20 years
4.	Cut-in Wind Speed (m/s)	3.5
5.	Cut-out Wind Speed (m/s)	20 (10 min. average)
6.	Maximum Rotational Speed	14.4 rpm
Main Specification		
7.	Rotor Diameter (m)	82
8.	No. of Blades	3
9.	Power Control	Active Stall
10.	Rotational Speed (Synchronous)	14.4 rpm
11.	Rotor Position	Upwind
12.	Nominal Power	1650 kW

13.	Hub Height	78 m
Rotor		
14.	Rotor Diameter	82 m
15.	Tilt Angle	5^o
16.	Swept Area	5281 m^2
Blade		
17.	Material	Carbon Fiber/Epoxy/Wood
18.	Blade Length	40 m
19.	Blade Profile	FFA-W, NACA 63.4
20.	Air Break	Full Break
Hub		
21.	Type	Spherical
22.	Material	EN-GJS-400-18U-LT
Main Shaft		
23.	Type	Forged shaft and flange
24.	Material	34CrNiMo6
Main Bearing		
25.	Front Bearing	Spherical roller bearing
Main Gearbox		
26.	Gear ratio	1:70.2
27.	Mechanical Power	1800 kW
Couplings		
28.	Gearbox/ Generator	Flexible
Generator		
29.	Nominal Power	1650 kW
30.	Rotational speed (synchronous)	1012 rpm at rated power
31.	Insulation Class	F/B
32.	Protection Class (IEC529)	IP54
Machine Frame		
33.	Type	Casted front end

34.	Material	EN-GJS-400-18U-LT
Yawing System		
35.	Yaw Nearing Type	Ball bearing, internal gearing
36.	Yaw Motor	6 nos.
37.	Yaw Gear	6 pcs
38.	Gearing Ration	1:1666
39.	Yaw Brake	Hydraulic disc break, 6 pcs
Mechanical Brake		
40.	Type	Fail safe – Hydraulic release
41.	Position	Mounted on high speed shaft
42.	Number of calipers	1 pc.
Tower		
43.	Type	Conical tubular
44.	Height	75.5 m
45.	Corrosion protection	Acc. To ISO 12944:C5I
Control System		
46.	Manufacture	NEGM Control System
47.	Type	Microprocessor based

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

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The project activity would result into total CO_2 emission reduction of 57290 tons for 10 years of crediting period.

Table - 5: Estimated amount of emission reduction

Year	Estimated annual emission reductions in tonnes of CO_2e
2012-13	5729
2013-14	5729
2014-15	5729
2015-16	5729
2016-17	5729
2017-18	5729
2018-19	5729
2019-20	5729

2020-21	5729
2021-22	5729
Total estimated reductions (tonnes of CO_2e)	57290
Total no of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	5729

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

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There is no public funding involved in this project.

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

According to appendix C of simplified modalities & procedures for small-scale CDM project activities, '***debundling'*** is defined as the fragmentation of a large project activity into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale CDM project activities.

As per "Guidelines on assessment of debundling for SSC project activities (version 03)[1]",A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small- scale activity at the closest point

According to above-mentioned points of de-bundling, proposed project activity is not a part of any of the above, so it should be considered as small scale CDM project activity.

[1] https://cdm.unfccc.int/UserManagement/FileStorage/B2G0MI867OH5JVD9FYN4CXQPKEATWZ

SECTION B. Application of a baseline and monitoring methodology

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

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Project Type : **I –** Renewable Energy Projects

Project Category : **D –** Grid connected renewable electricity generation

(Version 17: 17th June 2011)

Reference: Appendix B of the simplified modalities and procedures for small-scale CDM project activities i.e. 'indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories.'[2] Tool to calculate the emission factor for an electricity system (Version 02.2.1, EB 63, Annex 19)

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

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

Table - 6: Justification of the choice of project category

Applicability criteria	Project case
This category comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project is a wind mill project which supplies electricity to the NEWNE regional grid of India. Hence the project is applicable to this methodology.
Illustration of respective situations under which each of the	As per Table 2 of the

[2] http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=43

methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2	methodology, the project qualifies as *"(1) Project supplies electricity to a national/regional grid "* and is hence eligible under AMS-I.D
This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The present project is a greenfield activity
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • 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/m^2 • 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/m^2	The project activity is wind power project hence this condition is not relevant.
If the unit added has both renewable and nonrenewable components, 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 (non-) renewable biomass and fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW	There is neither non-renewable component added, nor co-firing is required for the proposed project activity. The renewable project capacity is 3.3 MW, well below the limit of 15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	Not relevant, as this project is Wind Power Project.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	Not relevant; all windmills are new and this project is not capacity enhancement or up gradation project.
In the case of retrofit or replacement, to qualify as a small-scale	Not relevant as no retrofit or replacement is involved in the

project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW	project activity.

B.3. Description of the project boundary:

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In the context of present project activity the project boundary would include the wind turbine generators, main transformer, transmission lines and sub-stations. A diagrammatic representation of the project boundary has been given below:

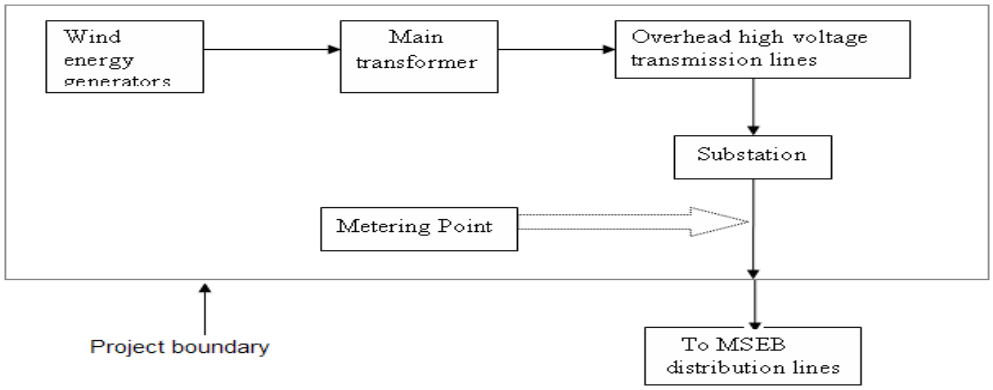

Figure – 3: Schematic Representation of Project Boundary

B.4. Description of baseline and its development:

The baseline methodology has followed the one specified under Project category I.D in Appendix B of the Simplified M&P for small scale CDM project activities. As per the applied methodology, AMS ID, (Version 17), the baseline emissions are the product of electrical energy baseline expressed in kWh of electricity produced by the renewable generating unit multiplied by an emission factor. For the estimation of the emission factor the project proponent has chosen to calculate the combined margin, consisting of the combination of the operating margin (OM) and the build margin (BM) according to the procedures laid out in the 'Tool to calculate the Emission Factor for an electricity system'. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Combined Margin for the NEWNE grid, the details of which are available on the following website.

http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

The latest version of the said tool, Version 02.2.1, has been used by the CEA for the calculation. The procedures followed, the assumptions made and the formulae applied by the CEA for the calculation of the OM and the BM is detailed in Section B.6.1 of this PDD.

