



**Monitoring report form
(Version 05.1)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Wind power project by HZL in Karnataka	
UNFCCC reference number of the project activity	1824	
Version number of the monitoring report	01	
Completion date of the monitoring report	06/11/2015	
Monitoring period number and duration of this monitoring period	Monitoring Period No.: -8 th Duration:- 01/12/2013 – 31/08/2015	
Project participant(s)	Hindustan Zinc Limited Emergent Ventures India Pvt. Ltd. CF Carbon Fund II Limited	
Host Party	India	
Sectoral scope(s)	Sectoral Scope 1 Energy industries (renewable/ non-renewable sources).	
Selected methodology(ies)	ACM0002, Version 06 Title: 'Consolidated baseline methodology for grid connected electricity generation from renewable sources'.	
Selected standardized baseline(s)	Not applicable (NA)	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	90181 tonnes of CO ₂ e	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	NA	90181 tonnes of CO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

1. Purpose of the project activity:-

Hindustan Zinc Ltd. (HZL), a vertically integrated natural resources enterprise, headquartered at Udaipur, Rajasthan having broad operations ranging from exploration, mining, and ore processing to smelting of non-ferrous metals is the owner and project proponent of the proposed project activity.

The project activity is a 34.4 MW wind power project consisting of 43 WEGs of individual capacity 0.8 MW sourced from Enercon India Limited at Gadag in Karnataka, India. The electricity generated from the wind farm is exported to the regional electricity grid and sold to the state electricity utility.

Since, wind power is Green House Gas (GHG) emissions free, the power generated prevents the anthropogenic greenhouse gas GHG emissions generated by the fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas.

2. Brief description of the installed technology and equipment's:-

Wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has considerable amount of kinetic energy when blowing at high speeds. When this kinetic energy 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 Project activity envisages installation of 43 WEGs of E-48 SL Enercon make (800 kW WEGs). The WEGs generate 3-phase power at 400V, which is stepped up to 33 KV. The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V \pm 20%. The other salient features of the state-of-art-technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 12 to 29 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum withdrawal (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEG with voltage fluctuation of -20 to +20%.
- Less wear & tear since the system eliminates mechanical brake, which are not needed due to low speed generator which runs at maximum speed of 29 rpm and uses Aerodynamic Braking system as primary brakes.
- Three Independent Braking Systems with emergency backup supply.
- Generator achieving rated output at only 29 rpm.
- Incorporates lightning protection system, which includes blades.
- Starts Generation of power at wind speed of 3 m/s.

E-48 SL TECHNICAL DATA

Rated capacity	: 800 kW
Rotor diameter	: 53 m
Hub height	: 75 m
Rotor with Pitch Control	
Type	: Upwind rotor with active pitch control
Direction of rotation	: Clockwise
Number of blades	: 3
Swept area	: 2 198 m ²

Blade material protection	: Fibreglass (reinforced epoxy) with integral lightning
Rotor speed	: Variable, 12-29 rpm
Tip speed	: 80 m/s max.
Pitch control	: Continuous variable pitching mechanism
Generator	: Synchronous - Type

This is a multi-pole variable speed generator. Due to this and Power electronics the Gear Box which steps up the speed to meet the speed of Induction Generator is eliminated resulting in reduced transmission losses, and elimination of wear and tear of the Gear Box and oil leakage associated with it.

Hub	: Casted Steel
Bearings	: Tapered roller bearings
Grid Feeding	: AC-DC-AC through Converter - Inverter
Braking System	: 3 independent Aero Brakes with power back up supply.
Yaw Control	: Active through adjustment gears, friction damping
Cut-in Wind Speed	: 3 m/s
Rated Wind Speed	: 12 m/s
Tower	: E-48 SL– Concrete, 74 m height

Enercon (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH and has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.

3. Relevant dates for the project activity:-

Construction start date	15/11/2007
The starting date of fully commercial Operation	28/07/2008
Operation lifetime	20 years
First monitoring period	15/01/2009 – 31/07/2009 (Completed and CER issued)
Second monitoring period	01/08/2009 – 31/03/2010 (Completed and CER issued)
Third monitoring period	01/04/2010 – 30/11/2010 (Completed and CER issued)
Fourth monitoring period	01/12/2010 – 30/06/2011 (Completed and CER issued)
Fifth monitoring period	01/07/2011 – 31/01/2012 (Completed and CER issued)
Sixth monitoring period	01/02/2012- 31/07/2012 (Completed and CER issued)
Seventh monitoring period	01/08/2012 – 30/11/2013 (Completed and CER issued)
Eight monitoring period	01/12/2013- 31/08/2015 (Current)

4. Total emission reduction achieved in this monitoring period:-

During the monitoring period (01/12/2013- 31/08/2015) the project activity was operated and monitored in accordance with the applicable baseline and monitoring methodology ACM0002, Version 06 and registered PDD.

All the WEGs are in operation and No abnormal circumstance occurred during this monitoring period. Wind World India Ltd (WWIL) operation and maintenance activities are ISO 9001:2008 certified and all the events are recorded in the log book available at the project site. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance.

Total emission reductions for the monitoring period (01/12/2013- 31/08/2015) both days inclusive are 90,181 tCO₂e considering the vintage wise baseline emission.

