



**Verified Carbon
Standard**

WIND POWER PROJECT BY PATNAIK MINERALS PVT. LTD.



Document Prepared by EKI Energy Services Limited

Project Title	Wind power project by Patnaik Minerals Pvt. Ltd.
Version	04
Report ID	VVER287
Date of Issue	30-January-2023
Project ID	734
Monitoring Period	28-May-2011 to 30-April-2017 (Inclusive of both days)
Prepared By	EKI Energy Services Limited
Contact	Email ID : registry@enkingint.org; ishani@enkingint.org Address: Office no. 201, Plot 48, Scheme 78 part 2 Vijay Nagar, Near Brilliant Convention Centre Indore - 452010 (M.P, India) Website www.enkingint.org

CONTENTS

1	PROJECT DETAILS.....	4
1.1	Summary Description of the Implementation Status of the Project.....	4
1.2	Sectoral Scope and Project Type.....	5
1.3	Project Proponent	5
1.4	Other Entities Involved in the Project	5
1.5	Project Start Date	6
1.6	Project Crediting Period	6
1.7	Project Location.....	7
1.8	Title and Reference of Methodology	8
1.9	Participation under other GHG Programs	9
1.10	Other Forms of Credit.....	10
1.11	Sustainable Development Contributions.....	10
2	SAFEGUARDS	14
2.1	No Net Harm	14
2.2	Local Stakeholder Consultation	14
2.3	AFOLU-Specific Safeguards	15
3	IMPLEMENTATION STATUS	15
3.1	Implementation Status of the Project Activity	15
3.2	Deviations	18
3.3	Grouped Projects	18
4	DATA AND PARAMETERS.....	18
4.1	Data and Parameters Available at Validation.....	18
4.2	Data and Parameters Monitored.....	19
4.3	Monitoring Plan.....	20
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	22
5.1	Baseline Emissions	22
5.2	Project Emissions	22
5.3	Leakage.....	22
5.4	Net GHG Emission Reductions and Removals	22
	APPENDIX 1: CALIBRATION RECORDS	25

APPENDIX 2: MAJOR BREAKDOWN DETAILS 26

APPENDIX 3: DEDICATED METER DETAILS 28

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Patnaik Minerals Pvt. Ltd. (PMPL) is the flagship company of R N Patnaik group. The main line of activities are mining of Iron & Manganese Ore. Starting as a Proprietorship Firm, since 1961, it has evolved to be the most reputed mining company in Joda - Barbil region (Dist. Keonjhar, Orissa), which is considered as the hub of Iron Ore mining in India.

The project activity is a 35.2 MW wind power project consisting of 44 Wind Electric Generators (WTGs) of individual capacity 0.8 MW located at Samana Site in Gujarat, India. Out of the 44 WTGs, 38 WTGs are owned by PMPL and Banspani Iron Limited (BIL) owns 6 WTGs. 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 details of the project have been tabulated below:-

S. N.	Name of Owner	Capacity (MW)	Location	Connection with Grid	Usage
1.	Patnaik Minerals Pvt. Ltd. (PMPL)	30.4	Samana, Gujarat, India	Indian Grid	Sale to Utility
2.	Banspani Iron Limited (BIL)	4.8			

Technology and Implementation Status

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 comprises of 44 WTGs of E-48 Enercon make (800 kW WTGs).

The commissioning trend of the WTGs which starts from 21 March 2007 (Commissioning date of the first WTG) onwards, and it took some more time to connect to the grid and some 15 days were also taken as trial period for checking that the WTG is working fine and all the connections are OK, hence the project proponent has started claiming the credits from 1 May 2007 onwards and not 21 March 2007. The Commissioning dates of each of the 44 WTGs has been included in Section 3 of this Monitoring Report.

The WTGs generate 3-phase power at 400V, which is stepped up to 33 KV at Sadodar substation of the state utility, GETCO (Gujarat Energy Transmission Company Limited). The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V $\pm$ 20%.

The windfarm is connected by 33 kV grid line to 220 kV capacity Enercon site substation at Samana/Sadodar. The Samana/ Sadodar site substation is connected to 220 kV GETCO Motipaneli substation.

The project activity is in line with the sustainable development priorities of the country. The electricity generated from the wind farm is exported to the regional electricity grid (now part of the Indian Grid) and sold to the state electricity utility, thereby marginally contributing to reducing the energy demand supply gap in the state of Gujarat.

During the current monitoring period i.e. 28-May-2011 to 30-April-2017(inclusive of both dates), 297,283 tCO_{2e} of emission reduction has been achieved. The major breakdown is being mentioned over *APPENDIX 2: Major Breakdown details*.

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope : 01 - Energy industries (renewable / non-renewable sources)
 Project Type : I - Renewable Energy Projects
 Project Category :ACM0002: Grid-connected electricity generation from renewable sources - Version 12.1.0¹

The project is not a grouped project activity.

