



**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	25.5 MW WIND ENERGY FARM AT NANDURBAR MAHARASHTRA BY HZL	
UNFCCC reference number of the project activity	7981	
Version number of the monitoring report	02	
Completion date of the monitoring report	01/05/2016	
Monitoring period number and duration of this monitoring period	Monitoring Period No.: -1st Duration:- 27/12/2012 – 29/02/2016	
Project participant(s)	Hindustan Zinc Limited	
Host Party	India	
Sectoral scope(s)	Sectoral Scope 1 Energy industries (renewable/ non-renewable sources).	
Selected methodology(ies)	ACM0002, Version 12.3.0 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	136 377 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
	180 tonnes of CO ₂ e	155 879 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, ore processing to smelting of non-ferrous metals is the owner and project proponent of the proposed project activity. The project activity primarily aims at reducing Green House Gas (GHG) emissions through utilization of renewable energy technology for generation of electrical energy. The electricity generated from the project activity (approximately 45 033 MWh annually) will displace equivalent electricity generation in grid connected power plants. The project activity will reduce the anthropogenic GHG emissions (approximately 42 912 tCO₂ annually) associated with the equivalent amount of electricity generation from the fossil fuel based grid connected power plants

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

The project activity involves installation and operation of seventeen Suzlon make 1.5 MW Wind Electric Generators (WEGs) by Hindustan Zinc Limited (HZL) in the state of Maharashtra. All of these 17 WEGs are commissioned in the month of Sept 2011. The cumulative capacity of the project activity is 25.5 MW. The electricity generated from the project activity will be exported to regional Grid.

The technology employed by the project activity converts kinetic energy in wind to mechanical energy and mechanical energy to electrical energy using wind turbine generators (WEGs). In this process, there are no greenhouse gas emissions or burning of any fossil fuels. The electricity is generated through sustainable means without causing any negative effect to the environment and therefore the technology is environmentally safe and sound.

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 WEGs of S-82 Suzlon make (1500 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%.

3. Relevant dates for the project activity:-

WTGs installed in the project activity are as follows:

LOCATION No	Date of commissioning	Connected Load (MW)
C-02,06,07,28,29,30,32	02/09/2011	10.5 MW
C-05,20	09/09/2011	3.0 MW
C-04,18,37,67	15/09/2011	6.0 MW
C-03,19	21/09/2011	3.0 MW
C-26,27	29/09/2011	3.0 MW

Operation lifetime	20 years
First monitoring period	27/12/2012 – 29/02/2016 (Current)

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

During the monitoring period (27/12/2012 - 29/02/2016) the project activity was operated and monitored in accordance with the applicable baseline and monitoring methodology ACM0002, Version 12.3.0 and registered PDD.

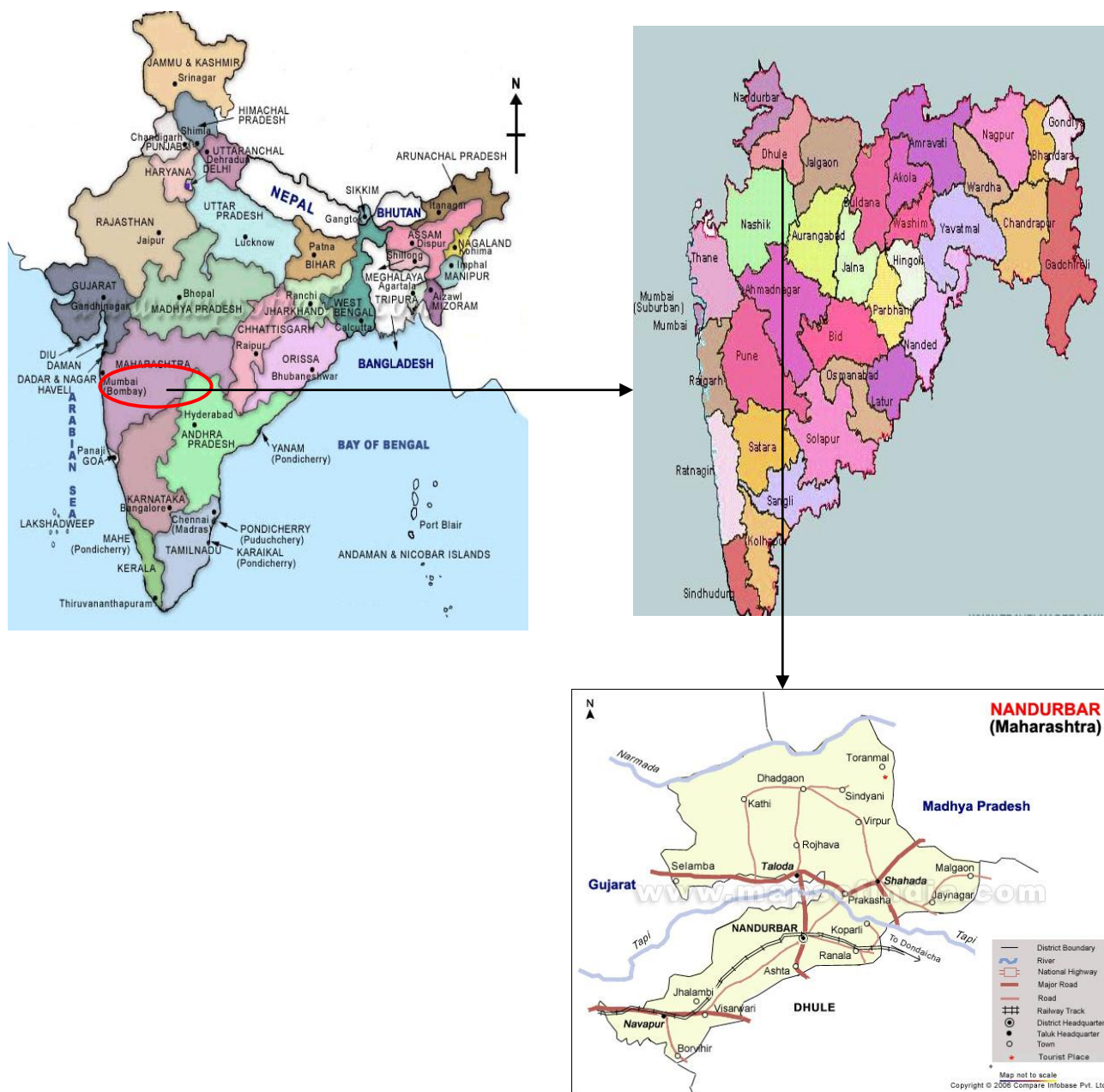
All the WEGs are in operation and No abnormal circumstance occurred during this monitoring period. Suzlon operation and maintenance activities are ISO 9001:2008 certified and all the events are recorded in the log book available at the project site. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance. The major events (Break down/ shut down) are provided in the Annexure 2.

