

WIND POWER PROJECT BY PATNAIK MINERALS PVT. LTD.

Document Prepared By (Patnaik Minerals Pvt. Ltd.)

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Prepared By	Patnaik Minerals Pvt. Ltd.
Contact	Patnaik Minerals Pvt. Ltd., P.O. Boneikala Joda, Keonjhar, Orissa, India, ZipCode-758038 Ph. No. : +91-6767 – 273699 Fax: +91-6767-272066 Website: http://patnaikminerals.com E-mail: panda.sanjit@rediffmail.com, pmp1123@rediffmail.com

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1 PROJECT DETAILS

1.1 Summary Description of Project

The project activity envisages implementation of a 35.2 MW wind power project consisting of 44 Wind Electric Generators (WEGs) of individual capacity 0.8 MW at Samana Site in Gujarat, India. Out of the 44 WEGs, 38 WEGs are owned by PMPL and Banspani Iron Limited (BIL) owns 6 WEGs. PMPL holds 49.9% shareholding in BIL and is the promoter of the same. In view of PMPL having more knowledge and a better understanding of wind power projects, BIL has opted to entrust the responsibility of negotiating, monitoring and executing the said project activity to PMPL.

The project is located at:

District: Jamnagar, Rajkot

Taluk: Kalavad, Upleta

Site: Samana

Village: Dhun Dhoraji, Hakumati, Vadali, Khirsara, Moti Vavdi

Purpose

The proposed project activity is an initiative by PMPL to export renewable electricity produced by Wind Electric Generator (WEG) to the power deficit NEWNE grid in order to decrease power shortage, diversify the grid and reduce greenhouse gas emissions.

Technology

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 over 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 44 WEGs of E-48 Enercon make (800 kW WEGs).

E-48 TECHNICAL DATA

Rated capacity	: 800 kW
Rotor diameter	: 48 m
Hub height	: 56 m
Turbine Type	: Gearless horizontal axis wind turbine with variable rotor speed
Power regulation	: Independent electromechanical pitch system for each blade
Cut-in wind speed	: 3 m/s
Rated wind speed	: 12 m/s

Cut-out wind speed	: 28-34 m/s
Extreme wind speed	: 59.5 m/s
Rated operational wind speed	: 31.5 m/s
Operating range rot. Speed	: 16 – 31.5 m/s
Orientation	: Upwind
No. of blades	: 3
Blade material	: Glass Fiber reinforced Epoxy
Gear box type	: Gearless
Generator type	: Synchronous generator
Braking	: Aerodynamic
Output voltage	: 400 V
Yaw system	: Active yawing with 4 electric yaw drives with brake motor and friction bearing

Enercon (India) Ltd has complete control on production through in-house manufacturing of all key components¹. Enercon (India) Ltd. has established 4 manufacturing plants at Daman in India besides concrete tower manufacturing facilities in Gujarat and Karnataka². Further, the project activity does not involve any technology transfer. It is ensured environmentally safe and sound technology is being deployed in the project activity.

1.2 Sectoral Scope and Project Type

The project activity is considered under ACM 0002 “Consolidated baseline methodology for gridconnected electricity generation from renewable sources”, Version 09. The project activity has a capacity more than 15 MW. Therefore, as per the scope of the project activity enlisted in the list of sectoral scopes and related approved baseline and monitoring methodologies, the project activity may principally be categorized in:

Scope Number 1

Sectoral Scope – Energy Industries (renewable/non-renewable sources)

The project activity is not a grouped project activity

1.3 Project Proponent

Contact information:

Mr. Sanjit Panda

Patnaik Minerals Private Limited (Private Entity)

Joda Building, Street P.O. Boneikala

¹ <http://www.enerconindia.net/way.jsp?menuName=1&subMenu=&linkMenu=3>

² <http://www.enerconindia.net/profile.jsp?menuName=1&subMenu=&linkMenu=4>

Keonjhar, Orissa

Postfix-758038, India

Ph. No. : +91-6767 – 273699

Fax: +91-6767-272066

E-mail: panda.sanjit@rediffmail.com, pmpl123@rediffmail.com
Roles and responsibilities: To ensure trouble free operations and efficient generations through all the wind turbines, PMPL, the project proponent, has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines for a period of 10 years. The contractor EIL, under the O&M contract with PMPL would be responsible for the operation and maintenance of the project activity for the entire crediting period.