Leakage

The project activity involves installation of Wind Turbine Generators which is renewable energy technology to generate electrical energy from the renewable wind energy.

As per the Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, "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."

The energy generating technologies adopted in the project activity does not involve any equipment transfers from another activity or vice versa which may be verified on-site. Therefore there would be no net change of anthropogenic emissions by sources of greenhouse gases outside the project boundary. Hence, there are no leakage emissions in this project activity.

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 installed capacity of the project is 3.3 MW, is less than the limiting capacity of 15 MW and is thus eligible to use small-scale simplified methodologies. Further, the project activity is generation of electricity for a grid system using wind energy. Hence, the type and category of the project activity matches with I.D. as specified in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.

Barriers and Additionality:

Referring to Attachment A[3] to appendix document of "indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories", project participants are required to provide a qualitative explanation to show that the project activity would not have occurred anyway, at least one of the listed elements, should be identified in concrete terms to show that the activity is either beyond the regulatory and policy requirement or improves compliance to the requirement by removing barriers(s); The guidance provided herein has been used to establish project additionality. The barriers that were considered are listed below:

1. Investment barrier

[3] http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=43

1. Investment Barriers:

1.1. Internal Rate of Return

An investment analysis of the project activity was conducted with the post tax project Internal Rate of Return (IRR) 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. IRR is calculated using following parameters & assumptions.

Table - 7: Data considered for calculation of IRR

Parameter	Value	Unit	Source
Location	**Maharashtra**		
Project Size	3.3	MW	As per quote from Vestas dated 13/12/2007
Capacity of WEG	1650	kW	As per quote from Vestas dated 13/12/2007
No. of Wind Electric Generators	2	No(s).	As per quote from Vestas dated 13/12/2007
Gross Generation Estimation at site	41	Lakhs [4]kWh p.a.	As per quote from Vestas dated 13/12/2007
Generation estimation after considering machine & grid availability EACH as 95%	36.90	Lakhs kWh p.a.	As per quote from Vestas dated 13/12/2007
Generation estimation considering 4% transmission line loss & uncertainty	31.57	Lakhs kWh p.a.	As per quote from Vestas dated 13/12/2007
Cost per WTG	1128.30	INR Lakhs	As per quote from Vestas dated 13/12/2007
Cost of Project / MW	683.82	INR Lakhs	Calculated
Total Project Cost	2256.60	INR Lakhs	Calculated
Generation per MW	19.13	Lakhs kWh	Calculated[5]
Total Generation for the project	63.14	Lakhs kWh	Calculated
Sales Realization (Rate per unit) for	3.50	INR/kWh	As per Tariff

[4] 1 Lakhs = 100,000 = 0.1 million

[5] The PLF has been calculated based on the generation and losses mentioned in the quotation from Vestas. It may please be noted here that in accordance to EB 48/Annex 11, a PLF study had been conducted which projected a PLF of 20.44%. Thus, in order to maintain conservativeness, the higher of the two PLF values, i.e., the PLF value based on the quote, has been adopted for the assessment & demonstration of additionality

1st year and 14th year			Order[6]
Escalation in tariff rate (Years 2-13 and 15-20)	0.15	INR/kWh	As per Tariff Order
Plant Load Factor (PLF)	21.84%	-	Calculated
Life of the Wind Turbine	20	years	As per WTG type certificate
Operation & Maintenance	12.00	Lakhs/ WTG	As per quote from Vestas dated 13/12/2007
Escalation on O & M charges (Years 3-5)	7.5%	-	As per quote from Vestas dated 13/12/2007
Escalation on O & M charges (Years 3-5)	5.0%	-	As per MERC Tariff Order
Insurance cost	5.84601	Lakhs/ WTG	As per previous project by PP in Tamil Nadu using same WTG model
Residual Value	5.00%	-	As per MERC Tariff Order
Promoter's Contribution	30%	of Project Cost	As per MERC Tariff Order
Term Loan	70%	of Project Cost	As per MERC Tariff Order
Interest rate	13%		Average RBI PLR published at the time of investment decision[7]
Total Repayment period incl. Moratorium	10	year(s)	As per MERC Tariff Order
Moratorium	1	year(s)	As per MERC Tariff Order
IT Depreciation Rate	80%[8]	WDV	Income Tax Act of India, 1961

Based on the above data IRR without consideration of CDM revenue is 8.90%

Further the PP has considered the external Weighted Average Cost of Capital (WACC) as the benchmark for the demonstration of additionality in this project. As per the 2.b. step of 'Tool for the demonstration and assessment of additionality', the benchmark value should represent standard returns in the market,

[6] MERC Tariff Order
[7] RBI PLR published on 11/01/2008 (http://www.rbi.org.in/scripts/WSSView.aspx?Id=11936)
[8] http://sunilkhullar.com/default.asp?_mode=mn&_umid=6&_artid=679

considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. As examples, the tool has suggested the use of benchmarks derived from Government bond rates increased by suitable risk premium [paragraph (a)], estimate of cost of financing and required return on capital [paragraph (b)] and internal benchmark of the company [paragraph (c)].

Of the examples suggested by the additionality tool, the PP has identified the cost of financing and required return on capital [paragraph 4(b) of sub-step 2b)] as the benchmark. The benchmark has been derived based on the cost of financing and required return on capital (by investors) in accordance with paragraph 4(b). Since the project is financed by both loan and equity, WACC represents the cost of financing and returns required by investor groups - the equity investors and debt creditors. Thus, WACC represents the minimum rate of return which the project should earn to merit consideration by all investor groups (investors and creditors). In other words the investment is financially sound, if and only if the project IRR exceeds the minimum required of return, viz., WACC.

WACC has been calculated as follows:

The respective proportion of debt and equity in the financing pattern has been taken as weights. While the documented rate of interest adjusted to tax rate has been taken as the cost of debt, expected return on equity has been arrived at using the Capital Asset Pricing Model (CAPM).