Total emission reductions for the monitoring period (27/12/2012 - 29/02/2016) both days inclusive are 156 059 tCO₂e.

A.2. Location of project activity

The project activity consists of seventeen 1.5 MW wind turbines in the district of Nandurbar in the state of Maharashtra, India. The nearest railway station to Nandurbar is Nandurbar railway station and nearest airport is situated at Nasik which is 188 Kms from Nandurbar. Details of the location of the project activity:

Sr. No.	WTG. No.	Latitude	Longitude
1	C-02	21°18'10"N	74°18'32"E
2	C-03	21°17'55"N	74°18'28"E
3	C-04	21°17'17"N	74°18'16"E
4	C-05	21°17'30"N	74°18'32"E
5	C-06	21°17'47"N	74°18'09"E
6	C-07	21°17'59"N	74°18'05"E
7	C-18	21°17'14"N	74°17'51"E
8	C-19	21°17'29"N	74°17'51"E
9	C-20	21°17'43"N	74°17'49"E
10	C-26	21°18'47"N	74°17'09"E
11	C-27	21°18'54"N	74°16'51"E
12	C-28	21°17'31"N	74°17'05"E
13	C-29	21°17'38"N	74°16'56"E
14	C-30	21°17'25"N	74°16'42"E
15	C-32	21°17'17"N	74°16'10"E
16	C-37	21°15'45"N	74°19'33"E
17	C-67	21°15'06"N	74°16'20"E



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)
India (host)	Hindustan Zinc Limited (Private entity)	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 12.3.0 (EB 66), 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

A.5. Crediting period of project activity

Type: - Renewable

Start Date of Current Crediting period: - 27/12/2012

Crediting period: 27/12/2012 – 26/12/2019 (Renewable)

Current Monitoring Period: 27/12/12 – 29/02/2016

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 equipment's;

The technology employed by the project activity converts kinetic energy in wind to mechanical energy and mechanical energy to electrical energy using wind turbine generators (WTGs). In this process, there are no greenhouse gas emissions or burning of any fossil fuels. The electricity is generated through sustainable means without causing any negative effect to the environment and therefore the technology is environmentally safe and sound.

The technical specifications of the WEGs are as below:

WTG (S82 , 1.5 MW, 50 Hz) TECHNICAL DATA

Rated capacity : 1500 kW

Rotor diameter : 82 m

Hub height : 78.5 m

Rotor with Pitch Control

Type : Upwind rotor with active pitch control

Number of blades : 3

Swept area: 5281 m²

Blade material : The rotor blades are made epoxy bonded fibre glass

Rotor speed : 16.30 rpm

Tip speed : 70 m/s

Generator :

Type: Single fed Induction Generator with slip- rings, variable rotor resistance with SUZLON flexi slip control system.

Hub : Cast spherical hub
Bearings : Spherical roller bearing
Tower : Steel Tubular, 76 m height

2. Information on the actual operation of the project activity

During the monitoring period (27/12/12 - 30/02/2016) the project activity was operated and monitored in accordance with the applicable baseline and monitoring methodology ACM0002, Version 12.3.0 and registered PDD.

All the WEGs are in operation and No abnormal circumstance occurred during this monitoring period. Suzlon 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 2.