The authority and responsibility of project management, monitoring, measurement and reporting is with PMPL. PMPL has formulated a Project Team to ensure proper and continuous monitoring of the performance of turbines and generation of power.

1.4 Other Entities Involved in the Project

N/A

1.5 Project Start Date

21st March, 2007 (Date of commissioning of the first WEG in the project)

1.6 Project Crediting Period

10 Years and 0 Months from the project start date

The project has been registered as a CDM project activity under UNFCCC on 28 May 2011. So, the VERs would be claimed only till 27th May 2011, to avoid any double counting.

1.7 Project Location

The project activity is located in the Kalavad taluka of Jamnagar district and Upleta taluka of Rajkot District in Gujarat. The nearest airport and railway station is at Jamnagar city, which is located at a distance of approximately 60 kms from the project activity site.

The specific GPS coordinates for all the WEGs under the project activity has been provided below:

Serial No.	Location No.	Latitude	Longitude
1	81	22°05'54"	70°16'22"
2	82	22°05'48"	70°16'24"
3	83	22°05'41"	70°16'26"
4	84	22°05'35"	70°16'29"
5	85	22°05'28"	70°16'34"

6	86	22°05'20"	70°16'27"
7	87	22°05'15"	70°16'29"
8	88	22°05'09"	70°16'31"
9	89	22°05'03"	70°16'32"
10	90	22°04'56"	70°16'31"
11	91	22°04'58"	70°16'11"
12	92	22°05'05"	70°16'11"
13	93	22°05'11"	70°16'11"
14	94	22°05'18"	70°16'05"
15	96	22°05'31"	70°16'04"
16	97	22°05'38"	70°16'03"
17	98	22°05'44"	70°16'03"
18	99	22°05'38"	70°15'29"
19	100	22°05'32"	70°15'31"
20	101	22°05'26"	70°15'31"
21	102	22°05'19"	70°15'34"
22	103	22°05'12"	70°15'33"
23	104	22°05'05"	70°15'37"
24	105	22°04'33"	70°16'05"
25	106	22°04'26"	70°16'09"
26	107	22°04'20"	70°16'13"
27	108	22°04'13"	70°16'15"
28	109	22°04'05"	70°16'18"
29	110	22°03'59"	70°16'21"
30	111	22°03'34"	70°16'03"
31	112	22°03'28"	70°16'06"
32	113	22°03'21"	70°16'10"
33	114	22°03'16"	70°16'13"
34	501	21°57'46"	70°16'16"

35	502	21°57'53"	70°16'16"
36	503	21°57'60"	70°16'11"
37	504	21°58'03"	70°16'02"
38	507	21°58'26"	70°15'43"
39	508	21°58'31"	70°15'41"
40	510	21°58'46"	70°15'59"
41	511	21°58'50"	70°15'59"
42	512	21°58'55"	70°16'00"
43	513	21°59'01"	70°16'03"
44	514	21°59'05"	70°16'04"

1.8 Title and Reference of Methodology

Title of the baseline methodology: "Consolidated Baseline Methodology for grid connected electricity generation from renewable sources".

Reference: ACM0002, Version 09, EB 45, Sectoral scope: 01.

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>).

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project activity has been exporting electricity to the NEWNE grid continuously since commissioning. The first WEG (Phase-I) was commissioned on 21st March 2007 and the last WEG (Phase-II) was commissioned on 3rd September 2007. There have been no outages during the current monitoring period.

The project is registered as a CDM project activity with the UNFCCC under the methodology ACM0002 Version 06 on 28th May 2011

(<http://cdm.unfccc.int/Projects/DB/RWTUV1288029478.94/view>).

This is the second Voluntary emission reductions being claimed for the period 1st Sep 2009 to 27th May 2011 (Both days included). The first Voluntary emission reductions were claimed for the period of 01st May 2007 to 31st August 2009.