Capital Asset Pricing Model is well accepted methodology for estimating the expected rate of return on equity. The reliability of CAPM to estimate the expected return on equity has been advocated by many authors on security analysis. “The CAPM is also useful in capital budgeting decisions. For a firm considering a new project, the CAPM can provide the required rate of return that the project needs to yield, based on its beta, to be acceptable to investors. Managers can use the CAPM to obtain this cut off internal rate of return (IRR), or “hurdle rate” for the project.” (Kane, Bodie and Marcus; Investments (fifth edition), p 273) The usefulness and the reliability of CAPM for estimating the expected return on equity has been advocated by Stanley Feldman in his book Principles of Private Firm Valuation.

As per CAPM, the required return on equity investment is the return of a risk-free security plus beta times the difference between the market return and the risk-free return. The weighted average yield of Government Securities has been taken to represent the risk free return. Stock index has been used to represent the market return. With a view to eliminating the unsystematic risks associated with the projects

totally, index containing 30 selected companies [BSE Sensex] has been taken to represent the market return.

The market return has been arrived at based on the average annual return of the 30 listed securities forming part of BSE Sensex since 02/01/1991 to the date during the investment decision (01/01/2008), i.e., a period of around 17 years[9]. This leaves the systematic risk to be accounted for, which in the CAPM model is refers to as market beta (β). There can be no objective method of selecting the beta value, which is acceptable to investors (which determines required rate of return), than the beta value of existing companies engaged in the similar activity.

The list of all companies listed and being traded on BSE is available on (http://www.bseindia.com/downloads/about/abindices/file/Indices.zip). Being a power project activity, only 'POWER' sector listed companies have been used for arriving at the list of similar companies. If the listing dates of these companies are looked at, only 16 companies were being traded on BSE at the time of decision making.

The time period for beta estimation has been derived from several business-related literatures. As per "*Estimating Risk Parameters*" by Aswath Damodaran[10]: "*Risk and return models are silent on how long a time period one needs to use to estimate betas. Services use periods ranging from two years to five years for beta estimates, with varying results*". Again, "*Investment Management: A modern guide to security analysis and stock selection*"[11] mentions *"…an analyst has the liberty to choose the time period for beta estimation. Typically analysts use 2 year and 5 year data. The latter is more popular…*" Based on both available literatures, beta of 5 years has been considered for estimating the risk portfolio of similar companies. Considering that a company should have been listed for at least 5 years at the time of investment , the list of similar companies are narrowed down to 7. The beta for all of these companies for the relevant 5 year period (01/01/2003 to 01/01/2008) has been sourced as follows:

[9] Historic data is not available for the period since a day after its inception, i.e., 02/04/1978 (inception date: 01/04/1978) to 01/01/1991. Hence, market growth has been calculated between both periods (01/04/1978-11/01/2008) and (02/01/1991-11/01/2008). The more conservative value for growth has been observed for the latter period. Though the period of (02/01/1991-11/01/2008) is around 17 years, it may please be noted that not only is this data conservative, it is also more similar to project duration of 20 years rather than (01/04/1978-11/01/2008) which is less conservative and widely different than the project duration. Hence the same may be considered appropriate against the assessment period chosen for investment analysis.

[10] http://archive.nyu.edu/bitstream/2451/26906/2/wpa99019.pdf

[11] http://books.google.co.in/books?id=oowq_PkME3UC&pg=PA84&lpg=PR1

Table: 8: Beta Values of Various Companies

Sr. No	Company	Listing Date	Beta Value
1	Tata Power Co. Ltd	01/01/1986	1.1107
2	CESC Ltd.	02/05/1995	1.0208
3	Reliance Infrastructure Ltd.	12/03/1993	1.2039
4	Neyveli Lignite	28/11/1995	1.1986
5	BF Utilities	20/08/2001	0.7289
6	Gujarat Industries Power	02/04/1993	1.0746
7	Diamond Cables Ltd.	25/01/1994	0.9197
Average			1.0367

Source: Capitaline Database

To arrive at appropriate beta value for comparison average of all the 7 beta value is considered. The calculation of the external WACC by CAPM is shown below:

Table: 9: External WACC by CAPM

Parameter	**Value**	**Remarks**
BSE Sensex as on 02/01/1991	999.26	Source: BSE
BSE Sensex as on 11/01/2008	20827.45	Source: BSE
Time period for estimating market returns (years)	17.03	Source: BSE
Compounded Annual Growth Rate (CAGR)	19.53%	Calculated
Risk-free return	8.2083%	20 year yield on maturity of government securities/bonds
Beta (Calculated)	1.0367	In relation to BSE Sensex
Expected Return (CAPM model)	19.95%	Calculated
Cost of Debt		
Debt: Equity Ratio	70:30	As per MERC Tariff Order
Interest on Term Loan (Pre Tax Cost)	13%	As per MERC Tariff Order
Income Tax during Repayment (Corporate Tax)	33.66%	=30%*1.1*1.02
Interest on Term Loan (Post Tax Cost)	8.62%	Calculated

Weighted Average Cost of Capital (WACC)	**12.02%**	**Calculated**

The cost of financing works out to be 12.02%, which is very conservative given the high-risk nature of investments in wind power project. Hence, in normal project selection process and deciding on investment proposition, the project proponent would not opt for any project which has IRR lower than 12.02%.

The project proponent has invested in wind power generation considering external weighted average cost of capital as benchmark for this projects activity. The external WACC of 12.02% is selected as benchmark because as per additionality tool "*Only in the particular case where the project activity can be implemented by the project participant, the specific financial/economic situation of the company undertaking the project activity can be considered*".

The IRR on of the project activity is 8.90% without taking into account revenue from sale of carbon credits.

From the above it is apparent that without the CDM revenue the project activity is not an economically viable option for the project proponent. This was the most important barrier faced by the project proponent at the initial stages of the project activity.