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

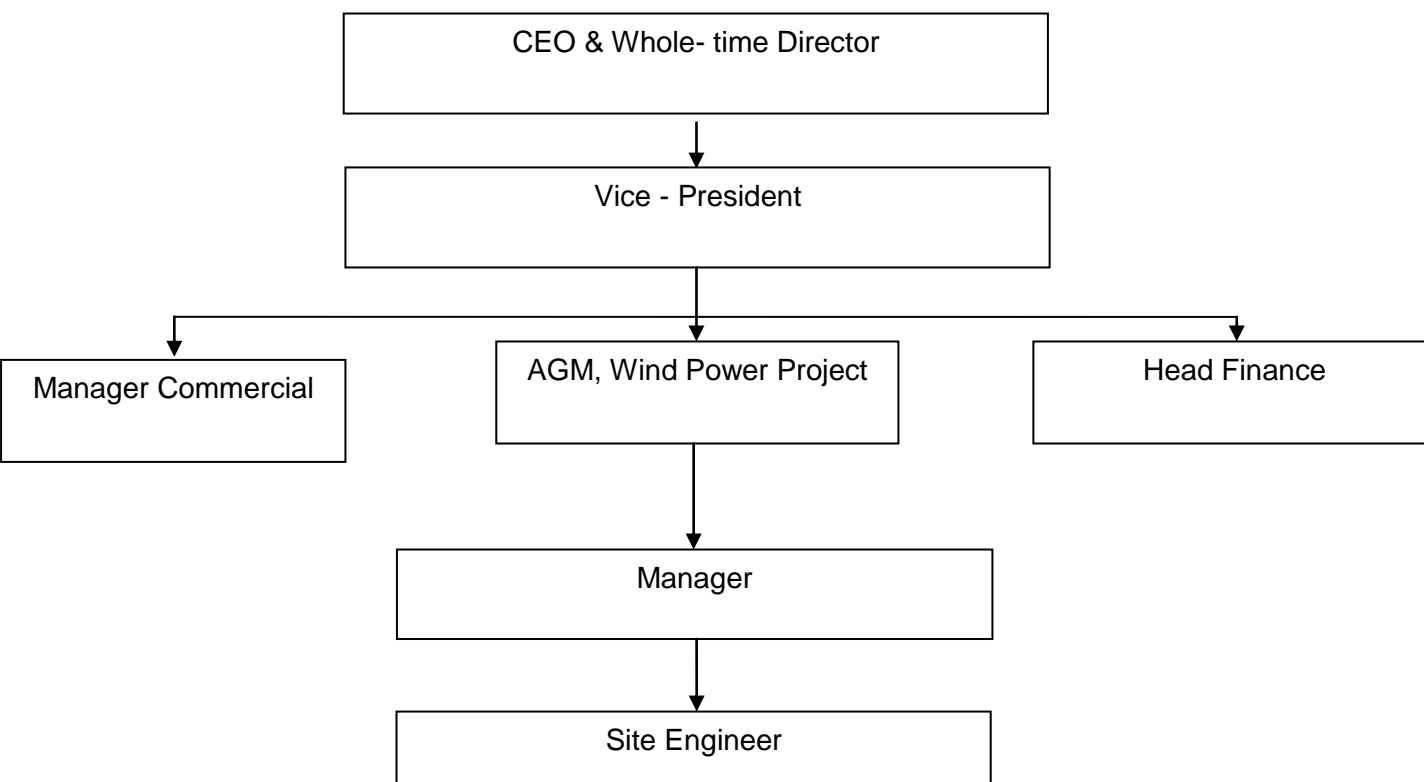
The purpose of the monitoring plan is to define the organizational structure of the monitoring team, monitoring practices, QA and QC procedures and archiving procedures. The monitoring plan will ensure that the emission reductions from the project activity are reported accurately and transparently.

Roles and Responsibilities of the Monitoring Team

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

To ensure trouble free operation of all the wind turbines, HZL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines. The contractor, Suzlon Infrastructure Limited, would be responsible for the operation and maintenance of the WTGs. The O&M personnel are qualified engineers and are trained at the WEG manufacturing facility of Suzlon Infrastructure Limited.

The monitoring will interact with the O&M contractors as well as the State Utility officials for executing the monitoring plan. The structure of the Monitoring Team is as follows:



The site engineer from HZL shall supervise the wind power plant operations under the guidance of the Manager. The Site Engineer of HZL will also interact with the O&M contractors and ensure that the WTG generation reports and JMR statements are forwarded to the Manager for review and electronic archiving. The O&M contractors would be responsible for forwarding monitoring data to Manager of HZL. The Manager would review the monitoring records and suggest corrective action

as and when required. The Manager – Commercial will ensure that records of payments for sale of electricity to the state utility are maintained and archived electronically. HZL management will have a CDM review meeting on a bi-annual basis for review of the emission reductions and performance of the project activity.

Metering Arrangements and Procedures

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). The electricity exported from the sub-station will be metered using electronic TOD meters. A main and check meter of 0.2 accuracy class would be installed for every feeder at the sub-station of the state electricity board. On a monthly basis, a joint meter reading will be carried out in the presence of the state electricity board officials and representatives of the project promoters.

The total electricity exported and imported by the project activity has been provided by state electricity board. The MSEDCL issue a credit note to project promoter which included the details of the energy generated, exported and imported by the each WEG of the project proponent. This credit note is used for the emission reduction calculation.