The commissioning trend of the WEG which starts from 21st March 2007 onwards, and it took some more time to connect to the grid and approximately 15 days were also taken as trial period for checking that the WEG is working fine and all the connections are working appropriately, hence the project proponent started claiming the credits from 1st May 2007 onwards and not 21st March 2007.

2.2 Deviations from the Monitoring Plan

N/A

2.3 Grouped Project

N/A

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	EF _y
Data unit:	tCO ₂ /MWh
Description:	Combined Margin CO ₂ emission factor for western regional grid
Source of data:	Estimated figure based on 75% of OM and 25% of BM values. Referred from CO ₂ Baseline Database for the Indian Power Sector prepared by Central Electricity Authority Version 3.0
Value applied:	0.9058
Purpose of the data:	CEA has calculated it as per "Tool to calculate the emission factors for an electricity system" with 3years vintage data and option of ex ante calculation based on 75% of OM and 25% of BM values approach. Computed once during PD finalization. The project activity will export power to Western regional grid which is now part of NEWNAE grid and uses the emission factor from the western grid
Any comment:	The data will be archived for two years beyond the crediting period

3.2 Data and Parameters Monitored

Data Unit / Parameter:	EG _y
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data:	Monthly Joint Meter Reading Sheets
Description of measurement methods and procedures to be applied:	The WEGs of a single customer (PMPL & BIL in this case) in a particular location are connected to metering yards which in turn connects to a feeder that ultimately leads to the bulk main GETCO meter of accuracy class 0.2s, at the substation

	maintained by Enercon India Limited. The wind farm of PMPL & BIL is connected to meters at respective metering yards which in turn are connected to GETCO meters at the substation. Net electricity generated by the WEGs will be monitored and reported by GEDA in its share certificate on the basis of the metering done at the bulk main meter connected to the incoming feeder of GETCO and the meters installed at the metering yard. Data monitoring has taken place both at the metering yard and the GETCO meters at the substation. The electricity metered at the GETCO meter is proportionally divided among the customers connected to the meter on the basis of the pro-rata readings taken at the metering yard. There are three meters at the GETCO sub-station each of accuracy class 0.2s and one dedicated meter for PMPL and BIL at each metering yard of accuracy class 0.2s. This figure mentioned in the share certificate issued by GEDA on monthly basis has been used to calculate emission reductions.
Frequency of monitoring/recording:	Monthly
Value monitored:	Measured Value: 95,664.55, Corrected Value: 95,612.19
Monitoring equipment:	GETCO Meters
QA/QC procedures to be applied:	Regular calibration of the GETCO meters will be undertaken yearly and faulty meters will be duly replaced immediately.
Calculation method:	There is a delay in the calibration of the meters in 2011, hence as per EB 52, Annex 60 the maximum correction factor is applied to electricity exported for whole of January 2011, Feb 2011, March 2011, April 2011 and May 2011. The next calibration after the monitoring period is also checked where the error is within the permissible limit.
Any comment:	The data will be archived electronically for 2 years beyond the crediting period or the last issuance of emission reductions whichever

occurs later

3.3 Description of the Monitoring Plan

The uncertainty level associated with the monitored data used for calculating emission reductions is low as the following additional parameters are being monitored for cross checking purposes:

- The electricity generation data for each WEG has been recorded in daily generation reports provided by Enercon India Limited.
- The electricity generation at each metering yard has been recorded in daily generation reports provided by Enercon India Limited.

The calibration of all main meters at the substation is being carried out annually.

The electricity export readings come directly from electricity board via calibrated meters, thus there is no requirement of auditing in the project activity.