1.2 Sensitivity of IRR:

Being wind power project it is very sensitive to PLF it is getting for the IRR. Hence sensitivity of the project IRR without CDM is done with changes in PLF. Results of the same is given in table 10:

Table: 10: Sensitivity Analysis

Sensitivity Analysis (PLF)		
% Change	Net Generation (Lakhs kWh)	IRR without CDM Benefit
10%	69.45	10.59%
0%	63.14	8.90%
-10%	56.83	7.27%

Sensitivity Analysis (Capital Cost)		
% Change	Capital Cost (Lakhs INR)	IRR without CDM Benefit
10%	2482.26	7.72%
0%	2256.60	8.90%
-10%	2030.94	10.29%

Sensitivity Analysis (Tariff)		
% Change	Tariff (INR/kWh)	IRR without CDM Benefit
10%	3.85	10.31%
0%	3.50	8.90%
-10%	3.15	7.43%

Sensitivity Analysis (O&M)		
% Change	O&M (Lakhs INR/ WTG)	IRR without CDM Benefit
10%	13.20	8.56%
0%	12.00	8.90%
-10%	10.80	9.21%

It is very clear from the table that with the variation in PLF, capital cost or tariff, value of project IRR does not increase above the 12.02% (Benchmark). Additionally, the following may be noted:

1. PLF: The IRR crosses the benchmark at a PLF sensitivity of +19.6%, i.e., a PLF value of 26.12%. It may be noted here that there are two sources demonstrating the PLF for the project activity:
    a. The quote received from Vestas provides a PLF of 21.84%
    b. Third-party Wind Assessment Report provides a PLF of 20.44%
    c. As per the report on performance of demonstration wind power projects in Maharashtra[12], published by the Maharashtra Energy Development Agency, the average PLF observed across Maharashtra is less than even 20%

    In light of the above, it may safely be concluded that achieving a PLF of at least 26.12% is very unlikely and hence, cannot be considered further for sensitivity analysis and/or additionality demonstration.

2. Capital Cost: The IRR crosses the benchmark at a capital cost sensitivity of (-19.2%). However, the capital cost for the project has been frozen through a legal agreement between the PP and Vestas. The actual capital cost being incurred by the PP is INR 2236.60 Lakh, i.e., a capital cost sensitivity of (-0.89%) only. Hence, any further consideration of sensitivity is entirely hypothetical.

[12] MEDA Report (http://www.mahaurja.com/PDF/GEN_IDD_INFORMATION.pdf)

3. Tariff: The IRR crosses the benchmark at a tariff sensitivity of +21%. However, the base tariff and the escalation therein, as mentioned in the MERC Tariff Order, have been fixed as per the Power Purchase Agreement between the state electricity board and the PP. Hence, no further sensitivity on the contracted tariff is possible.

4. O&M: The IRR crosses the benchmark at an O&M variation of -180%. Since this is unrealistic, the project retains its additionality irrespective of variation in O&M.

Hence, the revenue from the CER sale is important to make this project commercially viable.

Table: 12: Chronology of Events

Identity	Date	Description
Awareness of CDM prior to project activity	29/05/2006	PP's first project was registered on the mentioned date (UNFCCC ref No. 0310)
Quotation for WTG from Vestas	13/12/2007	Detailed techno-commercial quotation from technology supplier to HPPL.
Evidence of CDM	11/01/2008	Board of HPPL has passed resolution for the consideration of CDM fund for this project activity
Project approval	14/01/2008	Project was approved with serious consideration CDM fund by Mr. Gautam Choksi, (authorised person by The Board of HPPL).
Purchase Order (Start date)	16/01/2008	Purchase order (Agreement for Supply Agreement) for 2x1.65 MW
Discussion with PDD Consultant	28/01/2008	Preliminary discussion about CDM/PDD consultants. Emails are available as evidence.
Infrastructure Clearance	13/02/2008	Infrastructure clearance from MEDA is received for setting up of 2x1.65 MW
Commissioning	31/03/2008	Project was commissioned in the presence of Executive engineer, MSEDCL
Appointment of PDD consultant	04/04/2008	Contract with PDD consultant was

		signed.
Meeting for HCA Approval at MoEF, Govt. Of India	17/11/2008	PP has presented the project activity at MoEF for HCA.
Work Order placed to DOE	23/12/2008	PP has signed the agreement for the validation of the project with SGS after inviting proposals & negotiations from various validators.
PDD webhosted for Global Stakeholder Consultation	27/01/2009 to 25/02/2009	PDD of project activity was webhosted by SGS on UNFCCC site for Global Stakeholder comments.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Energy (electricity) generated by the wind turbines will be metered directly, both at the source (power plant site) and the point of discharge (grid). The energy fed in to the grid will be used to calculate the emission reductions and is measured in terms of kWh.

As per the applied methodology AMS I.D, the baseline is the kWh produced by the renewable energy generating unit multiplied by an emission coefficient (measured in kg CO_2equ/kWh) calculated in a transparent and conservative manner.

The approach used to determine the baseline is of the combined margin (CM), consisting of the simple operating margin (OM) and build margin (BM) according to the procedures prescribed in the **"Tool to calculate the emission factor for an electricity system (Version 02.2.1)"**. The choice of ex-ante approach has been adopted for the calculation of the Grid Emission Factor and will remain the same during the entire crediting period.

Method of calculation of combined margin emission factor: ***"Tool to calculate the emission factor for an electricity system", Version 02.2.1, EB 63 (Annex 19: Methodological Tool).***

The combined margin calculations estimate the baseline emission factor for grid. It consists of a combination of operation margin (OM) and build margin (BM) factors obtained from publication issued by

Central Electricity Authority (CEA) of India- CO_2 Baseline Database for the Indian Power Sector, Version 04, dated September 1, 2008.

Calculation of the Baseline Emission Factor

Step 1: Identifying the relevant electric power system

A "project electricity system" is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

A "connected electricity system" is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. The tool requires the following considerations while determining whether significant transmission constraints exist or not:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5% between the systems during 60% or more of the hours of the year.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

In the Indian context, as no well established spot markets exist, the first criterion is not applicable. Similarly, a transmission line fulfilling the second criteria is an exception in Indian Context. Hence the use of these criteria does not result in a clear grid boundary. In such a scenario, the use of a regional grid definition in case of large countries with layered dispatch systems (e.g. provincial, regional/national) is recommended. Further, it states that a provincial grid definition may in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity.

Of the two regional grids of the Indian Electricity system, i.e., the NEWNE grid and the Southern grid, the latter covers four states and two Union Territories while the NEWNE grid covers the rest of India. The project is located in the state of Maharashtra which is connected to NEWNE grid.

Each state in a regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional grid in which it is located. Hence for the purpose of estimation of the baseline emission factor, the NEWNE Regional grid has been chosen as the relevant electricity system.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system within India:

(a) 0 tCO_2/MWh; or

(b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 below;

For imports from connected electricity systems located in another host country (ies), the emission factor is 0 tons CO_2 per MWh.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

The project proponent wishes to include only grid power plants in the calculation, while off-grid plants will be excluded.