Quality control and Quality Assurance procedures:

Calibration Procedures:

Main meters and check meters are installed for monitoring the energy exported. The main and check meters shall be calibrated on an annual basis with reference to a portable standard meter. The meters shall be deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class. The data registered by the main meter alone will be adopted for the purpose of calculation as long as the error in the main meter is within permissible limits. If during the annual accuracy tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the limits, the main meter reading shall be considered as usual. However, the check meter shall be calibrated immediately. If the main meter is found to be beyond the permissible limits of error, but corresponding check meter is within limits, then the check meter reading shall be adopted for that period. The main meter shall be calibrated immediately.

Apportioning Procedures in case the dates of monitoring period do not match with billing cycle dates

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

$$\text{Apportioned Net Electricity Generation} = \text{Apportioning Ratio} \times \text{Net Electricity Generation as per JMR Statement}$$

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

Note:-

In this monitoring period apportioning applied for the month of Dec'12 which is explained below:-

Apportioned Net Electricity Generation	=	Apportioning Ratio	x	Net Electricity Generation as per JMR Statement
Apportioned Net Electricity Generation for the month of Dec'12	=	0.16129	x	1171234
Apportioned Net Electricity Generation for the month of Dec'12	=	188908.7	kWh	

Data collection and archiving

The daily data on electricity generation from WTGs at the site is collected in electronic form. Monthly JMR statements are collected and maintained in hard copy, and archived electronically. The project proponent shall keep complete and accurate records of all the data as a part of monitoring for at least a period of 2 years after the end of the crediting period or the last issuance of CERs for the project activity, whichever occurs later.

Net Electricity Exported = Total Electricity Exported - Total Electricity Imported

Baseline Emission Calculation:-

$$BE_y = EF_y \times EG_y$$

BE_y baseline emissions, tCO₂e

EG_y Net Quantity of Electricity supplied to MSEDCL facility

EF_y grid emission factor, i.e. 0.9529 tCO₂/MWh (it has been fixed ex-ante)

Emission Reduction Calculation:-

$$ER_y = BE_y - PE_y - Ly$$

ER_y Emission Reduction

BE_y baseline emissions

PE_y project emissions

Ly leakage emissions

SECTION D. Data and parameters

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

Data/parameter:	EF _{grid,OM,y}
Unit	tCO ₂ /MWh
Description	Operating Margin emission factor for NEWNE grid
Source of data	Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 7.0
Value(s) applied)	0.9842 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 and Government of India. Hence it is an appropriate source
Purpose of data	Baseline calculations

Additional comments	The operating margin emission factor has been published by CEA in accordance with the 'Tool to calculate the emission factor for an electricity system.' The option of ex ante calculation based on Simple Operating Margin Method have been applied using a three year generation weighted average (2008-09, 2009-10 and 2010-11). This value is determined ex-ante and will be fixed for the crediting period.
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Data/parameter:	$EF_{grid,BM,y}$
Unit	tCO ₂ /MWh
Description	Build Margin emission factor for NEWNE grid
Source of data	Referred from CO2 Baseline Database for the Indian Power Sector prepared by Central Electricity Authority, Version 7.0.
Value(s) applied)	0.8123 tCO ₂ /MWh
Choice of data or measurement methods and procedures	The CEA CO2 Baseline Database is the most authentic data available in India since it has been prepared & published by Central Electricity Authority, Ministry of Power and Government of India. Hence it is an appropriate source
Purpose of data	Baseline calculations
Additional comments	The build margin emission factor has been published by CEA in accordance with the 'Tool to calculate the emission factor for an electricity system.' The build margin is calculated as the average emissions intensity of the 20% most recent capacity additions in the grid based on net generation. The build margin has been taken corresponding to the year 2009-10, the latest year for which data is available. This value is determined ex-ante and will be fixed for the crediting period.

Data/parameter:	$EF_{grid,CM,y}$
Unit	tCO ₂ /MWh
Description	Combined Margin CO2 emission factor for NEWNE grid
Source of data	Calculated based on values given in the CO2 Baseline Database Version 7.0 for the Indian Power Sector prepared by Central Electricity Authority.
Value(s) applied)	0.9529 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	<p>The combined margin emission factor has been determined based on data published by the CEA, applying a 75% weightage for EF_{grid}, OM, y and 25% for EF_{grid}, BM, y in accordance with the 'Tool to calculate the emission factor for an electricity system.'</p> <table border="1"> <tr> <td colspan="2">Combined Margin Estimation for NEWNE Grid (tCO₂/MWh)</td></tr> <tr> <td>Operating Margin (EF_{grid}, OM, y)</td><td>0.9842</td></tr> <tr> <td>Build Margin (EF_{grid}, BM, y)</td><td>0.8123</td></tr> <tr> <td>Combined Margin (EF_{CO₂}, grid, y)</td><td>0.9529</td></tr> </table> <p>This value is determined ex-ante and will be fixed for the crediting period.</p>	Combined Margin Estimation for NEWNE Grid (tCO ₂ /MWh)		Operating Margin (EF _{grid} , OM, y)	0.9842	Build Margin (EF _{grid} , BM, y)	0.8123	Combined Margin (EF _{CO₂} , grid, y)	0.9529
Combined Margin Estimation for NEWNE Grid (tCO ₂ /MWh)									
Operating Margin (EF _{grid} , OM, y)	0.9842								
Build Margin (EF _{grid} , BM, y)	0.8123								
Combined Margin (EF _{CO₂} , grid, y)	0.9529								