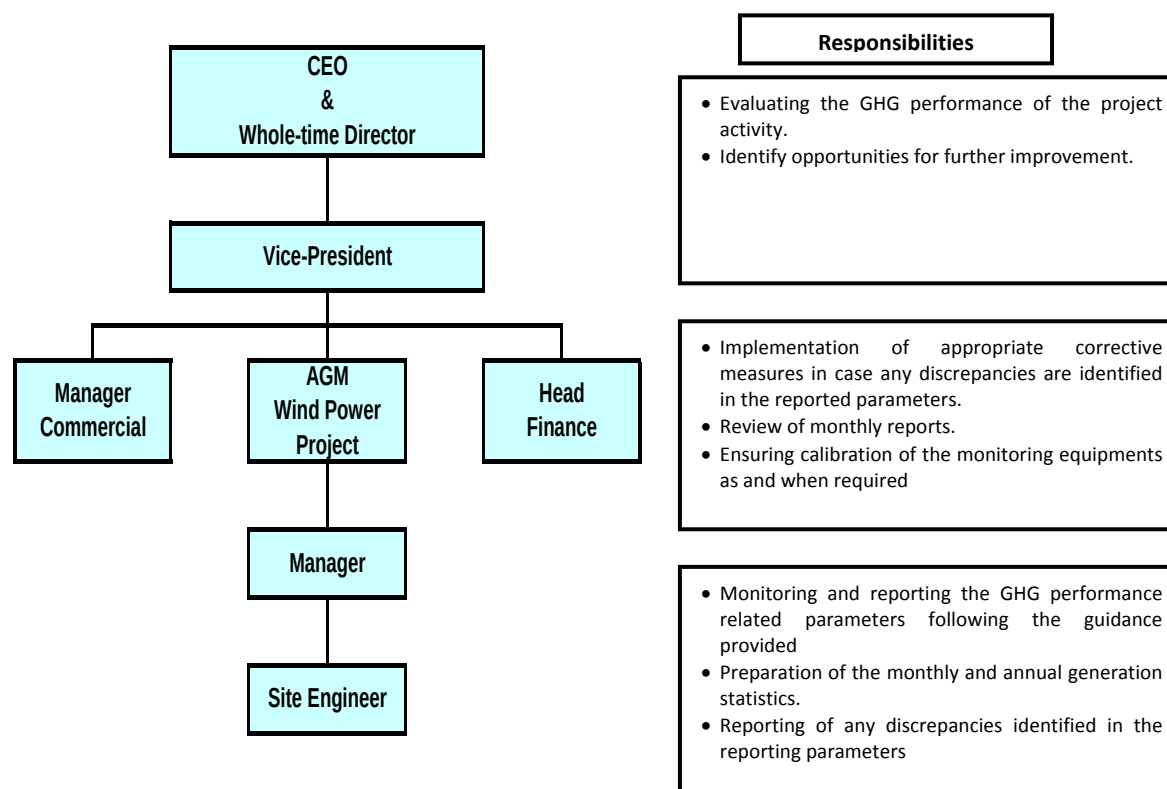
It is to be noted that no meter has been replaced in the current monitoring period. The following table indicates the details of meters including their accuracy levels and calibration dates:

GETCO Main Meters Details:

	Meter Serial No.	Meter Type	Meter Make	Accuracy Class	Date of Calibration		Error observed during Calibration
					From	Till	
Main Meter	GJU04175	E3MO21	Secure	0.2s	03/03/2009	02/03/2010	Error within permissible limit
					22/01/2010	21/01/2011	
					17/01/2012	16/01/2013	
	GJU04176	E3MO21	Secure	0.2s	03/03/2009	02/03/2010	Error within permissible limit
					22/01/2010	21/01/2011	
					17/01/2012	16/01/2013	
	GJB01470	E3MO21	Secure	0.2s	03/03/2009	02/03/2010	Error within permissible limit
					22/01/2010	21/01/2011	
					17/01/2012	16/01/2013	

The calibration of the meters has not been done in 2011 due to which PP has reduced the emission reductions by 0.2% (accuracy class) for the whole year of 2011 to be on a conservative side. To ensure trouble free operations and efficient generations through all the wind turbines, PMPL has entered into a comprehensive Operation and Maintenance agreement with the manufactures of the turbines. The contractor EIL, under the O&M contract with PMPL is responsible for the operation and maintenance of the project activity for the entire crediting period.