A.2. Location of project activity

The project activity is located at Gadag district in Karnataka. The site is composed of elevated plains with an elevation of 680-710 metres above sea level. The nearest airport is Hubli Airport wherein daily flights from Bangalore and Mumbai are operated. The project activity lies between the following geographical coordinates:

Latitude: 15°15 '43"- 15°25'0" N

Longitude: 75°31'15" - 75°36'57" E

Host party: India

Region/State/Province: Karnataka

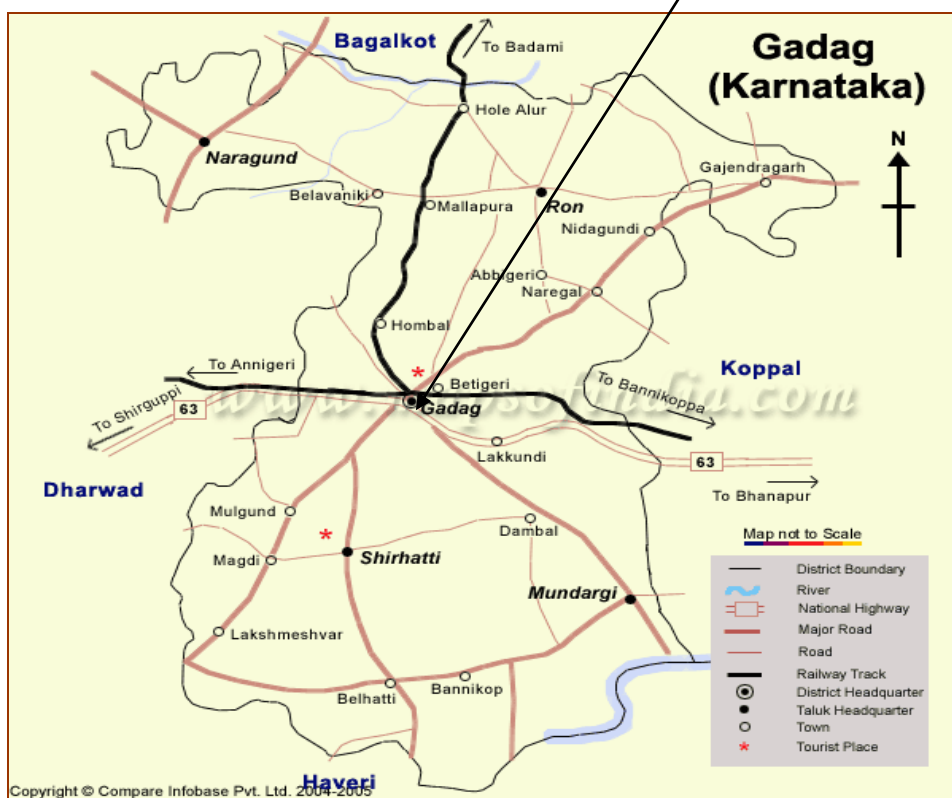
District: Gadag

Villages: Kurthkoti and Malasamudra

Location Details for Gadag, Karnataka Wind Power Project

S.No	Village Name	Loc. Nos.	Co-ordinates	Control Cabinet Nos.
1	Kurthkoti	142	(560306.2,1697983.0)	2109
2		143	(560242.5,1698162.0)	2103
3		144	(560169.4,1698362.0)	2111
4		145	(560111.1,1698550.0)	2116
5		146	(560055.0,1698770.0)	2088
6		147	(559943.4,1698979.0)	1831
7		148	(559880.9,1699154.0)	2383
8		149	(559808.2,1699356.0)	1689
9		150	(559735.9,1699555.0)	1819
10		151	(559648.5,1699744.0)	2417
11		159N	(559134.0,1701147.0)	2458
12		160	(559635.9,1701209.0)	2413
13		161N	(559277.0,1700745.0)	2437
14		162N	(559363.0,1700575.0)	2448
15	Mallasamudra	182	(560701.4,1699680.0)	2165
16		183	(560639.0,1699884.0)	2312
17	Kurthkoti	184	(560568.9,1700094.0)	2295
18		185	(560483.9,1700292.0)	2315
19		186	(560410.8,1700478.0)	2229
20		187	(560336.7,1700674.0)	2283
21		188N	(559913.0,1700644.0)	2488
22		189	(560188.4,1701079.0)	2395
23		190	(560100.1,1701256.0)	2381
24		191	(560016.9,1701450.0)	2435
25		192N	(559489.0,1701639.0)	2489
26	Mallasamudra	213	(560311.5,1702131.0)	2501
27		214	(560383.5,1701931.0)	2500
28		215	(560455.8,1701742.0)	2427
29		216	(560529.4,1701535.0)	2436
30		217	(560603.1,1701334.0)	2449
31		218N	(561154.0,1701214.0)	2491
32		219N	(561221.0,1701637.0)	2451
33		220	(560821.4,1700734.0)	2327
34		221	(560876.2,1700531.0)	2321
35		222	(560965.2,1700339.0)	2299
36		223	(561022.0,1700147.0)	2360
37		224	(561109.8,1699947.0)	2347
38		225	(561185.8,1699741.0)	2366
39		253	(561084.6,1701400.0)	2499

40	Kurthkoti	150A	(559253.0,1699492.0)	2434
41		160A	(559156.0,1700914.0)	2419
42		149A	(559324.0,1699293.0)	2447
43		151A	(559457.0,1699936.0)	2408



A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
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India (host)	Hindustan Zinc Limited (Private entity)	No
Switzerland	Emergent Ventures India Pvt. Ltd.	No
United Kingdom of Great Britain and Northern Ireland	CF Carbon Fund II Limited	No

A.4. Reference of applied methodology and standardized baseline>>

Title of the baseline methodology: "[Consolidated methodology for grid-connected electricity generation from renewable sources](#)".

Title of the monitoring methodology: "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources".

Reference: ACM0002, Version 06 (19th May, 2006), Sectoral scope: 1.

It has been referred from the list of approved methodologies for CDM project activities in the UNFCCC CDM website (<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>)

Tool: Tool for the demonstration and assessment of additionality (Version 04)

A.5. Crediting period of project activity

Type: - Renewable

Start Date of Current Crediting period: - 15/01/2009

Crediting period: 15/01/2009 – 14/01/2016 (Renewable)

Current Monitoring Period: 01/12/2013 – 31/08/2015

A.6. Contact information of responsible persons/entities

Please refer to Appedndix-1.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

Description of the installed technology, technical processes and equipments;

Wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has considerable amount of kinetic energy when blowing at high speeds. When this kinetic energy 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 Project activity envisages installation of 43 WEGs of E-48 SL Enercon make (800 kW WEGs). The WEGs generate 3-phase power at 400V, which is stepped up to 33 KV. The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V \pm 20%.