D.2. Data and parameters monitored

Data/parameter:	EG_{facility, y}
Unit	kWh
Description	Net electricity supplied to grid
Measured/calculated/default	Calculated from measured values
Source of data	MSEDCL reports on energy delivered at MSEDCL grid (Credit Notes)
Value(s) of monitored parameter	163 843 252 kWh
Monitoring equipment	ANNEXURE – 1
Measuring/reading/recording frequency:	Measured: Continuously Reporting Frequency: Monthly (Calculated)
Calculation method (if applicable):	The net electricity supplied to the grid is calculated as follows: Net Electricity supplied to the grid by Project Activity = Total electricity exported by project activity - Total electricity imported by project activity
QA/QC procedures:	The quantity of net electricity supplied will be cross-verified from the invoices/sales receipts raised to the state utility.
Purpose of data:	Baseline calculation
Additional comments:	The data will be kept for two years after the crediting period or from last issuance. The values shall be monitored ex-post and CERs will be calculated at actual.

Data/parameter:	EG_{y, Export}
Unit	kWh
Description	Sum of Gross electricity generated by all 17 WEGs of project activity connected to substation of the state utility
Measured/calculated/default	Measured
Source of data	MSEDCL report on energy delivered at MSEDCL grid (Credit Notes)

Value(s) of monitored parameter	164 423 739 kWh
Monitoring equipment	ANNEXURE – 1
Measuring/reading/recording frequency:	Measured: Continuously Reporting Frequency: Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Testing of energy meters will be carried out by MSEDCL officials on an annual basis. The primary monitoring is done through a main meter which is located at the sub-station. In the case the main meter malfunctions, the Check meter readings would be considered for billing purposes.
Purpose of data:	Calculation of baseline emissions
Additional comments:	-

Data/parameter:	EG _{y, Import}
Unit	kWh
Description	Electricity imported from the grid by the project activity
Measured/calculated/default	Measured
Source of data	MSEDCL report on energy delivered at MSEDCL grid (Credit Notes)
Value(s) of monitored parameter	580 487 kWh
Monitoring equipment	Annexure 1
Measuring/reading/recording frequency:	<ul style="list-style-type: none"> Measured: Continuously Reporting Frequency: Monthly
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Testing of energy meters will be carried out by MSEDCL officials on an annual basis. The primary monitoring is done through a main meter which is located at the sub-station. In the case the main meter malfunctions, the Check meter readings would be considered for billing purposes.
Purpose of data:	Calculation of baseline emissions
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**

Baseline emissions (BE_y in tCO_2e) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh) as described in registered PDD.

$$BE_y = EF_{CO_2,grid,y} \times EG_{BL,y}$$

Where,

BE_y baseline emissions, tCO_2e

$EG_{BL,y}$ Net Quantity of Electricity exported to MSEDCL facility

$EF_{CO_2,grid,y}$ grid emission factor, i.e. $0.9529 t CO_2/MWh$ (it has been fixed ex-ante)

$$\begin{aligned} EG_{BL,y} &= EG_{y,Export} - EG_{y,Import} \\ &= 164\,423\,739 - 580\,487 \\ &= 163\,843\,252 \text{ kWh} \\ &= 163\,843.252 \text{ MWh} \end{aligned}$$

The value of electricity exported and imported has been adjusted for the month of May'14, Jun'14, Jun'15 and Jul'15 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	Quantity of Electricity exported by HZL to MSDCL facility ,total of all feeders	Adjusted Quantity of Electricity exported by HZL to MSDCL facility ,total of all feeders	Quantity of Electricity imported by HZL from MSDCL facility ,total of all feeders	Adjusted Quantity of Electricity imported by HZL from MSDCL facility ,total of all feeders	Net Quantity of Electricity Exported to MSDCL facility(EG_y)	Adjusted Net Quantity of Electricity Exported to MSDCL facility(EG_y)
01 May 14- 31 May 14	9110962	9092740	6634	6647	9104328	9086093
01 Jun 14 - 30 Jun 14	11007637	10985622	4534	4543	11003103	10981079
01 Jun 15 - 30 Jun 15	5244545	5234056	13449	13476	5231096	5220580
01 Jul 15- 31 Jul 15	9673198	9653852	3101	3107	9670097	9650744

Adjusted Net Quantity of Electricity Exported to MSEDCL facility $EG_y = 163\,773\,068 \text{ kWh}$

So,

$$\begin{aligned} EG_y &= EG_{y,Export} - EG_{y,Import} \\ &= 164\,353\,611 - 580\,542 \\ &= 163\,773\,068 \text{ kWh} \\ &= 163\,773.068 \text{ MWh} \end{aligned}$$

And

$$\begin{aligned}
 BE_y &= EG_y \times \text{emission factor} \\
 &= 163\,773.068 \times 0.9529 \\
 &= 156\,059 \text{ tCO}_2\text{e (Round down to nearest integer)}
 \end{aligned}$$