The project team formulated by PMPL ensures proper and continuous monitoring of the performance of turbines and generation of power. The same has been outlined as follows:



The hierarchy shows the reporting structure for the project activity.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

$$BE_y = EF_y \cdot EG_y$$

Where:

BE_y = Baseline emissions in year y (tCO₂)

EG_y = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)

EF_y = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the version 01.1 of the "Tool to calculate the emission factor for an electricity system"

$$BE_y = 86,592 \text{ tCO}_2$$

4.2 Project Emissions

According to the chosen baseline methodology ACM0002 Version 12.1.0, for wind energy based renewable energy project activities, $PE_y = 0$.

4.3 Leakage

According to ACM0002 Version 09, no leakage emissions are to be considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.

4.4 Summary of GHG Emission Reductions and Removals

$$ER_y = BE_y - PE_y$$

Emission reductions = **86,592 tCO₂** (for the total monitoring period)

5 ADDITIONAL INFORMATION

VER Calculation

Month	Net Electricity Exported (PMPL Phase-I)	Net Electricity Exported (PMPL Phase-II)	Net Electricity Exported (BIL)	Total Net Electricity Exported	Emission Factor	Emission Reductions
	kWh	kWh	kWh	MWh	tCO ₂ e/MWh	tCO ₂ e
September-09	1,618,572.00	1,498,263.00	552,585.00	3,669.42	0.9058	3,323
October-09	1,166,953.00	1,151,096.00	398,774.00	2,716.82	0.9058	2,460

November-09	1,311,294.00	1,359,777.00	504,115.00	3,175.19	0.9058	2,876
December-09	1,610,978.00	1,726,124.00	813,666.00	4,150.77	0.9058	3,759
SubTotal for 2009	5,707,797.00	5,735,260.00	2,269,140.00	13,712.20		12,418
January-10	1,770,108.00	1,918,655.00	795,125.00	4,483.89	0.9058	4,061
February-10	1,576,250.00	1,679,582.00	662,033.00	3,917.87	0.9058	3,548
March-10	2,350,966.00	2,415,265.00	806,465.00	5,572.70	0.9058	5,047
April-10	1,868,759.00	1,856,173.00	570,054.00	4,294.99	0.9058	3,890
May-10	4,108,969.00	4,223,088.00	1,254,746.00	9,586.80	0.9058	8,683
June-10	2,889,113.00	2,865,393.00	875,468.00	6,629.97	0.9058	6,005
July-10	2,385,858.00	2,088,974.00	734,548.00	5,209.38	0.9058	4,718
August-10	1,671,377.00	1,427,226.00	523,444.00	3,622.05	0.9058	3,280
September-10	1,064,513.00	1,076,883.00	358,141.00	2,499.54	0.9058	2,264
October-10	1,154,561.00	1,254,134.00	412,966.00	2,821.66	0.9058	2,555
November-10	1,350,602.00	1,434,875.00	576,057.00	3,361.53	0.9058	3,044
December-10	1,577,492.00	1,582,027.00	616,109.00	3,775.63	0.9058	3,419
SubTotal 2010	23,768,568	23,822,275.00	8,185,156.00	55,776		50,514
January-11	2,101,921.00	2,092,963.00	810,024.00	4,994.90 (Corrected value as per calibration delay)	0.9058	4,524

				guidance)		
February-11	1,470,662.00	1,508,593.00	551,689.00	3,523.88 (Corrected value as per calibration delay guidance)	0.9058	3,191
March-11	1,858,116.00	1,974,004.00	644,288.00	4,467.46 (Corrected value as per calibration delay guidance)	0.9058	4,046
April-11	2,420,909.00	2,473,537.00	821,016.00	5,704.03 (Corrected value as per calibration delay guidance)	0.9058	5,166
May-11 (Prorated till 27 May 11)	3,305,601.29	3,193,591.35	949,436.71	7,433.73 (Corrected value as per calibration delay guidance)	0.9058	6,733
SubTotal 2011	11,157,209.29	11,242,688.35	3,776,453.7 1	26,124.00		23,660
Total	40,633,574.29	40,800,223.35	14,230,749.7 1	95,612.19		86,592