Step 3: Selection of an Operating Margin method

The project proponent wishes to use the Simple Operating Margin (OM) method for the estimation of the Operating Margin Emission Factor. The use of the Simple OM method is justified as the share of the low cost/ must run resources constitute less than 50% of the total grid generation. The data pertaining to the total grid generation and the low/cost must run resources have been included in Annex 3. The Ex ante option has been chosen where in a three year generation weighted average based on the most recent data has been calculated ex ante and is fixed for the entire crediting period. Hence, the parameters for the calculation of OM do not need to be monitored and the OM does not need to be calculated during the entire crediting period of ten years.

Step 4: Calculation of the Operating Margin Emission Factor according to the Simple OM method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. This may be calculated by any of the two options:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system. This option can only be used if:

a) The necessary data for Option A is not available; and
b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

Net electricity generation and fuel consumption of each power plant is available through the data provided by the Central Electricity Authority (CEA), an official data source[13]. The same has been detailed in Annex 3. CEA database, Version 4, dated 1st September, 2008 is the latest version at the time of commencement of validation and hence, has been used.

Assumptions:

The following assumptions have been made in case of unavailability of data at station level:

- Net generation: In case of stations where only gross generation is available, CEA standard values for auxiliary consumption have been applied to calculate the net generation data.

- GCV: Default GCV values for some thermal power stations have been used for cases where station specific data was unavailable.

The following assumptions have been in case of unavailability of data at unit level:

Net generation: The data is not monitored at a unit level and hence the following assumptions have been made

1. The auxiliary consumption (in % of gross generation) of the unit was assumed to be equal to that of the respective stations in the following cases:

a) All units of a station fall into the build margin; or
b) All units of a station have the same installed capacity; or
c) The units in the station have different capacities but do not differ with respect the applicable standard auxiliary consumption.

2. In all other cases, standard values for auxiliary consumption adopted by CEA were applied.

3. Fuel consumption and GCV: Fuel consumption and GCV are generally not measured at unit level. Instead, the specific CO_2 emissions of the relevant units were directly calculated based on heat rates.

Calculation Approach:

The Simple OM has been calculated using the following formula:

$$EF_{grid,OMsimple,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

m = All power units serving the grid in year y except low-cost / must-run power units

y = The relevant year as per the data vintage chosen in Step 3

Determination of $EF_{EL,m,y}$

[13] http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

The emission factor of each power unit m should be determined as follows:

• Option A1. If for a power unit m data on fuel consumption and electricity generation is available, the emission factor ($EF_{EL,m,y}$) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

$EF_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type "i" consumed by power plant / unit m in year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EFCO_{2,i,y}$ = CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)

m = All power plants / units serving the grid in year y except low-cost / must-run power plants / units

i = All fossil fuel types combusted in power plant / unit m in year y

y = The three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (for ex ante option)

The three most recent years for which data was available at the time of submission to the DOE included 2005-06, 2006-07 and 2007-08 and the same is presented in Annex 3 of the PDD. The generation weighted average value for these three years works out to 1.01 for the NEWNE grid. Thus,

EF_{OMy} = 1.01 tCO_2/MWh

Step 5: Calculate the build margin emission factor

With regards to data vintage, the project participant wishes to use Option 1 viz., for the crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group "m" at the time of CDM-PDD submission to the DOE for validation.

The sample group of power units *m* used to calculate the build margin has been determined as per the following procedure, consistent with the data vintage selected above:

(a) The set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) was identified and their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh) was determined;

(b) The annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh) was determined. The set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) was identified and their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh) was determined;

(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ the set of power units that comprises the larger annual electricity generation (SET_{sample}) was selected;

Since none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, this set SET_{sample} has been used to calculate the build margin.

The data pertaining to the units thus identified are detailed in the Version 4 of the Baseline Carbon Dioxide Emissions database of the CEA.

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

The Build Margin has been calculated ex ante during the crediting period. For ex ante calculation the most recent data available has been used and the build margin thus calculated is 0.60 for the NEWNE grid. Therefore,

EF_{BMy} = 0.60 tCO_2/MWh

Step 6: Calculation of the Combined Margin Emission Factor

The combined margin emission factor is calculated as follows:

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

Where,

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

The default values to be used for Wind Power projects are

w_{OM}= 0.75 w_{BM}= 0.25

Hence, the Baseline Emission Factor is calculated as below:

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

= 0.75 * 1.01+ 0.25 * 0.60

= 0.9075 tCO_2/MWh

The Baseline Factor thus calculated is fixed during the entire crediting period.

Moreover, this project activity is grid connected wind power generation. Hence there is no project emission and leakage from the project activity.

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

(Copy this table for each data and parameter)

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2e/MWh
Description:	Grid Emission factor (*Operating Margin*), NEWNE Grid
Source of data used:	Central Electricity Authority: CO_2 Baseline Database, Version 4
Value applied:	1.01
Justification of the choice of data or description of measurement methods and procedures actually applied :	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission factor is calculated by taking average of last three years OM from officially published by Central Electricity Authority, Government of India.
Any comment:	

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2e/MWh
Description:	Grid Emission factor (*Build Margin*), NEWNE Grid
Source of data used:	Central Electricity Authority: CO_2 Baseline Database, Version 4
Value applied:	0.60
Justification of the choice of data or description of measurement methods and procedures actually applied :	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission factor is estimated and officially published by Central Electricity Authority, Government of India
Any comment:	

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2e/MWh
Description:	Grid Emission factor (*Combine Margin*), NEWNE Grid
Source of data used:	Central Electricity Authority: CO_2 Baseline Database, Version 4
Value applied:	0.9075
Justification of the choice of data or description of measurement methods and procedures actually	As required by the methodology AMS-I.D data from the official source need to be used for the calculation of emission factor and emission reduction. To meet this requirement here, emission factor is calculated using EF_{OMy} and EF_{BMy}. Method used to calculate EF_{CMy} is given in section B.6.1

applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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As per the approved methodology AMS- I.D version 17, formula used to calculate the net emission reduction for the project activity is

$ER_y = BE_y – PE_y – LE_y$ ..... (I)

Where,

ER_y - Net Emission Reduction in tCO_2e/year

BE_y - Emission reductions due to displacement of electricity in tCO_2e /year

PE_y - Project emissions in tCO_2e/year

LE_y - Emissions due to leakage in tCO_2e/year

This project activity is grid connected wind power generation and no transfer of technology/equipment is involved in this activity, hence there is no project emission and leakage from the project activity. There is no GHG emission within the project boundary.