Monitored Data

Month	Gross electricity generated by all WEGs owned by PP (Y)	Quantity of Electricity exported by HZL to MSDCL facility (EGy, Export)	Quantity of Electricity imported by HZL from MSDCL facility (EGy, Import)	Net Quantity of Electricity Exported to MSDCL facility(EGy)
	kWh	kWh	kWh	kWh
27 Dec 12- 31 Dec 12	195349	192094	3185	188909
01 Jan 13- 31 Jan 13	1880724	1820628	15670	1804958
01 feb 13 - 28 feb 13	2117950	2108786	20422	2088364
01 Mar 13 - 31 Mar 13	2963117	2923098	20727	2902371
01 Apr 13- 30 Apr 13	6558264	6683490	9455	6674035
01 May 13- 31 May 13	12843278	12606453	34	12606419
01 Jun 13 - 30 Jun 13	8024618	7737705	9650	7728055
01 Jul 13- 31 Jul 13	9150394	9006613	936	9005677
01 Aug 13- 31 Aug 13	9614332	9485489	65	9485424
01 Sept 13 - 30 Sept 13	5190850	4884595	14726	4869869
01 Oct 13- 31 Oct 13	2286830	2209367	25336	2184031
01 Nov 13- 30 Nov 13	695851	691646	16009	675637
01 Dec 13- 31 Dec 13	595204	548076	21173	526903
01 Jan 14- 31 Jan 14	1852957	1848951	15221	1833730
01 feb 14 - 28 feb 14	2685893	2622731	11793	2610938
01 Mar 14 - 31 Mar 14	3087013	3105930	14423	3091507
01 Apr 14- 30 Apr 14	5168303	5100539	12778	5087761
01 May 14- 31 May 14	8764998	9117596	6634	9110962
01 Jun 14 - 30 Jun 14	11626687	11012171	4534	11007637
01 Jul 14 - 31 Jul 14	7765445	7358164	1523	7356641
01 Aug 14- 31 Aug 14	2193514	2162092	8756	2153336
01 Sept 14 - 30 Sept 14	5768147	5654161	12827	5641334

01 Oct 14- 31 Oct 14	497136	471671	37192	434479
01 Nov 14- 30 Nov 14	511379	477650	30065	447585
01 Dec 14- 31 Dec 14	1327949	1296278	13796	1282482
01 Jan 15- 31 Jan 15	1035193	1022502	20117	1002385
01 feb 15 - 28 Feb 15	1592333	1616081	17837	1598244
01 Mar 15 - 31 Mar 15	2329896	2266508	25435	2241073
01 Apr 15- 30 Apr 15	5804745	5628728	12587	5616141
01 May 15- 31 May 15	9341683	9187829	8201	9179628
01 Jun 15 - 30 Jun 15	5355608	5257994	13449	5244545
01 Jul 15- 31 Jul 15	9877664	9676299	3101	9673198
01 Aug 15- 31 Aug 15	8586864	8445131	1268	8443863
01 Sept 15 - 30 Sept 15	4374024	4269967	13333	4256634
01 Oct 15- 31 Oct 15	1040239	1016449	41333	975116
01 Nov 15- 30 Nov 15	529039	495488	30521	464967
01 Dec 15- 31 Dec 15	1220968	1184862	18197	1166665
01 Jan 16- 31 Jan 16	1154438	1121247	28960	1092287
01 feb 16 - 29 Feb 16	2152675	2108680	19218	2089462
Total	167761551	164423739	580487	163843252

Emission Reduction

Month	Baseline Emissions (tCO ₂)	Project Emissions (tCO ₂)	Leakages	Emission Reduction (tCO ₂)
			(tCO ₂)	
27 Dec 12- 31 Dec 12	180.01	0	0	180.01
01 Jan 13- 31 Jan 13	1719.94	0	0	1719.94
01 feb 13 - 28 feb 13	1990.00	0	0	1990.00
01 Mar 13 - 31 Mar 13	2765.67	0	0	2765.67