1.3 Project Proponent

Organization name	Patnaik Minerals Private Limited
Contact person	Mr Sanjit Panda
Title	-
Address	Joda Building, Street P.O. Boneikala Keonjhar, Orissa, Postfix-758038, India
Telephone	+91-6767 - 273699
Email	panda.sanjit@rediffmail.com

1.4 Other Entities Involved in the Project

Organization name	EKI Energy Services Limited
-------------------	-----------------------------

¹

Role in the Project	Project Consultant
Contact person	Manish Dabkara
Title	CEO & MD
Address	EnKing Embassy, Office No 201, Plot 48, Scheme 78, Part 2, VijayNagar, Indore- 452010, Madhya Pradesh, India.
Telephone	+91-731-4289086
Email	manish@enkingint.org

1.5 Project Start Date

Project Start Date: 01-May-2007²

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

1.6 Project Crediting Period

10 Years and 0 Months from the project start date.

Crediting Period Start date : 01-May-2007³

Crediting Period End date : 30-April-2017

It is to be noted that the CDM fixed crediting period of this project activity is from 28-May-2012 to 27-May-2022⁴. The project CP can be renewed twice under VCS (10x3) but not beyond the CDM crediting period. Therefore, the total VCS CP will be from as below:

VCS CP1: 01-May-2007 to 30-April 2017 (inclusive of first and last dates)

²https://registry.terra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=5933&IDKEY=n8723kjnf7kjandsasImdv09887vasksmrmnwqkjoianfnfuq038181607

³https://registry.terra.org/mymodule/ProjectDoc/Project_ViewFile.asp?FileID=5933&IDKEY=n8723kjnf7kjandsasImdv09887vasksmrmnwqkjoianfnfuq038181607

⁴ <https://cdm.unfccc.int/Projects/DB/RWTUV1288029478.94/view>

1.7 VCS CP2: 01-May-2017 to 27-May-2022 (inclusive of first and last dates)Project Location

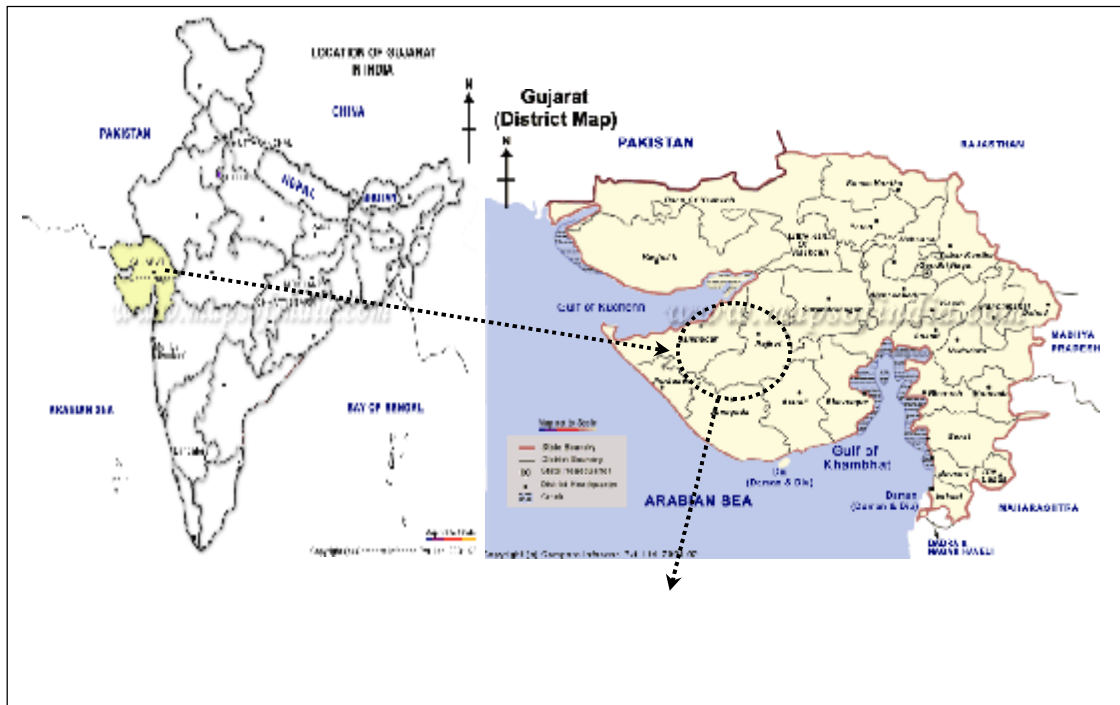
The project activity is located in the Kalavad taluka of Jamnagar district and Upleta taluka of Rajkot District in Gujarat. The nearest airport and railway station is at Jamnagar city, which is located at a distance of approximately 60 kms from the project activity site.