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2. Information on the implementation of project activity:-

Commissioning dates of the wind machines:-

Sr.	No. of machines commissioned	Commissioning date	certificate no.
1	10	25/06/2008	EEE/TL&SS/GDG/425-35 dt.26/06/2008

2	8	30/03/2008	EEE/TL&SS/GDG/2453-63 dt.31/03/2008
3	6	31/05/2008	EEE/TL&SS/GDG/276-86 dt.02/06/2008
4	10	17/03/2008	EEE/TL&SS/GDG/2364-74 dt.17/03/2008
5	5	17/12/2007	EEE/TL&SS/GDG/1733-42 dt.18/12/2007
6	4	28/07/2008	EEE/TL&SS/GDG/661-70 dt.29/07/2008

First monitoring period	15/01/2009–31/07/2009 (Completed and CER issued)
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Seventh monitoring period	01/08/2012–30/11/2013 (Completed and CER issued)
Eight monitoring period	01/12/2013- 31/08/2015 (Current)

3. Information on the actual operation of the project activity

During the monitoring period (01/12/2013- 31/08/2015) the project activity was operated and monitored in accordance with the applicable baseline and monitoring methodology ACM0002, Version 06 and registered PDD.

All the WEGs are in operation and no abnormal circumstance occurred during this monitoring period. WWIL operation and maintenance activities are ISO 9001:2008 certified and all the events are recorded in the log book available at the project site. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance. The major events (Break down/ shut down) are provided in the Annexure 1.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

The monitoring plan is as per the registered PDD. No temporary deviations from registered monitoring plan or applied methodology is applied standardized baseline have been applied during this monitoring period.

B.2.2. Corrections

The monitoring plan is as per registered PDD. No corrections have been applied during this monitoring period, neither to any previous monitoring period.

B.2.3. Changes to start date of crediting period

There has been no request for change in start date of crediting period.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

Not Applicable

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

The registered monitoring plan and applied methodology are as per the registered PDD only. No permanent Changes have been made subsequently.

B.2.6. Changes to project design of registered project activity

The project design of the registered project activity is as per the registered PDD. No subsequent changes have been made to the project design of the registered project activity

B.2.7. Types of changes specific to afforestation or reforestation project activity

Not applicable as the project activity is not an afforestation or reforestation project activity.

SECTION C. Description of monitoring system**Monitoring Plan**

The monitoring plan has been devised as per approved consolidated monitoring methodology ACM0002 - "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources".

The methodology requires monitoring of the following parameters:

1. Electricity generation from the proposed project activity;
2. Data needed to recalculate the operating margin emission factor, if needed, based on the choice of the method to determine the operating margin (OM), consistent with "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002);
3. Data needed to recalculate the build margin emission factor, if needed, consistent with "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"(ACM0002);

For the project activity to establish its creditable emission reduction, it has to record the actual electricity generation, which would displace equivalent units of electricity at the operating and build margin of the grid. Since, the simple OM emission factor is calculated based on a 3 year average, based on the most recent statistics available at the time of PDD preparation, its updation based on ex post monitoring is not required. For BM calculation, option 1 (refer ACM0002) has been chosen, which is calculated ex ante based on the most recent information, hence its monitoring is also not required. Hence, under the monitoring protocol for the project it is required to monitor and record the electricity generated and exported by the wind farm to the regional grid.

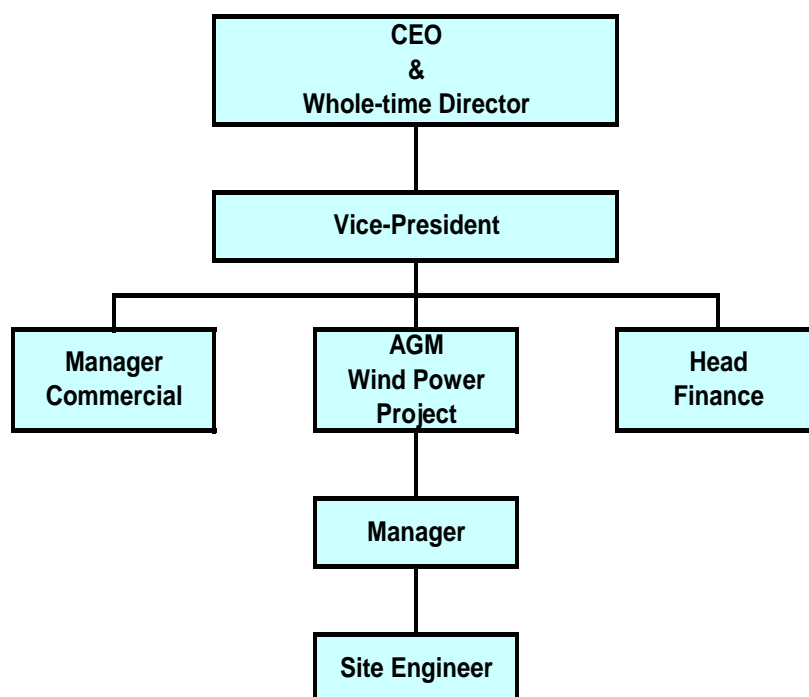
Operation and Maintenance

To ensure trouble free operations and efficient generations through all the wind turbines, HZL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a period of 10 years. The contractor WWIL, under the

O&M contract with HZL is responsible for the operation and maintenance of the project activity.