01 Apr 13- 30 Apr 13	6359.69	0	0	6359.69
01 May 13- 31 May 13	12012.66	0	0	12012.66
01 Jun 13 - 30 Jun 13	7364.06	0	0	7364.06
01 Jul 13- 31 Jul 13	8581.51	0	0	8581.51
01 Aug 13- 31 Aug 13	9038.66	0	0	9038.66
01 Sept 13 - 30 Sept 13	4640.50	0	0	4640.50
01 Oct 13- 31 Oct 13	2081.16	0	0	2081.16
01 Nov 13- 30 Nov 13	643.81	0	0	643.81
01 Dec 13- 31 Dec 13	502.09	0	0	502.09
01 Jan 14- 31 Jan 14	1747.36	0	0	1747.36
01 feb 14 - 28 feb 14	2487.96	0	0	2487.96
01 Mar 14 - 31 Mar 14	2945.90	0	0	2945.90
01 Apr 14- 30 Apr 14	4848.13	0	0	4848.13
01 May 14- 31 May 14	8664.45	0	0	8664.45
01 Jun 14 - 30 Jun 14	10468.18	0	0	10468.18
01 Jul 14 - 31 Jul 14	7010.14	0	0	7010.14
01 Aug 14- 31 Aug 14	2051.91	0	0	2051.91
01 Sept 14 - 30 Sept 14	5375.63	0	0	5375.63
01 Oct 14- 31 Oct 14	414.02	0	0	414.02
01 Nov 14- 30 Nov 14	426.50	0	0	426.50
01 Dec 14- 31 Dec 14	1222.08	0	0	1222.08
01 Jan 15- 31 Jan 15	955.17	0	0	955.17
01 Feb 15 - 28 Feb 15	1522.97	0	0	1522.97
01 Mar 15 - 31 Mar 15	2135.52	0	0	2135.52
01 Apr 15- 30 Apr 15	5351.62	0	0	5351.62
01 May 15- 31 May 15	8747.27	0	0	8747.27
01 Jun 15 - 30 Jun 15	4987.48	0	0	4987.48
01 Jul 15- 31 Jul 15	9199.14	0	0	9199.14
01 Aug 15- 31 Aug 15	8046.16	0	0	8046.16
01 Sept 15 - 30 Sept 15	4056.15	0	0	4056.15
01 Oct 15- 31 Oct 15	929.19	0	0	929.19
01 Nov 15- 30 Nov 15	443.07	0	0	443.07
01 Dec 15- 31 Dec 15	1111.72	0	0	1111.72
01 Jan 16- 31 Jan 16	1040.84	0	0	1040.84

01 Feb 16 - 29 Feb 16	1991.05	0	0	1991.05
Total	156059.36	0.00	0.00	156059.36
				156059

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	136 377	0	0	180	155 879	156 059

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)	$(42\,912/365) \times 1160 = 136\,377$	156 059

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

The estimated emission reductions in the registered PDD for the monitoring period are 136 377 tCO₂e. The actual emission reductions are 156 059 tCO₂e which are more than the estimated emission reduction. The reason for this is high wind velocity as the pattern of the wind changed during the monitoring period.

ANNEXURE-1

Details of Meters

					2012-13	2013-14	2014-15	2015-16
Feeder No	Machine No	Meter	Serial No.	After Replaced by ABT meters Serial No.	Calibration Dates	Calibration Dates	Calibration Dates	Calibration Dates
1	C32	Main	MSP32644		05-10-2012	17-08-2013	04-06-2014	08-07-2015
		Back	Msp32642		05-10-2012	17-08-2013	04-06-2014	08-07-2015
3	C18,C19, C20,C26, C27,C28, C29,C30	Main	4738073	14831497	30-07-2012	21-05-2013	04-06-2014	08-07-2015
		Back	4961771	14831498	30-07-2012	21-05-2013	04-06-2014	08-07-2015
4	C02,C03, C04,C05, C06,C07	Main	4961770	14796438	25-07-2012	21-05-2013	04-06-2014	08-07-2015
		Back	4961773	14796439	25-07-2012	21-05-2013	04-06-2014	08-07-2015
11	C37	Main	MSP32637		04-10-2012	06-08-2013	17-06-2014	08-07-2015
		Back	MSP32638		04-10-2012	06-08-2013	17-06-2014	08-07-2015
12	C67	Main	MSP32639	14831484	30-07-2012	22-05-2013	17-06-2014	08-07-2015
		Back	MSP32640	14796430	30-07-2012	22-05-2013	17-06-2014	08-07-2015

Annexure-2

Major Breakdown or Shut down details:-

Gen. Date	Loc. No.	Breakdown Remark	Formula Parameter	Breakdown Hrs.
25-Jun-2013	C05	Elec GenBrushesWornOut	U	15.70
03-Jul-2013	C28	Elec GenBrushesWornOut	U	24.00
04-Jul-2013	C20	Elec GenBrushesWornOut	U	18.70
04-Jul-2013	C28	Elec GenBrushesWornOut	U	23.50
04-Jul-2013	C30	FSS Fault1	U	16.40
06-Aug-2013	C07	Elec GenBrushesWornOut	U	24.00
07-Aug-2013	C27	Elec GenBrushesWornOut	U	15.50
07-Aug-2013	C37	Elec GenBrushesWornOut	U	18.70
24-Aug-2013	C20	Elec SafteyChainStop	U	20.00
25-Aug-2013	C20	Elec SafteyChainStop	U	22.60
26-Aug-2013	C20	Elec SafteyChainStop	U	24.00
27-Aug-2013	C20	Hyd GearOilLevel LowStop	U	23.40
28-Aug-2013	C20	Hyd GearOilLevel LowStop	U	24.00
29-Aug-2013	C20	Hyd GearOilLevel LowStop	U	24.00
30-Aug-2013	C20	Hyd GearOilLevel LowStop	U	17.40
12-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	24.00
13-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	23.80
14-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	15.50
15-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	24.00
16-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	24.00
17-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	22.60
18-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	24.00
19-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	24.00
20-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	24.00
21-Sep-2013	C29	Pitch Akku2Voltage LowStop	U	15.30
18-Nov-2013	C29	Pitch Akku2Voltage LowStop	U	16.80
07-Dec-2013	C30	Elec FB Generator Heating	U	16.50
14-Feb-2014	C02	Elec TestAkkuPitch TimeOutStop	U	15.90
02-Mar-2014	C07	Rep Pitch CANComFail	U	15.60
02-Mar-2014	C05	VCB Tripped	U	20.90
21-Mar-2014	C30	Pitch CAN3ComFail	U	15.40
21-Mar-2014	C27	Elec FB GearOilCooler Stop	U	20.20
22-Mar-2014	C27	Elec FB GearOilCooler Stop	U	24.00
23-Mar-2014	C27	Elec FB GearOilCooler Stop	U	24.00
24-Mar-2014	C27	Elec FB GearOilCooler Stop	U	23.20
25-Mar-2014	C27	Elec FB GearOilCooler Stop	U	24.00