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

S.N.	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"

The location of the project activity has been depicted in the map below:



1.8 Title and Reference of Methodology

Methodology: ACM0002

Version 12.1.0⁵ (EB 58) Consolidated methodology for grid-connected electricity generation from renewable sources”⁶

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>).

The approved methodology also draws upon:

1. Version 5.2 of the “Tool for demonstration and assessment of additionality”⁷
2. Version 1.1 of the “Tool to calculate the emission factor for an electricity system;”⁸
3. Version 02.2. of the “Combined tool to identify the baseline scenario and demonstrate additionality;”⁹
4. Version 02 of the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion.”¹⁰

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>)

1.9 Participation under other GHG Programs

The Project activity is registered under the CDM mechanism under the Kyoto protocol with reference no. UN 4072¹¹. The Project Participant has submitted a declaration to avoid double counting of emission reductions for the current monitoring period from 28-May-2011 to 30-April-2017 (Inclusive of both days). These emission reductions will not be claimed in CDM mechanism by the Project Proponent.

⁵ As per CDM Registered PDD of UN 4072;
<https://cdm.unfccc.int/UserManagement/FileStorage/G7U8PWIE94BRS63FCXQ0ZLV5YHNJAM>

⁶ <https://cdm.unfccc.int/UserManagement/FileStorage/4W1SCKX3EMPO6AYGRJUTD7BQ8IVNOH>

⁷ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>

⁸ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf>

⁹ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v2.2.pdf>

¹⁰ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf>

¹¹ <https://cdm.unfccc.int/Projects/DB/RWTUV1288029478.94/view>

1.10 Other Forms of Credit

The project activity is not availing any REC benefits and the same can be confirmed from publically available link of REC generators.

Web-link: https://www.recregistryindia.nic.in/index.php/publics/accrued_regens/

PP will not avail other forms of environmental credit for the current monitoring period (28-May-2011 to 30-April-2017 (Inclusive of both days) under consideration.

1.11 Sustainable Development Contributions

Contribution to sustainable development:

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment, Forests and Climate Change (MoEFCC), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India . Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well being

- The project activity leads to alleviation of poverty in the region by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of the local grid of the state electricity utility.
- The infrastructure in and around the project area has also improved due to project activity. This includes development of road network and improvement of electricity quality, frequency and availability as the electricity is fed into a deficit grid.

Economic well-being

- The generated electricity is fed into the NEWNE grid (now part of the Indian Grid) through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub-urban habitants) which provides new opportunities for industries and economic activities to be setup in the area, thereby resulting in greater local employment, ultimately leading to overall development.
- The project activity also leads to diversification of the national energy supply, which is dominated by conventional fuel based generating units.

Environmental well being

- The project utilizes wind energy for generating electricity which otherwise would have been generated through alternate fossil fuel based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions.

- As wind power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus, the project has no negative impact on the surrounding environment contributing to environmental well-being.

Technological well being

- The project activity is utilising the latest technology which is comparable with best practices in the renewable wind based energy sector anywhere in the world. The project also leads to the promotion of Wind Electric Generators (WTGs) in the region demonstrating the success of wind based renewable energy generation. Hence the project leads to technological well being.

In a nutshell, the various contributions by the Project Proponent (PP) towards the SDGs has been given below: -

1. **SDG 7 Affordable and Clean Energy¹²**: Since the project activity is a wind power project, it generates clean energy. The Project activity is a new facility (Greenfield) and the electricity generated by the project is exported to the Indian electricity grid. The project therefore displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.
2. **SDG 13 Climate Action¹³**: The main purpose of this project activity is to generate a clean form of electricity through renewable wind energy sources. The project activity involves total capacity of 35.2 MW solar power project which is Gujarat state of India. Out of the 44 WTGs, 38 WTGs are owned by PMPL and Banspani Iron Limited (BIL) owns 6 WTGs. 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.
3. **SDG 8 Economic Growth¹⁴**: The Project Proponent aims to provide employment to local men and women with decent compensation. PP has targeted to employ 10 persons by the year 2025 and minimum 1 person per annum after 2025.

¹² <https://sdgs.un.org/goals/goal7>

¹³ <https://sdgs.un.org/goals/goal13>

¹⁴ <https://sdgs.un.org/goals/goal8>

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 328,202.53 MWh renewable electricity was supplied to the Indian grid during the current monitoring period that helps to increase the renewable energy share in the energy mix.	Previous Monitoring Period: 01-May-2007 to 31-August-2009 (First and last date included): 143,747 MWh Previous Monitoring Period: 01-September-2009 to 27-May-2011 (Inclusive of both the dates): 95,612.19 MWh Current Monitoring Period: 28-May-2011 to 30-April-2017 (Inclusive of both the dates) : 328,202.53 MWh Overall, the project activity has contributed a total of 567,561.72 MWh of clean electricity generation since commissioning.