Authority and Responsibility

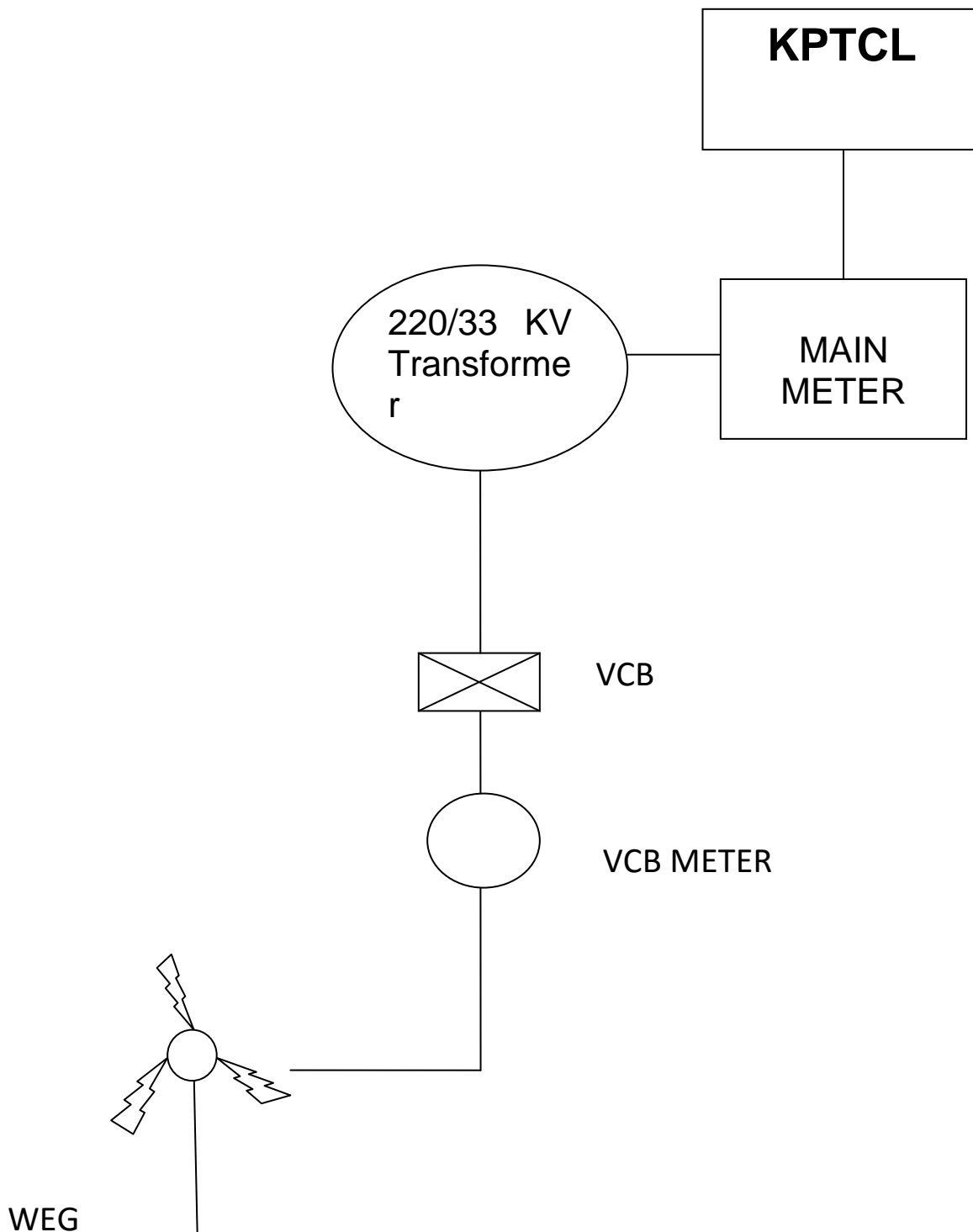
The authority and responsibility of project management as well as registration, monitoring, measurement and reporting lies with HZL. HZL has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power.



The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be as per the PPA (power purchase agreement) with HESCOM .

Metering: The Delivered Energy shall be metered by the Parties at the high voltage side of the step up transformer installed at the Receiving Station. The electricity generated by the project shall be metered by the Parties at the high voltage side of the step up transformer installed at the Project Site. The WEGs of a single customer (HZL in this case) at a particular site are connected to a Vacuum Circuit Breaker metering yard (VCB) which in turn connects to a feeder that ultimately leads to the shared main KPTCL meter at the substation maintained by WWIL. Data monitoring takes place at the VCB metering yard and WEG (through SCADA system). The electricity metered at the KPTCL meter is proportionally divided among the customers connected to the meter on the basis of the prorata readings taken at the VCB end. The emission reduction calculations are done on the basis of the KPTCL Main meter reading.

General arrangement of WEG, VCB and Main meter is shown below:



Metering Equipment: Metering equipment shall be electronic trivector meters of accuracy class 0.2% required for the Project (both main and check meters). The main meter shall be installed and owned by the Company, whereas check meters shall be by the Corporation. Dedicated core of both CT's and PT's of required accuracy shall be made available by the Company to Corporation. The metering equipment shall be maintained in accordance with electricity standards. Such equipment shall have the capability of recording half-hourly and monthly readings. The Company shall provide such metering results to the Corporation. The meters installed shall be capable of

recording and storing half hourly readings of all the electrical parameters for a minimum period of 35 days with digital output.

Meter Readings: The monthly meter readings (both main and check meters) at the Project Site and the Receiving Station shall be taken simultaneously and jointly by the Parties on the first day of the following month at 12 Noon. The recorded metering data shall be downloaded through meter recording instrument.

Inspection of Energy Meters: Main and check energy meters (export and import) and all associated instruments, transformers installed at the project shall be of 0.2% accuracy class. Each meter shall be jointly inspected and sealed on behalf of the Parties and shall not be interfered with by either Party except in the presence of the other Party or its accredited representatives

Records:

Records: O&M Contractor WWIL will maintain an accurate and up-to-date operating log at the wind farm site with records of:

- i. Hourly logs of real and reactive power generation, frequency, transformer tap position, bus voltage(s), Main meter and Back up meter readings and any other data mutually agreed.
- ii. Any unusual conditions found during operation/inspections
- iii. Chart and printout of event loggers, if any, for system disturbances/outages
- iv. All the records will be preserved for 2 years beyond the crediting period.

Billing:

The billing will be on monthly basis. The Hubli Electricity Supply Company Limited will be billed by HZL based on statement given by SLDC/Hubli Electricity Supply Company Limited at the end of each month for the energy supplied.