$PE_y = 0$ tCO_2e/year

$LE_y = 0$ tCO_2e/year

So the equation (I) is simplified to

$ER_y = BE_y$

Baseline Emission

As per the approved methodology AMS I.D version 17 baseline emissions for the project activity are calculated by multiplying the net quantity of electricity supplied by this project activity ($EG_{BL,y}$) with the CO_2 baseline emission factor for the electricity displaced due to the project (EF_{CO2}) as follows:

$BE_y = EG_{BL,y} \times EF_{CO2,grid,y} = EG_{BL,y} \times EF_{grid,CM,y}$ .....(II)

Where,

$EF_{CO2,grid,y}$ = Baseline emission factor

= 0.9075 tCO_2e/MWh

$EG_{BL,y}$ = Net electricity supplied to the NEWNE regional grid (MWh)

= 6314 MWh

Putting values of $EG_{BL,y,}$ PE_y LE_y and EF_{CO2} in formula (I)

ER_y = 6314 x 0.9075 – 0 – 0

= 5729 tCO_2e

Net Emission Reduction (ER_y) = 5729 tCO_2e

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

>>**Table: 7 – Summary of ex-ante estimation of emission reduction**

Year	Estimation of project activity emissions	Estimation of baseline emissions	Estimation of leakage	Estimation of overall emission reductions
2012-13	0	5729	0	5729
2013-14	0	5729	0	5729
2014-15	0	5729	0	5729
2015-16	0	5729	0	5729
2016-17	0	5729	0	5729
2017-18	0	5729	0	5729
2018-19	0	5729	0	5729
2019-20	0	5729	0	5729
2020-21	0	5729	0	5729
2021-22	0	5729	0	5729
Total (tonnes of CO_2e)				57290

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	**Net Electricity Exported ($EG_{BL,y}$)**
Data unit:	MWh
Description:	Net units of electricity due to substituted in the grid during the period y.
Source of data to be used:	Data will be calculated from by Joint Meter Reading and Apportioning Procedure. Steps to calculate $EG_{BL,}$y is given in Annex 4. Same will appear in the electricity bill or MSEDCL credit note.
Value of data	6314 MWh
Description of measurement methods and procedures to be applied:	Monitoring: tri-vector meter (accuracy class 0.2), located in sub-station, is used for monitoring of import and export values at feeder and WTG controllers, located in each WTGs, are used for monitoring of Net Electricity at each WTG, value of $EG_{BL,y}$ will be calculated based on these data. Data Type: Calculated

	Frequency: Monthly Archiving Policy: Paper & Electronic Responsibility: Manager (Wind Project) would be responsible for regular calibration of the meter. Calibration Frequency: Once in a year. Only main & check meters will be calibrated. WTG controllers cannot be calibrated.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site. The net electricity exported data appearing in the credit note will be cross-checked with the invoices against sale of power raised by PP.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**Gross Electricity Exported ($EG_{Export,y}$)**
Data unit:	MWh
Description:	Gross units of electricity exported to grid from feeder during the period y.
Source of data to be used:	Data will be monitored by Main and/or Check meter, located at sub-station.
Description of measurement methods and procedures to be applied:	Monitoring: tri-vector meter (accuracy class 0.2) is used for monitoring of export value ($EG_{Export,y}$). This value is gross export metered at substation feeder and it includes electricity export from project activity and other WTGs connected to same feeder Data Type: Measured Frequency: Measured continuously, recorded Monthly. Archiving Policy: Paper & Electronic Responsibility: Manager (Wind Project) would be responsible for regular calibration of the meter. Calibration Frequency: Once in a year. Only main & check meters will be calibrated. WTG controllers cannot be calibrated.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site. The net electricity exported data appearing in the credit note will be cross-checked with the invoices against sale of power raised by PP.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**Gross Electricity Imported ($EG_{Import,y}$)**
Data unit:	MWh
Description:	Units of electricity imported from grid from feeder during the period y.
Source of data to be used:	Data will be monitored by Main and/or Check meter, located at sub-station.
Description of measurement methods and procedures to be	Monitoring: tri-vector meter (accuracy class 0.2) is be used for monitoring of import ($EG_{Import,y}$). This value is gross import metered at substation feeder and it

applied:	includes electricity import by project activity and other WTGs connected to same feeder Data Type: Measured Frequency: Measured continuously, recorded Monthly. Archiving Policy: Paper & Electronic Responsibility: Manager (Wind Project) would be responsible for regular calibration of the meter. Calibration Frequency: Once in a year. Only main & check meters will be calibrated. WTG controllers cannot be calibrated.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site. The net electricity exported data appearing in the credit note will be cross-checked with the invoices against sale of power raised by PP.
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**Export as per Project WTG Controller ($EG_{PR\_Controller,y}$)**
Data unit:	MWh
Description:	Electricity exported from project WTG, as recorded in controller of WTG during the period y.
Source of data to be used:	WTG Controller readings
Description of measurement methods and procedures to be applied:	Monitoring: WTG controller will be used to monitor this parameter. Data Type: Measured & Calculated Frequency: Measured continuously, recorded Monthly. Archiving Policy: Paper & Electronic Responsibility: Site supervisor is responsible for up keeping of WTG controllers. Calibration Frequency: WTG controllers cannot be calibrated.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

Data / Parameter:	**Total Export as per WTG Controller ($EG_{All\ Controller,y}$)**
Data unit:	MWh
Description:	Sum of electricity exported, as metered by controller, of all WTGs connected to same feeder where project WTG are connected, during the period y.
Source of data to be used:	WTG Controller readings
Description of measurement methods and procedures to be applied:	Monitoring: WTG controller will be used to monitor this parameter. Data Type: Measured & Calculated Frequency Measured continuously, recorded Monthly. Archiving Policy: Paper & Electronic

	Responsibility: Site supervisor is responsible for up keeping of WTG controllers Calibration Frequency: WTG controllers cannot be calibrated.
QA/QC procedures to be applied:	Yes, Quality Management System will be used and the same procedures would be available at the project site
Any comment:	Data archived: Crediting period + 2 yrs

B.7.2 Description of the monitoring plan:

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Roles and responsibilities:

Director – Finance: In the project management structure Director – Finance is responsible for the overall project management. Director – Finance is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organizing third party contractors, revenue collection etc. Director – Finance will check the monthly electricity generated and annual emission reduction calculations. Director – Finance is responsible for any leakage of emissions in the project boundary.

Manager: Manager is assisting to Director – Finance for completing the task discussed above. He/She is responsible for the electricity generations at the individual wind turbine installations. He/She will crosscheck the credit notes with the log book regularly and report to Director – Finance for any abnormality. Operation and maintenance of wind generators will be done by Vestas and they will be responsible to Manager. He/she is also responsible for conducting annual calibration of main & check meters.