2)	8.0	Employment of local men and women	Implemented activities to increase	No change. The Project Proponent has targeted to employ 10 persons by the year 2025 and minimum 1 person per annum after 2025.	Previous Monitoring Period: 01-May-2007 to 31-August-2009 (First and last date included): 0 Previous Monitoring Period: 01-September-2009 to 27-May-2011 (Inclusive of both the dates): 0 Current Monitoring Period: 28-May-2011 to 30-April-2017 (Inclusive of both the dates) : 0 There has been no contribution against this SDG since its commissioning, hence overall contribution is zero. 0
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to decrease	By supplying 328,202.53 MWh clean electricity to Indian grid, the project avoided release of 297,283 tCO₂ in to the atmosphere during the reporting period.	Previous Monitoring Period: 01-May-2007 to 31-August-2009 (First and last date included): 130,009 tCO₂e Previous Monitoring Period: 01-September-2009 to 27-May-2011 (Inclusive of both the dates): 86,592 tCO₂e Current Monitoring Period: 28-May-2011 to 30-April-2017 (Inclusive of both the dates) : 297,283 tCO₂e Overall the project activity has prevented the release of a total of 513,884 tCO₂e in the atmosphere since its commissioning.

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the WTGs, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that wind power project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same¹⁵.

Thus there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

2.2 Local Stakeholder Consultation

Detailed local stakeholders’ consultation was conducted during the registration of the project – by identification of stakeholders, identification of local stakeholders, invitation of them, held meeting where project activity was explained in details and the PP also took due care of comments/suggestions of the local stakeholders.

The process of local stakeholder consultation is continuous. During the current monitoring period, the project proponent has kept grievance register in plant site office and sought comments/grievances/suggestions from local stakeholders including local community, government agencies and NGOs. Besides, the PP has also kept provision for submitting comments/grievances/suggestions from local stakeholders through direct mail. However, no major comments/grievances/suggestions have been received from the aforementioned stakeholders during the current monitoring period and all such minor suggestions have been take care by the PP.

¹⁵ <https://smartnet.niua.org/sites/default/files/resources/report-on-developmental-impacts-of-RE.pdf>

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

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 comprises of 44 WTGs of E-48 Enercon make (800 kW WTGs).

The WTGs generate 3-phase power at 400V, which is stepped up to 33 KV at Sadodar substation of the state utility, GETCO (Gujarat Energy Transmission Company Limited). The project can operate in the frequency range of 46–54 Hz and in the voltage range of 400 V $\pm$ 20%.

The windfarm is connected by 33 kV grid line to 220 kV capacity Enercon site substation at Samana/Sadodar. The Samana/ Sadodar site substation is connected to 220 kV GETCO Motipaneli substation.

No major breakdown took place during the entire monitoring period apart from the scheduled outages for maintenance. Also no machines were replaced during the entire monitoring period

The Commissioning details of the WTGs has been tabulated below: -

S.N.	Ownership	Name of Village	Taluka	District	Date of Commissioning	WTG ID No.
1	PMPL	Hakumati Sarvaniya	Kalavad	Jamnagar	11-June-2007	EIL/800/07-08/0557
2	PMPL	Hakumati Sarvaniya	Kalavad	Jamnagar	11-June-2007	EIL/800/07-08/0558
3	PMPL	Moti Vavdi	Kalavad	Jamnagar	27-August-2007	EIL/800/07-08/0559
4	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0560
5	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0561
6	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0562
7	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0563
8	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0564
9	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0565
10	PMPL	Moti Vavdi	Kalavad	Jamnagar	28-June-2007	EIL/800/07-08/0566
11	PMPL	Moti Vavdi	Kalavad	Jamnagar	28-June-2007	EIL/800/07-08/0567
12	PMPL	Moti Vavdi	Kalavad	Jamnagar	28-June-2007	EIL/800/07-08/0568