Net Electricity Exported = Total Electricity Exported - Total Electricity Imported - Total Transmission losses

Baseline Emission Calculation:-

$$BE_y = EF_y * EG_y$$

BE_y - baseline emissions, tCO₂e

EG_y - Net Quantity of Electricity supplied to KPTCL facility

EF_y - grid emission factor, i.e. 0.9293 t CO₂/MWh (it has been fixed ex-ante for 1st renewable crediting period.)

Emission Reduction Calculation:-

$$ER_y = BE_y - PE_y - L_y$$

ER_y = Emission Reduction

BE_y = baseline emissions

PE_y = project emissions

L_y = leakage emissions

SECTION D. Data and parameters**D.1. Data and parameters fixed ex ante or at renewal of crediting period**

Data/parameter:	EF _{OM,y}
Unit	tCO ₂ /MWh
Description	Operating Margin emission factor for Southern regional grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 3.0
Value(s) applied)	1.004 tCO ₂ /MWh
Choice of data or measurement methods and procedures	The CEA CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Ministry of Power, Government of India. Hence it is an appropriate source
Purpose of data	Baseline calculations
Additional comments	CEA has Calculated it as per ACM0002 with 3years vintage data (2004-05, 2005-06 and 2006-07) and option of ex ante calculation based on Simple Operating Margin Method. Computed once during PDD finalization

Data/parameter:	EF _{BM,y}
Unit	tCO ₂ /MWh
Description	Build Margin emission factor for Southern regional grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 3.0.
Value(s) applied)	0.7054 tCO ₂ /MWh
Choice of data or measurement methods and procedures	The CEA CO ₂ Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Ministry of Power, Government of India. Hence it is an appropriate source
Purpose of data	Baseline calculations
Additional comments	CEA has Calculated it as per ACM0002 for the year 2005-06. The build margin is calculated in this database as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation and option of ex ante calculation. Computed once during PDD finalization

Data/parameter:	EF _y
Unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor for Southern regional grid
Source of data	Estimated figure based on 75% of OM and 25% of BM values, Version 3.0.
Value(s) applied)	0.9293 tCO ₂ /MWh
Choice of data or measurement methods and procedures	Calculated using the build margin and operating margin data from CEA database. In case of wind power projects default weights of 0.75 for EFOM and 0.25 for EFBM are applicable, hence calculated with 75% & 25% weightage.
Purpose of data	Baseline calculations
Additional comments	CEA has calculated it as per ACM0002 with 3years vintage data and option of ex ante calculation based on “75% of OM and 25% of BM values approach. Computed once during PDD finalization.

D.2. Data and parameters monitored

Data/parameter:	EG_y																																																																																											
Unit	kWh																																																																																											
Description	Net quantity of electricity exported to KPTCL facility																																																																																											
Measured/calculated/default	Calculated																																																																																											
Source of data	Joint Meter Reading Sheets																																																																																											
Value(s) of monitored parameter	97042.088 MWh																																																																																											
Monitoring equipment	<table border="1"> <thead> <tr> <th>Particular</th><th>Meter Serial No.</th><th>Validity of Calibration</th><th>Accuracy class</th><th>Date of Previous Calibration</th><th>Date of current Calibration</th><th>Date of latest Calibration</th></tr> </thead> <tbody> <tr> <td>Metering Point-1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Main Meter</td><td>07022944</td><td>One year</td><td>0.2s</td><td>25/09/12</td><td>23/07/2013</td><td>20/10/2014</td></tr> <tr> <td>Check Meter</td><td>07022903</td><td>One year</td><td>0.2s</td><td>25/09/12</td><td>23/07/2013</td><td>20/10/2014</td></tr> <tr> <td>Metering Point -2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Main Meter</td><td>07022908</td><td>One year</td><td>0.2s</td><td>25/09/12</td><td>23/07/2013</td><td>20/10/2014</td></tr> <tr> <td>Check Meter</td><td>07022915</td><td>One year</td><td>0.2s</td><td>25/09/12</td><td>23/07/2013</td><td>20/10/2014</td></tr> <tr> <td>Metering Point -3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Main Meter</td><td>06760786</td><td>One year</td><td>0.2s</td><td>25/09/12</td><td>23/07/2013</td><td>20/10/2014</td></tr> <tr> <td>Check Meter</td><td>06767587</td><td>One year</td><td>0.2s</td><td>25/09/12</td><td>23/07/2013</td><td>20/10/2014</td></tr> <tr> <td>VCB</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr> <td>Main Meter</td><td>07022932</td><td>One year</td><td>0.2s</td><td>22/01/2015</td><td>17/06/2015</td><td>20/08/2015</td></tr> <tr> <td>Check Meter</td><td>07022952</td><td>One year</td><td>0.2s</td><td>22/01/2015</td><td>17/06/2015</td><td>20/08/2015</td></tr> </tbody> </table>	Particular	Meter Serial No.	Validity of Calibration	Accuracy class	Date of Previous Calibration	Date of current Calibration	Date of latest Calibration	Metering Point-1							Main Meter	07022944	One year	0.2s	25/09/12	23/07/2013	20/10/2014	Check Meter	07022903	One year	0.2s	25/09/12	23/07/2013	20/10/2014	Metering Point -2							Main Meter	07022908	One year	0.2s	25/09/12	23/07/2013	20/10/2014	Check Meter	07022915	One year	0.2s	25/09/12	23/07/2013	20/10/2014	Metering Point -3							Main Meter	06760786	One year	0.2s	25/09/12	23/07/2013	20/10/2014	Check Meter	06767587	One year	0.2s	25/09/12	23/07/2013	20/10/2014	VCB							Main Meter	07022932	One year	0.2s	22/01/2015	17/06/2015	20/08/2015	Check Meter	07022952	One year	0.2s	22/01/2015	17/06/2015	20/08/2015
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Check Meter	07022952	One year	0.2s	22/01/2015	17/06/2015	20/08/2015																																																																																						
Measuring/reading/recording frequency:	Calculated monthly																																																																																											
Calculation method (if applicable):	<p>Net electricity generated calculated from the readings of electricity exported to the grid and electricity imported from the grid indicated by the main meter connected to the incoming feeder of KPTCL. The Delivered Energy metered by the Parties at the high voltage side of the step up transformer installed at the Receiving Station. The electricity generated by the Project metered by the Parties at the high voltage side of the step up transformer installed at the Project Site. The WEGs of a single customer (HZZ in this case) at a particular site are connected to a Vacuum Circuit Breaker metering yard (VCB) which in turn connects to a feeder that ultimately leads to the shared main KPTCL meter at the substation maintained by Wind World India Limited. Data monitoring takes place at the VCB metering yard and WEG (through SCADA system). The electricity metered at the KPTCL meter is proportionally divided among the customers connected to the meter on the basis of the prorata readings taken at the VCB end. The emission reduction calculations are done on the basis of the KPTCL Main meter reading</p>																																																																																											
QA/QC procedures:	Regular calibration of all the meters undertaken at required intervals and faulty meters replaced immediately. The KPTCL meter calibrated once in an year																																																																																											
Purpose of data:	Baseline calculation																																																																																											