26-Mar-2014	C27	Elec FB GearOilCooler Stop	U	17.00
26-Mar-2014	C28	Elec FB YawCW Error	U	17.00
27-Mar-2014	C27	Elec FB GearOilCooler Stop	U	24.00
27-Mar-2014	C28	Elec FB YawCW Error	U	24.00
28-Mar-2014	C27	Elec FB GearOilCooler Stop	U	24.00
28-Mar-2014	C28	Elec FB YawCW Error	U	24.00
29-Mar-2014	C27	Elec FB GearOilCooler Stop	U	21.80
29-Mar-2014	C28	Elec FB YawCW Error	U	24.00
30-Mar-2014	C28	Elec FB YawCW Error	U	17.40
07-Apr-2014	C37	Rep SE RebootPLC	U	24.00
06-May-2014	C28	Elec FB YawCW Error	U	23.60
07-May-2014	C28	Elec FB YawCCW Err	U	24.00
08-May-2014	C28	Elec FB YawCCW Err	U	24.00
21-May-2014	C28	Pitch AccuChargerStop	U	24.00
22-May-2014	C28	Pitch AccuChargerStop	U	22.10
20-Jun-2014	C04	Rep SE RebootPLC	U	24.00
14-Aug-2014	C32	Elec YawSensor ErrStop	U	24.00
14-Aug-2014	C07	Elec FB YawCCW Err	U	23.00
14-Aug-2014	C05	Elec FB YawCCW Err	U	20.30
14-Aug-2014	C02	Elec FB YawCCW Err	U	23.00
15-Aug-2014	C32	Elec YawSensor ErrStop	U	24.00
15-Aug-2014	C18	Pitch CAN1ComFail	U	24.00
16-Aug-2014	C02	Pitch 1 OverCurrent	U	23.90
17-Aug-2014	C02	Pitch 1 OverCurrent	U	24.00
30-Aug-2014	C29	Pitch Akku2Voltage LowStop	U	23.10
31-Aug-2014	C29	Pitch Akku2Voltage LowStop	U	24.00
10-Sep-2014	C28	SFS Crowbar FB Fired Stop	U	24.00
14-Sep-2014	C29	Pitch Angle1 SPDifferenceStop	U	24.00
15-Sep-2014	C29	Pitch Angle1 SPDifferenceStop	U	23.90
03-Feb-2015	C29	Rep Pitch FreqConvPitch2 ErrStop	U	21.90
04-Feb-2015	C29	Rep Pitch FreqConvPitch2 ErrStop	U	24.00
05-Feb-2015	C29	Rep Pitch FreqConvPitch2 ErrStop	U	24.00
06-Feb-2015	C29	Pitch 2 OverCurrent	U	24.00
07-Feb-2015	C29	Pitch 2 OverCurrent	U	24.00
21-Apr-2015	C32	SFS RotorCurrent IOC Trip Stop	U	22.00
13-May-2015	C04	Pitch 3 ResolverError	U	24.00
14-May-2015	C04	Pitch 3 ResolverError	U	24.00
29-May-2015	C18	Elec TestAkkuPitch TimeOutStop	U	23.90
16-Jul-2015	C07	Elec FB YawCCW Err	U	23.90
15-Aug-2015	C19	Pitch AccuChargerStop	U	24.00
16-Aug-2015	C19	Pitch AccuChargerStop	U	24.00
17-Aug-2015	C19	Pitch AccuChargerStop	U	23.90
22-Aug-2015	C37	Pitch AccuChargerStop	U	23.80
23-Aug-2015	C37	Pitch AccuChargerStop	U	23.00
24-Aug-2015	C37	Pitch AccuChargerStop	U	24.00
25-Aug-2015	C37	Pitch AccuChargerStop	U	24.00
26-Aug-2015	C37	Pitch AccuChargerStop	U	24.00

27-Aug-2015	C37	Pitch AccuChargerStop	U	24.00
25-Sep-2015	C30	Pitch AccuChargerStop	U	22.00
05-Oct-2015	C06	Elec TestAkkuPitch TimeOutStop	U	22.70
09-Oct-2015	C26	Elec FB YawCCW Err	U	24.00
10-Oct-2015	C26	Elec FB YawCCW Err	U	24.00
11-Oct-2015	C26	Elec FB YawCCW Err	U	24.00
12-Oct-2015	C26	Elec FB YawCCW Err	U	24.00
13-Oct-2015	C26	Elec FB YawCCW Err	U	24.00

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
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