S.N.	Ownership	Name of Village	Taluka	District	Date of Commissioning	WTG ID No.
13	PMPL	Moti Vavdi	Kalavad	Jamnagar	28-June-2007	EIL/800/07-08/0569
14	PMPL	Moti Vavdi	Kalavad	Jamnagar	28-June-2007	EIL/800/07-08/0570
15	PMPL	Moti Vavdi	Kalavad	Jamnagar	28-June-2007	EIL/800/07-08/0571
16	PMPL	Moti Vavdi	Kalavad	Jamnagar	10-July-2007	EIL/800/07-08/0572
17	PMPL	Moti Vavdi	Kalavad	Jamnagar	10-July-2007	EIL/800/07-08/0573
18	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0574
19	PMPL	Moti Vavdi	Kalavad	Jamnagar	02-August-2007	EIL/800/07-08/0575
20	BIL	Khirsara	Upleta	Rajkot	24-March-2007	EIL/800/06-07/0240
21	BIL	Khirsara	Upleta	Rajkot	25-March-2007	EIL/800/06-07/0241
22	BIL	Khirsara	Upleta	Rajkot	26-March-2007	EIL/800/06-07/0242
23	BIL	Khirsara	Upleta	Rajkot	27-March-2007	EIL/800/06-07/0243
24	BIL	Khirsara	Upleta	Rajkot	28-March-2007	EIL/800/06-07/0244
25	BIL	Khirsara	Upleta	Rajkot	29-March-2007	EIL/800/06-07/0245
26	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0246
27	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0247
28	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0248
29	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0249
30	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0250
31	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0251
32	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0252
33	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0253
34	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0254
35	PMPL	Dhun Dhoraji	Kalavad	Jamnagar	27-March-2007	EIL/800/06-07/0255
36	PMPL	Hakumati Sarvaniya	Kalavad	Jamnagar	30-March-2007	EIL/800/06-07/0256
37	PMPL	Hakumati Sarvaniya	Kalavad	Jamnagar	30-March-2007	EIL/800/06-07/0257
38	PMPL	Hakumati Sarvaniya	Kalavad	Jamnagar	30-March-2007	EIL/800/06-07/0258
39	PMPL	Hakumati Sarvaniya	Kalavad	Jamnagar	30-March-2007	EIL/800/06-07/0259
40	PMPL	Vadali	Upleta	Rajkot	21-March-2007	EIL/800/06-07/0260
41	PMPL	Vadali	Upleta	Rajkot	21-March-2007	EIL/800/06-07/0261
42	PMPL	Vadali	Upleta	Rajkot	21-March-2007	EIL/800/06-07/0262
43	PMPL	Vadali	Upleta	Rajkot	21-March-2007	EIL/800/06-07/0263
44	PMPL	Vadali	Upleta	Rajkot	21-March-2007	EIL/800/06-07/0264

The technical specifications of the WTGs installed is as below: -

E-48 TECHNICAL DATA

Rated capacity : 800 kW

Rotor diameter : 48 m

Hub height : 56 m

Rotor with Pitch Control

Type : Upwind rotor with active pitch control

Direction of rotation : Clockwise

Number of blades : 3

Swept area : 1810 m²

Blade material : Fibreglass (reinforced epoxy) with integral lightning protection

Rotor speed : Variable, 16-31.5 rpm

Tip speed : 41 - 78 m/s

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 Invertor

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 : Steel Tubular, 56 m height

Enercon (India) Ltd has complete control on production through in-house manufacturing of all key components¹⁶. Enercon (India) Ltd. has established 4 manufacturing plants at Daman in India

¹⁶ <http://www.enerconindia.net/way.jsp?menuName=1&subMenu=&linkMenu=3>

besides concrete tower manufacturing facilities in Gujarat and Karnataka¹⁷. 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.

The technology employed in the project activity is environmentally safe and sound.

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation applied during this monitoring period.

3.2.2 Project Description Deviations

No project description deviation is applicable during this monitoring period and there is no previous project description deviation for this project activity.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _y
Data unit	tCO ₂ /MWh
Description	Combined Margin CO ₂ emission factor for western regional grid which is now part of the Indian 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 ¹⁸
Value applied	0.9058
Justification of choice of data or description of measurement methods and procedures applied	CEA has calculated it as per “Tool to calculate the emission factors for an electricity system” with 3 years 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

¹⁷ <http://www.enerconindia.net/profile.jsp?menuName=1&subMenu=&linkMenu=4>

¹⁸ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver10.pdf

	project activity exports power to Western regional grid which is now part of the Indian grid and uses the emission factor from the western grid.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

4.2 Data and Parameters Monitored

Data / 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 (Share Certificates issued by GETCO, Gujarat Energy Transmission Company).
Description of measurement methods and procedures to be applied	The WTGs 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 WTGs are 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	328,202.532	
	2011	30,009.44
	2012	63,543.30
	2013	55,632.98
	2014	52,827.76
	2015	59,410.55
	2016	50,706.99
	2017	16,071.51
	Total	3,28,202.53
Monitoring equipment	GETCO Meters	
QA/QC procedures to be applied	Regular calibration of the GETCO meters is undertaken yearly and faulty meters are duly replaced immediately ¹⁹ .	
Purpose of the data	Calculation of Baseline emissions	
Calculation method	-	
Comments	The data would be archived electronically and maintained for the entire crediting period plus two years.	

4.3 Monitoring Plan

The WTGs of a single customer (PMPL & BIL in this case) in a particular location are connected to a metering yard 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.

Net electricity generated by PMPL wind farm is 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 for electricity exported and electricity imported takes place at the metering yard and GETCO meter 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.