Additional comments:	-
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Data/parameter:	EGy, Export							
Unit	kWh							
Description	Quantity of Electricity exported to KPTCL facility							
Measured/calculated/default	Measured							
Source of data	Joint meter reading sheets							
Value(s) of monitored parameter	97817.432 MWh							
Monitoring equipment	Particular	Meter Serial No.	Validity of Calibration	Accuracy class	Date of Previous Calibration	Date of current Calibration	Date of latest Calibration	
	Metering Point-1							
	Main Meter	07022944	One year	0.2s	25/09/12	23/07/2013	20/10/2014	
	Check Meter	07022903	One year	0.2s	25/09/12	23/07/2013	20/10/2014	
	Metering Point -2							
	Main Meter	07022908	One year	0.2s	25/09/12	23/07/2013	20/10/2014	
	Check Meter	07022915	One year	0.2s	25/09/12	23/07/2013	20/10/2014	
	Metering Point -3							
	Main Meter	06760786	One year	0.2s	25/09/12	23/07/2013	20/10/2014	
	Check Meter	06767587	One year	0.2s	25/09/12	23/07/2013	20/10/2014	
	VCB							
	Main Meter	07022932	One year	0.2s	22/01/2015	17/06/2015	20/08/2015	
	Check Meter	07022952	One year	0.2s	22/01/2015	17/06/2015	20/08/2015	
Measuring/reading/recording frequency:	Measured & Recording Continuously and Reporting Monthly							
Calculation method (if applicable):	Electricity exported to KPTCL measured at the main meter connected to the incoming feeder of KPTCL. The procedures for metering as per the provisions of the power purchase agreement.							
QA/QC procedures:	Regular calibration of all the meters undertaken at required intervals and faulty meters replaced immediately.							
Purpose of data:	Baseline calculation							
Additional comments:	-							

Data/parameter:	EGy, Import
Unit	kWh
Description	Quantity of Electricity imported from KPTCL
Measured/calculated/default	Measured
Source of data	Joint meter reading sheets

Value(s) of monitored parameter	75.063 MWh						
Monitoring equipment	Particular	Meter Serial No.	Validity of Calibration	Accuracy class	Date of Previous Calibration	Date of current Calibration	Date of latest Calibration
	Metering Point-1						
	Main Meter	07022944	One year	0.2s	25/09/12	23/07/2013	20/10/2014
	Check Meter	07022903	One year	0.2s	25/09/12	23/07/2013	20/10/2014
	Metering Point -2						
	Main Meter	07022908	One year	0.2s	25/09/12	23/07/2013	20/10/2014
	Check Meter	07022915	One year	0.2s	25/09/12	23/07/2013	20/10/2014
	Metering Point -3						
	Main Meter	06760786	One year	0.2s	25/09/12	23/07/2013	20/10/2014
	Check Meter	06767587	One year	0.2s	25/09/12	23/07/2013	20/10/2014
	VCB						
	Main Meter	07022932	One year	0.2s	22/01/2015	17/06/2015	20/08/2015
	Check Meter	07022952	One year	0.2s	22/01/2015	17/06/2015	20/08/2015
Measuring/reading/recording frequency:	Measured & Recording Continuously and Reporting Monthly						
Calculation method (if applicable):	Electricity imported from KPTCL measured at the main meter connected to the incoming feeder of KPTCL. The procedures for metering as per the provisions of the power purchase agreement.						
QA/QC procedures:	Regular calibration of all the meters undertaken at required intervals and faulty meters duly replaced immediately.						
Purpose of data:	Baseline calculation						
Additional comments:	-						

Data/parameter:	EG _{WEG}
Unit	kWh
Description	Electricity generated by each WEG
Measured/calculated/default	Measured value
Source of data	Daily generation reports provided by Wind World India Limited
Value(s) of monitored parameter	99240.518
Monitoring equipment	Monitored through inbuilt WTG integrated electronic meter.
Measuring/reading/recording frequency:	Measured & Recording Continuously and Reporting Daily
Calculation method (if applicable):	Each WEG is equipped with an integrated electronic meter. These meters are connected to the Central Monitoring Station (CMS) of the entire wind farm through communication cables (SCADA system). The generation data of individual WEG can be monitored as a real-time entity at CMS. This data for each individual WEG recorded daily. The Control cabinet no of all the WEG meters are mentioned in the section A.3.