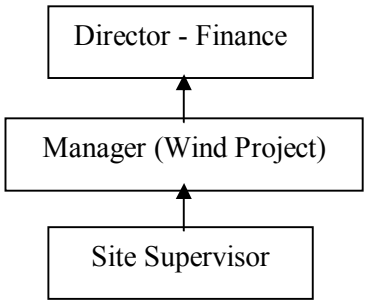

Fig – 03: Monitoring Organization Structure

Site Supervisor: Site supervisor from Vestas is responsible for onsite activities like operations & maintenance etc. Site supervisor is also responsible for recording the electricity meter reading and upkeep of WTG controllers.

Record Handling: OEM contractors are collecting daily report with all the related parameters. All the records are given to Manager every month. Manager can further pass on the information to concern person as shown in above organization chart. Manager is also responsible for record keeping.

JMR Procedure: Once in a month MSEDCL Asst engineer is taking reading at Karve sub station where both the machines are connected. Readings are noted by representatives from different division which is one official from Dy Elect. Engineer from Sangli Windmill division, one official from Asst. Engineer / Junior Engineer from Vita Sub division, Executive Engineering from Vita division, and one engineer from Vestas will present.

Once this JMR is completed, then within 5 days (approx.), JMR report to be submitted to Vita division and sub division and MSEDCL, Sangli circle office. Thereafter processing this JMR, MSEDCL will release the credit notes to individual developers name within 15th of every month. Accordingly invoice can be raised based on credit notes and payment releases after 45 days of invoice submission.

Internal Audits and performance review

These records are regularly audited and checked by the senior officials from PP during their visits to the site. The senior officials visit once in a year and audit the records. The officials will crosscheck the emissions reductions claimed in PDD with respect to actual emissions reduction.

For any deviation from the actual emission reduction values and reported values corrective action will be suggested by senior official to calculate the conservative emission reduction. All corrective actions will be recorded in the logbook.

Data will be cross checked in following manner to determine accuracy and uncertainty level,

1. Reading of main meter and check meter will compared
2. Difference between these values are calculated
3. If difference cross the permitted limits the meters will be checked for accuracy
4. In case of abnormality meter calibration will be done or meter will be replaced with similar meter.

CDM – Executive Board

Monitoring and Calibration

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 monitoring system is to have a constant watch on the emission reductions.

The delivered energy shall be metered by Vestas and state electricity board at the low voltage side of the step up transformers in substations. Metering is done either for two /three / more wind mills depending on the location of wind mills and service connection number. Metering equipment is electronic tri-vector meters. The metering equipment is maintained in accordance with electricity standards and has the capability of recording hourly and monthly readings. Records of joint meter reading are maintained at site and a copy is maintained at the head office. All the meters shall be tested for accuracy every calendar year with reference to a portable standard meter. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. Necessary records of calibration are maintained by Manager (Wind Project) and state electricity board.

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 & monitoring methodology 12th Sep. 2008

Name of Person:

Mr Gautam Choksi,

Designation: Director – Finance,

Hindustan Platinum Pvt. Ltd.

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:

>>
16th Jan. 2008 (Date of Purchase Order for WTG)

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

>>
20 years

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

C.2.1. Renewable crediting period

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:

>>
01/08/2012 or date of registration whichever is later.

C.2.2.2. Length:

>>
10 years

SECTION D. Environmental impacts

>>

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

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The Ministry of Environment and Forests (MoEF), Government of India (GoI) notification i.e. S.O. 1533 dated September 14, 2006[14], the wind projects are not included in the list of projects that has to get prior Environmental Clearance (EC) either from state or central government Authorities. Thirty-eight categories of activity with a certain investment criteria are required to undertake an Environment Impact Assessment (EIA). As the proposed project doesn't fall under the list of activities requiring EIA, no study was required for this project. However, certain foreseen impacts due to the project activity are discussed below:

During construction

Impact on air

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

Impact on water

Not much water discharge took place during construction. However proper sanitary arrangements were provided by project proponents

Impact on Land use

The land on which the project activity is implemented is barren and largely unfertile. Prior to the project activity, most of the land in near project activity site had no beneficial use. The project proponents had bought the land for a worthwhile application and obtained necessary approvals for installation of windmills. No dislocation of people was involved in the course of the project activity. In fact the land value appreciated due to the project activity and other wind energy developers and the landowners were benefited due to the project activity.

Impact due to noise

Personal protective equipments were provided to workers involved in the construction activity to mitigate the effects of noise pollution, but the construction activities did not have any impact on ambient noise levels. Taking into consideration the project life cycle, the magnitude of the impacts during the construction phase can be considered negligible as it ceases to exist after construction phase. Therefore, the environmental impacts during construction phase of the wind turbines can be considered insignificant.

Operation and Maintenance Phase

Project Proponent maintains high level of safety standards. Systematic and scientific maintenance of all equipments has been undertaken to ensure the best safety standards.

Impact on air

Wind energy plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation.

Impact on water

There is absolutely no effluent discharge during operation of wind turbine generators and therefore there would be no impact on water.

Impact on ecology

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

Impact due to noise

Noise is generated due to the movement of rotor blades. Noise generated is very much below the regulatory norms. It has no direct effect on the population, as the area is less populated and noise generated will be attenuated by ambient conditions. The impact on noise levels is insignificant.

Socio-Economic Impacts

[14] Page No: 10, S. O. 1533, Ministry of Environment & Forests (MoEF), Govt. of India, http://envfor.nic.in/legis/eia/so1533.pdf

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 has provided employment opportunities not only during the construction phase, but also during its operational lifetime. The project activity has improved the 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.

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

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

>>

HPPL has identified stakeholders for its 3.3 MW wind power project at Sangli in Maharashtra and held the stakeholder's meeting on 29th November 2008 at its Revangaon site. HPPL has issued notice and sent letters to invite various stakeholders for the meeting 30 days before the meeting. Following are the identified stakeholders for this project,

- Local government representatives.
- Designated National Authority, Government of India.
- Maharashtra State Electricity Distribution Company Limited (MSEDCL)
- Hindustan Platinum Pvt. Ltd's employees
- Vestas as supplier of equipment and also for operations & maintenance

E.2. Summary of the comments received:

>>

A brief summary of the stakeholder comments is as below,

Local Population: The local people have given very positive and encouraging response. They are one of the direct beneficiaries of the project. The construction and continuous operation of the project will also provide employment opportunities for them. They have also express their support to project as it does not require any major displacement nor create any inconvenience to the local population. In summing up, the project activity has received complete support from the local populace.