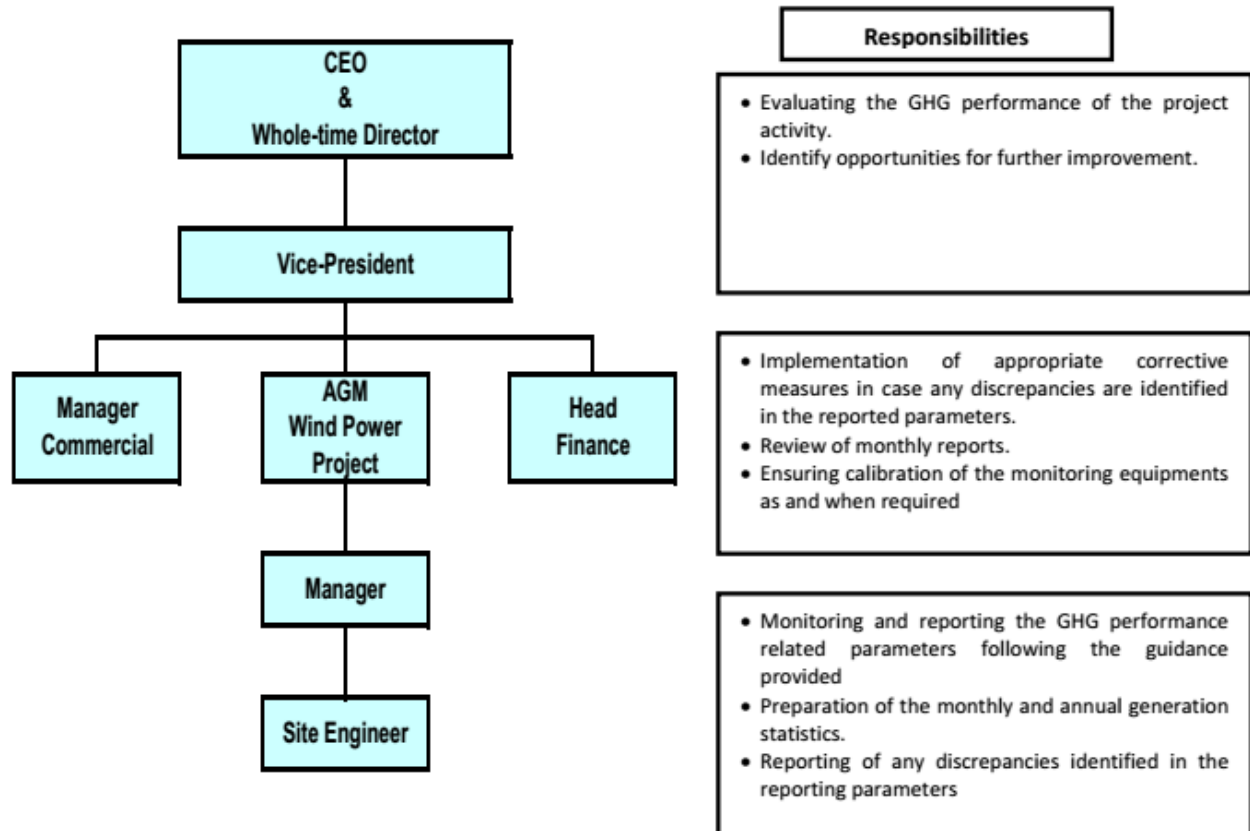
There are three meters at the GETCO sub-station each of accuracy class 0.2s and one dedicated meter for PMPL at each metering yard of accuracy class of 0.2s.

The emission reduction calculations are done on the basis of the net electricity supplied as mentioned in the share certificate issued by GEDA on monthly basis.

¹⁹ In reference to letter from Gujarat Urja Vikas Nigam Limited (GUVNL) (Ref No. GUVNL/Com/CFM(IPP)/GETCO:290 dated 10-2-2010) the frequency of calibration of meters is 3 years.

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.



QMS is being maintained by the Project Proponent which is based on the ISO standard procedure. Internal audit (at least once in a year) and non-conformities are being closed as per the QMS procedure.

Emergency preparedness

The project activity does not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized. Regular calibration of the GETCO meters is undertaken yearly and faulty meters are duly replaced immediately by the state utility and is not under the control of PP.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emission has been calculated using the formula: -

$$BE_y = EF_y \times EG_y$$

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"

Hence,

$$\begin{aligned} \text{Baseline Emission, } BE_y &= 328,202.532 \times 0.9058 \\ &= 297,283 \text{ tCO}_2 \text{ (Rounded down figure)} \end{aligned}$$

5.2 Project Emissions

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

5.3 Leakage

According to ACM0002 Version 12.1.0, 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.