QA/QC procedures:	WEG meters are self Calibrated and faulty meters replaced immediately.
Purpose of data:	This data is not used for the calculation of emission reductions per say but would act as a backup data for the net electricity generated.
Additional comments:	-

Data/parameter:	EG _{VCB}						
Unit	kWh						
Description	Electricity generation recorded at the Vacuum Circuit Breaker (VCB)						
Measured/calculated/default	Measured value						
Source of data	Daily generation reports provided by Wind World India Limited						
Value(s) of monitored parameter	97870.500 MWh						
Monitoring equipment	Particular	Meter Serial No.	Validity of Calibration	Accuracy class	Date of Previous Calibration	Date of current Calibration	Date of latest Calibration
	Main Meter	07022932	One year	0.2s	22/01/2015	17/06/2015	20/08/2015
	Check Meter	07022952	One year	0.2s	22/01/2015	17/06/2015	20/08/2015
Measuring/reading/recording frequency:	Measured & Recording Continuously and Reporting Daily						
Calculation method (if applicable):	The individual WEGs at a particular site connect to a meter at the VCB end where the secondary metering is done.						
QA/QC procedures:	Annual calibration of all the meters will be undertaken and faulty meters will be duly replaced immediately.						
Purpose of data:	This data is not used for the calculation of emission reductions per say but would act as a backup data for the net electricity generated.						
Additional comments:	-						

D.3. Implementation of sampling plan

Not Applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

Baseline Emissions

The baseline emissions (BE_y in tCO_{2e}) are the product of the baseline emissions factor (EF_y in tCO₂/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh) as described in registered PDD.

$$BE_y = EF_y * EG_y$$

Where,

BE_y- baseline emissions, tCO_{2e}

EG_y - Net Quantity of Electricity supplied to KPTCL facility

EF_y - grid emission factor, i.e. 0.9293 t CO₂/MWh (it has been fixed ex-ante for 1st renewable crediting period)

$$\begin{aligned}
 EG_y &= EG_{y, \text{Export}} - EG_{y, \text{Import}} - \text{Transmission loss} \\
 &= 97\,870\,500 - 75\,038 - 699\,885 \\
 &= 97\,095\,572 \text{ kWh} \\
 &= 97\,095.572 \text{ MWh}
 \end{aligned}$$

The value of electricity exported, imported and transmission loss has been adjusted for the month of Jul'14 and Oct'14 of current monitoring period, Adopting the conservative approach the adjustment has been made for maximum possible error i.e. 0.2% accuracy class, as the meter tested are found ok

Adjustment of Net Quantity shown in below table:-

Month	Electricity Exported and Imported			Import adjusted by 'KERC (115% of imported electricity)	Adjusted Import electricity considering accuracy class 0.2% (kWh)	Transmission losses (kWh)	Adjusted transmission loss considering accuracy class 0.2% (kWh)	Net electricity exported (EG _y) kWh	Adjusted Net Quantity of Net Electricity Exported (EG _y) considering accuracy class 0.2% (MWh)	tCO ₂ e/MWh	Emission Factor (EF _y)
	EG _{y, Export} (kWh)	Adjusted Exported electricity considering accuracy class 0.2% (kWh)	EG _{y, Import} (kWh)								
01 Dec 13- 31 Dec 13	4038750	4038750	0	0	0	13341	13341	4025	4025	0.9293	3740.813
01 Jan 14- 31 Jan 14	3561750	3561750	2250	2588	2588	11778	11778	3547	3547		3296.584
01 Feb 14- 28 Feb 14	1829250	1829250	4500	5175	5175	12135	12135	1812	1812		1683.836
01 Mar 14- 31 Mar 14	2542500	2542500	6750	7763	7763	15362	15362	2519	2519		2341.256
01 Apr 14- 30 Apr 14	1854000	1854000	9000	10350	10350	17286	17286	1826	1826		1697.240
01 May 14- 31 May 14	3854250	3854250	2250	2588	2588	20723	20723	3831	3831		3560.092
01 Jun 14- 30 Jun 14	9785250	9785250	0	0	0	41630	41630	9744	9744		9054.746
01 July 14- 31 July 14	12276000	12251448	2250	2588	2593	109224	109442	12164	12139		11281.156
01 Aug 14- 31 Aug 14	6831000	6817338	2250	2588	2593	39664	39743	6789	6775		6296.009
01 Sept 14- 30 Sept 14	5204250	5193842	2250	2588	2593	34025	34093	5168	5157		4792.545
01 Oct 14 - 31 Oct 14	2223000	2218554	4500	5175	5185	14621	14650	2203	2199		2043.269
01 Nov 14 - 30 Nov 14	3219750	3219750	2250	2588	2588	16002	16002	3201	3201		2974.838
01 Dec 14- 31 Dec 14	2889000	2889000	2250	2588	2588	16091	16091	2870	2870		2667.390
01 Jan 15- 31 Jan 15	2875500	2875500	2250	2588	2588	14783	14783	2858	2858		2656.060
01 Feb 15- 28 Feb 15	2711250	2711250	2250	2588	2588	16129	16129	2693	2693		2502.171
01 Mar 15- 31 Mar 15	2013750	2013750	9000	10350	10350	18246	18246	1985	1985		1844.804
01 Apr 15- 30 Apr 15	2229750	2229750	6750	7763	7763	21168	21168	2201	2201		2045.222
01 May 15- 31 May 15	4144500	4144500	2250	2588	2588	40828	40828	4101	4101		3811.138
01 Jun 15- 30 Jun 15	7922250	7922250	2250	2588	2588	88171	88171	7831	7831		7277.805
01 July 15- 31 July 15	9501750	9501750	0	0	0	81222	81222	9421	9421		8754.497
01 Aug 15- 31 Aug 15	6363000	6363000	0	0	0	57456	57456	6306	6306		5859.742
Total	97870500	97817432	65250	75038	75063	699885	700280	97096	97042.088		90181

Adjusted Net Quantity of Electricity Exported to KPTCL facility EGy = 97 042.088 MWh

So,

EGy = EGy, Export – EGy, Import – Transmission loss

= 97 817 432 – 75 063 – 700 280

= 97 042 088 kWh

= 97 042.088 MWh

And

BEy = EGy * emission factor

= 97 042.088 * 0.9293

= 90 181 tCO₂e (Round down to nearest integer)