Technology Supplier: Technology supplier – Vestas has expressed strong support to HPPL's effort towards clean technology. Technology supplier said, the initiative of HPPL for investment in wind power will increase confidence of other such companies and hence this will increase the investment in this technology. Wind being clean technology this will help in bridging the gap of power demand & generation with zero pollution.

Representative of Employees: Employees of HPPL involved in the project have expressed positive views on the project. They are mentioned that this project has given them exposure towards new technology and

understanding of renewable energy project. Employees also expect that their skills would improve thus providing them with an opportunity to gain higher wages.

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

>>

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

In view of various direct and indirect benefits (social, economical, environmental), all the stakeholders have supported the project activity, hence it is not required to take due account of the comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	M/s Hindustan Platinum Pvt Ltd
Street/P.O.Box:	
Building:	C-122 TTC Industrial Area, Pawane Village,
City:	Navi Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400703
Country:	India
Telephone:	+91 – 22 - 2768 3006
FAX:	+91 - 22 - 2761 9398 / 99
E-Mail:	info@hp.co.in
URL:	www.hp.co.in
Represented by:	
Title:	Vice President – Finance
Salutation:	Mr.
Last Name:	Choksi
Middle Name:	A.
First Name:	Gautam
Department:	
Mobile:	
Direct FAX:	+91 - 22 - 2761 9398 / 99
Direct tel:	
Personal E-Mail:	Gautam.Choksi@hp.co.in

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this project activity.

Annex 3

BASELINE INFORMATION

EMISSION FACTORS

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

	2005-06	2006-07	2007-08
NEWNE	0.84	0.83	0.82
South	0.73	0.72	0.72
India	0.82	0.80	0.80

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

	2005-06	2006-07	2007-08
NEWNE	0.84	0.82	0.81
South	0.73	0.72	0.72
India	0.81	0.80	0.79

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

	2005-06	2006-07	2007-08
NEWNE	1.02	1.02	1.01
South	1.01	1.00	0.99
India	1.02	1.01	1.01

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

	2005-06	2006-07	2007-08
NEWNE	1.02	1.01	1.00
South	1.01	1.00	0.99
India	1.02	1.01	1.00

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

	2005-06	2006-07	2007-08
NEWNE	0.67	0.63	0.60
South	0.71	0.70	0.71
India	0.68	0.65	0.63

Build Margin (tCO2/MWh) (not adjusted for imports)

	2005-06	2006-07	2007-08
NEWNE	0.67	0.63	0.60
South	0.71	0.70	0.71
India	0.68	0.65	0.63

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

	2005-06	2006-07	2007-08
NEWNE	0.85	0.82	0.80
South	0.86	0.85	0.85
India	0.85	0.83	0.82

Combined Margin in tCO2/MWh (incl. Imports)

	2005-06	2006-07	2007-08
NEWNE	0.85	0.82	0.80
South	0.86	0.85	0.85
India	0.85	0.83	0.81

GENERATION DATA

Gross Generation Total (GWh)

	2005-06	2006-07	2007-

EMISSION DATA

Absolute Emissions Total (tCO2)

	2005-06	2006-07	2007-08

			08
NEWNE	470,037	499,380	531,539
South	147,355	161,897	167,379
India	617,392	661,277	698,918

NEWNE	368,114,047	385,643,080	406,563,416
South	101,551,293	109,020,456	113,626,240
India	469,665,340	494,663,536	520,189,656

Net Generation Total (GWh)

	2005-06	2006-07	2007-08
NEWNE	437,877	465,361	496,119
South	138,329	152,206	157,315
India	576,206	617,567	653,434

Absolute Emissions OM (tCO2)

	2005-06	2006-07	2007-08
NEWNE	368,114,047	385,643,080	406,563,416
South	101,551,293	109,020,456	113,626,240
India	469,665,340	494,663,536	520,189,656

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

	2005-06	2006-07	2007-08
NEWNE	18.0%	18.5%	19.0%
South	27.0%	28.3%	27.1%
India	20.1%	20.9%	21.0%

Absolute Emissions BM (tCO2)

	2005-06	2006-07	2007-08
NEWNE	59,023,283	59,042,467	60,193,616
South	19,947,081	21,348,182	22,550,310
India	78,970,364	80,390,649	82,743,926

Net Generation in Operating Margin (GWh)

	2005-06	2006-07	2007-08
NEWNE	359,271	379,471	401,642
South	100,978	109,116	114,702
India	460,249	488,587	516,343

IMPORT DATA

Net Imports (GWh) - Net exporting grids are set to zero

	2005-06	2006-07	2007-08
NEWNE	4,853	5,126	8,193
South	0	0	0

20% of Net Generation (GWh)

	2005-06	2006-07	2007-08
NEWNE	87,575	93,072	99,224
South	27,666	30,441	31,463
India	115,241	123,513	130,68

Share of Net Imports (% of Net Generation)

	2005-06	2006-07	2007-08
NEWNE	1.1%	1.1%	1.7%

			7

South	0.0%	0.0%	0.0%

Net Generation in Build Margin (GWh)

	2005-06	2006-07	2007-08
NEWNE	87,764	93,524	100,707
South	28,228	30,442	31,613
India	115,991	123,965	132,320

Annex 4

MONITORING INFORMATION

Apportioning Method of Joint Meter Reading

Step 1: Gross Electricity Exported ($EG_{Export,y}$)

Reading of Main meter and Check meters for electricity export will be taken every month. Value of $EG_{Export,y}$ will be calculated by deducting previous months main meter reading for electricity export from the same of current month.

Step 2: Gross Electricity Imported ($EG_{Import,y}$)

Reading of Main meter and Check meters for electricity import will be taken every month. Value of $EG_{Import,y}$ will be calculated by deducting previous months main meter reading for electricity export from the same of current month.

Step 3: Export as per Project WTG Controller ($EG_{PR\_Controller,y}$)

This value will be taken from the WTG controller considered in the project activity

Step 4: Calculation of Total Export as per WTG Controller ($EG_{All\_Controller,y}$)

This value will be calculated by totaling export value metered by controller of all WTGs (including project WTGs) connected on same feeder as the project activity WTGs.

Step 5: Calculation of Net Electricity Exported ($EG_{BL,y}$)

This value will be calculated as follows,

$$EG_{BL,y} = (EG_{Export,y} - EG_{Import,y}) \times EG_{PR\_Controller,y} / EG_{All\_Controller,y}$$