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity is

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO₂/year

BE_y = Baseline emission in tCO₂/year

PE_y = Project emissions in tCO₂/year

For the project activity during the current monitoring period, as per section 5.1

BE_y = 297,283 tCO₂e

PE_y = 0 tCO₂e

Hence, ERY = 297,283 – 0
= 297,283tCO₂e (Rounded down figure)

The breakdown of GHG emission reductions and removals by vintages has been summarized in the table below: -

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
28-May-2011 to 31-December 2011	27,182	0	0	27,182
01-January 2012 to 31-December-2012	57,557	0	0	57,557
01-January 2013 to 31-December-2013	50,392	0	0	50,392
01-January 2014 to 31-December-2014	47,851	0	0	47,851
01-January 2015 to 31-December-2015	53,814	0	0	53,814
01-January 2016 to 31-December-2016	45,930	0	0	45,930

01-January 2017 to 30-April-2017	14,557	0	0	14,557
Total	297,283	0	0	297,283

The achieved GHG emission is 22.73 % is lower than the estimated value. This is due to unfavorable wind during the monitoring period and is beyond the control of the Project Proponent.

APPENDIX 1: CALIBRATION RECORDS

S. N.	Meter No.	Meter Type	Meter Make & Accuracy Class	Date of Calibration (Previous Verification)	Validity	Date of Calibration (Previous Verification)	Validity	Date of Calibration	Validity	Date of Calibration	Validity
1	GJU04175	E3M021	Secure 0.2%	22-January-2010	21-January-2011	17-January-2012	16-January-2013	06-September-2013	05-September-2014	28-June-2021	27-June-2022
2	GJU04176	E3M022	Secure 0.2%	22-January-2010	21-January-2011	17-January-2012	16-January-2013	06-September-2013	05-September-2014	28-June-2021	27-June-2022
3	GJB01470	E3M023	Secure 0.2%	22-January-2010	21-January-2011	17-January-2012	16-January-2013	06-September-2013	05-September-2014	28-June-2021	27-June-2022

The calibration of the meters has not been done in 2011 due to which PP has reduced the emission reductions for the whole year of 2011 to be on a conservative side. In addition to that there is delay in meter calibration in Jan 2012, Jan 2013, Feb 2013, Mar 2013, Apr 2013, May 2013, June 2013, Jun 2013, July 2013, Aug 2013 and Sep 2013. Further the latest meter calibration has been carried out in 2021, hence accordingly, error factor has been applied to the period Sep 2014 to end of MP that is April 2017.

It is to be noted that since the Share Certificates of Gujarat Utility has only Net Electricity Exported, hence it has been reduced by 0.4%²⁰ for a conservative approach.

²⁰ The accuracy class of the energy meter which measures the Export and Import of electricity of the project activity is 0.2 s. Generally, the Export is decreased by 0.2% and Import is increased by 0.2% but here since only Net Electricity is provided by the Utility, we have reduced the value of Net Electricity by 0.2% twice, that is, by 0.4% for a conservative approach

APPENDIX 2: MAJOR BREAKDOWN DETAILS

Date	Customer Name	WEC Name	Machine Fault	Remarks
08-May-14	PATNAIK MINERALS P. LTD.	PMLMV-07	22:56	BD-PMLMV-07:- 22:56hrs (00:00 to 22:56) machine fault for bearing temperature overtemp. Front bearing.
18-Jul-14	BANSPANI IRON LIMITED	BILVD-02	23:16	BD-BILVD-02:-23:16hrs (00:44 to 00:00) machine fault for fault rectifier thermoswitch rectifier 1.
06-Sep-15	PATNAIK MINERALS P. LTD.	PMLMV-04	23:40	BD-PMLMV-04:-24:00hrs (00:00 to 00:00) machine fault for semiconductor fuse blown Rectifier system 1.
16-Nov-15	PATNAIK MINERALS P. LTD.	PMLVD-12	22:59	BD-PMLVD-12:-24:00hrs (00:00 to 00:00) machine fault for fault emergency stop capacitor capacitor test 175V blade C.
17-Jun-16	PATNAIK MINERALS P. LTD.	PMLVD-14	23:26	BD-PMLVD-14:-24:00hrs (00:00 to 00:00) machine fault for fault emergency stop capacitor undervoltage 175V capacitor A.
27-Jun-16	PATNAIK MINERALS P. LTD.	PMLVD-13	23:30	BD-PMLVD-13:-24:00hrs (00:00 to 00:00) machine fault for fault emergency stop capacitor capacitor test 175V blade A.
27-Jun-16	PATNAIK MINERALS P. LTD.	PMLVD-14	23:30	BD-PMLVD-14:-24:00hrs (00:00 to 00:00) machine fault for fault emergency stop capacitor undervoltage 175V capacitor A.
11-Jan-17	PATNAIK MINERALS P. LTD.	PMLMV-15	23:28	BD-PMLMV-15:-23:28hrs (00:00 to 21:49 and 22:21 to 00:00) machine fault for excitation error Charging error.
05-Apr-17	PATNAIK MINERALS P. LTD.	PMLDD-06	23:50	BD-PMLDD-06:-23:50hrs (00:00 to 00:00) machine fault for 950KVA T/F failure.
05-Apr-17	PATNAIK MINERALS P. LTD.	PMLDD-08	23:50	BD-PMLDD-08:-23:50hrs (00:00 to 00:00) machine fault for excitation error Charging error.
05-Apr-17	PATNAIK MINERALS P. LTD.	PMLDD-10	23:50	BD-PMLDD-10:-23:50hrs (00:00 to 00:00) machine fault for excitation error (80:22).
05-Apr-17	PATNAIK MINERALS P. LTD.	PMLHS-04	23:50	BD-PMLHS-04:-23:50hrs (00:00 to 00:00) machine fault for prot circuit breaker tripped (90:9).
05-Apr-17	PATNAIK MINERALS P. LTD.	PMLHS-05	23:50	BD-PMLHS-05:-23:50hrs (00:00 to 00:00) machine fault for 950KVA T/F failure.