Monitored Data

Month	Electricity Generation (EG _{WEG}) (kWh)	Electricity Generation (EG _{VCB})		Electricity Generation at Main Meter				
		Export (kWh)	Import, kWh	Electricity exported (EG _{y, Export}) (kWh)	Electricity imported (EG _{y, Import}) (kWh)	Import adjusted by *KERC (115% of imported electricity) kWh	Transmission losses (kWh)	Net electricity exported (EG _y) kWh
01 Dec 13- 31 Dec 13	4090345	4038750	0	4038750	0	0	13341	4025409
01 Jan 14- 31 Jan 14	3609967	3561750	2250	3561750	2250	2588	11778	3547384
01 Feb 14- 28 Feb 14	1863218	1829250	4500	1829250	4500	5175	12135	1811940
01 Mar 14- 31 Mar 14	2589418	2542500	6750	2542500	6750	7763	15362	2519376
01 Apr 14- 30 Apr 14	1896302	1854000	9000	1854000	9000	10350	17286	1826364
01 May 14- 31 May 14	3913066	3854250	2250	3854250	2250	2588	20723	3830939
01 Jun 14- 30 Jun 14	9919726	9785250	0	9785250	0	0	41630	9743620
01 July 14- 31 July 14	12438993	12276000	2250	12276000	2250	2588	109224	12164188
01 Aug 14- 31 Aug 14	6925673	6831000	2250	6831000	2250	2588	39664	6788748
01 Sept 14- 30 Sept 14	5281179	5204250	2250	5204250	2250	2588	34025	5167637
01 Oct 14 - 31 Oct 14	2268978	2223000	4500	2223000	4500	5175	14621	2203204
01 Nov 14 - 30 Nov 14	3267860	3219750	2250	3219750	2250	2588	16002	3201160
01 Dec 14- 31 Dec 14	2936717	2889000	2250	2889000	2250	2588	16091	2870321
01 Jan 15- 31 Jan 15	2921986	2875500	2250	2875500	2250	2588	14783	2858129
01 Feb 15- 28 Feb 15	2754687	2711250	2250	2711250	2250	2588	16129	2692533
01 Mar 15- 31 Mar 15	2054807	2013750	9000	2013750	9000	10350	18246	1985154
01 Apr 15- 30 Apr 15	2278585	2229750	6750	2229750	6750	7763	21168	2200819
01 May 15- 31 May 15	4206000	4144500	2250	4144500	2250	2588	40828	4101084
01 Jun 15- 30 Jun 15	7861600	7922250	2250	7922250	2250	2588	88171	7831491
01 July 15- 31 July 15	9717055	9501750	0	9501750	0	0	81222	9420528
01 Aug 15- 31 Aug 15	6444356	6363000	0	6363000	0	0	57456	6305544
Total	99240518	97870500	65250	97870500	65250	75038	699885	97095572

Emission Reduction

Month	Baseline Emissions (tCO ₂)	Project Emissions (tCO ₂)	Leakages (tCO ₂)	Emission Reduction (tCO ₂)
01 Dec 13-31 Dec 13	3740.81	0.00	0.00	3740.81
01 Jan 14- 31 Jan 14	3296.58	0.00	0.00	3296.58
01 Feb 14- 28 Feb 14	1683.84	0.00	0.00	1683.84
01 Mar 14- 31 Mar 14	2341.26	0.00	0.00	2341.26
01 Apr 14- 30 Apr 14	1697.24	0.00	0.00	1697.24
01 May 14- 31 May 14	3560.09	0.00	0.00	3560.09
01 Jun 14- 30 Jun 14	9054.75	0.00	0.00	9054.75
01 July 14- 31 July 14	11281.16	0.00	0.00	11281.16
01 Aug 14- 31 Aug 14	6296.01	0.00	0.00	6296.01
01 Sept 14- 30 Sept 14	4792.54	0.00	0.00	4792.54
01 Oct 14 - 31 Oct 14	2043.27	0.00	0.00	2043.27
01 Nov 14 - 30 Nov 14	2974.84	0.00	0.00	2974.84
01 Dec 14- 31 Dec 14	2667.39	0.00	0.00	2667.39
01 Jan 15- 31 Jan 15	2656.06	0.00	0.00	2656.06
01 Feb 15- 28 Feb 15	2502.17	0.00	0.00	2502.17
01 Mar 15- 31 Mar 15	1844.80	0.00	0.00	1844.80
01 Apr 15- 30 Apr 15	2045.22	0.00	0.00	2045.22
01 May 15- 31 May 15	3811.14	0.00	0.00	3811.14
01 Jun 15- 30 Jun 15	7277.81	0.00	0.00	7277.81
01 July 15- 31 July 15	8754.50	0.00	0.00	8754.50
01 Aug 15- 31 Aug 15	5859.74	0.00	0.00	5859.74
Total	90181.21	0.00	0.00	90181.21
			Round down of nearest integer	90181

E.2. Calculation of project emissions or actual net GHG removals by sinks

There are no Project emissions from the project activity.

E.3. Calculation of leakage

There are no leakage emissions from the project activity

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	90181	0	0	0	90181	90181

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	$(65\ 036/365) \times 639 = 113\ 858$	90 181

E.6. Remarks on difference from estimated value in registered PDD

The estimated annual emission reductions in the registered PDD for the monitoring period are 113 858 tCO₂e. The actual emission reductions are 90 181 tCO₂e which are less than the estimated emission reduction. The reason for this is low wind season during the monitoring period.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Hindustan Zinc Limited
Street/P.O. Box	P.O Putholi
Building	
City	Chittorgarh
State/region	Rajasthan
Postcode	312021
Country	INDIA
Telephone	+91-01472-254801
Fax	+91-01472-253030
E-mail	Rajinder.Ahuja@vedanta.co.in
Website	www.hzlindia.com
Contact person	Mr. Rajinder Singh Ahuja
Title	Head- Power Business
Salutation	Mr.
Last name	Ahuja
Middle name	Singh
First name	Rajinder
Department	Power
Mobile	+91-9001996726
Direct fax	+91-01472-253030
Direct tel.	+91-01472-254801
Personal e-mail	

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		