15-May-17	PATNAIK MINERALS P. LTD.	PMLHS-04	23:33	BD-PMLHS-04:-23:33hrs (00:00 to 23:33) machine fault for fault rectifier (66:53).
27-May-17	PATNAIK MINERALS P. LTD.	PMLVD-13	23:50	BD-PMLVD-13:-23:50hrs (00:00 to 00:00) machine fault for fault emergency stop capacitor capacitor test 175V blade A.
14-Jul-17	PATNAIK MINERALS P. LTD.	PMLVD-13	23:50	BD-PMLVD-13:-23:50hrs (00:00 to 00:00) machine fault for fault security system (47:11).
27-Jul-17	PATNAIK MINERALS P. LTD.	PMLHS-06	23:50	BD-PMLHS-06:-23:50hrs (00:00 to 00:00) machine fault for acoustic sensor (69:19).
07-Oct-17	PATNAIK MINERALS P. LTD.	PMLDD-07	23:50	BD-PMLDD-07:-23:50hrs (00:00 to 00:00) machine fault for pitch control error (42:206).
10-Oct-17	BANSPANI IRON LIMITED	BILVD-04	23:45	BD-BILVD-04:-23:45hrs (00:00 to 00:00) machine fault for fault yaw inverter (25:101).
10-Oct-17	PATNAIK MINERALS P. LTD.	PMLVD-13	23:45	BD-PMLVD-13:-23:45hrs (00:00 to 00:00) machine fault for fault yaw inverter (25:235).

APPENDIX 3: DEDICATED METER DETAILS

SR. No.	Feeder	Customer	Total WEC	Metering Detail			
1	F#8 VADALI	Bansapani Iron Ltd (Loc. 501 to 508)	6	CT RATIO	150/1 A	TYPE	E3M 055
				PT RATIO	33KV/110V.	CTR	100/1 A
				CT CONNECTED	150/1 A	PTR	33KV/110V.
				MAKE	LAXMI ENGINEERING	MAKE	SECURE METER
				ACCURACY CLASS	0.2s	ACCURACY CLASS	0.2s
				SR. NO.	115686	SR. NO.	MPB 04019

SR. No.	Feeder	Customer	Total WEC	Metering Detail			
1	VADALI	Patnaik Minerals Pvt Ltd 510 to 514	5	CT RATIO	100/1 A	TYPE	E3M 055
				PT RATIO	33KV/110V.	CTR	100/1 A
				CT CONNECTED	100/1 A	PTR	33KV/110V.
				MAKE	LAXMI ENGINEERING	MAKE	SECURE METER
				ACCURACY CLASS	0.2s	ACCURACY CLASS	0.2s
				SR. NO.	115691	SR. NO.	MPB 04016
2	DHUNDHORAJI	Patnaik Minerals Pvt Ltd 99 to 114	16	CT RATIO	400/1 A	TYPE	ER300P
				PT RATIO	33KV/110V.	CTR	400/1 A
				CT CONNECTED	400/1 A	PTR	33KV/110V.
				MAKE	PRAGATI ELECTRICAL PVT LTD	MAKE	L&T
				ACCURACY CLASS	0.2s	ACCURACY CLASS	0.2s
				SR. NO.	07/333870	SR. NO.	6758363
3	MOTI VAVADI	Patnaik Minerals Pvt Ltd(81-98)	17	CT RATIO	400/5A	TYPE	ER300P
				PT RATIO	33KV/110V.	CTR	400/5A
				CT CONNECTED	400/5A	PTR	33KV/110V.
				MAKE	UNIVERSAL MEGNOFLUX	MAKE	L&T

				ACCURACY CLASS	0.2s	ACCURACY CLASS	0.2s
				SR. NO.	10218	SR. NO.	6769818