

GREEN ENERGY PROJECT AT GUJARAT BY POWERICA LIMITED



A Promise For Power

Document Prepared By

POWERICA LIMITED

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Monitoring Period	25-Feb-2012 to 30-Jan-2013
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The project activity involves commissioning and operation of a 25.2 MW wind power generation project at Bhachau, in the Kutch district of Gujarat by Powerica Ltd. The total installed capacity of 25.2 MW comprises of 14 WTGs, each with a capacity of 1.80 MW. The project provides electricity to the state of Gujarat by effective utilization of renewable resources. The technology has been supplied by Vestas. The project utilizes wind energy for exporting electricity which otherwise would have been generated through alternate fuels (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions. Electricity produced from the project activity is supplied to NEWNE grid of India.

The technical details of the WTGs involved in the project activity are as below.

Parameters	Value	Unit	Source/Reference
Make	-	Vestas	Supply agreement signed with Technology Supplier, Vestas
Model	-	V100	-do-
Rated Power	1800	kW	-do-
Rotor diameter	100	M	-do-
Swept area	7850	M2	-do-
No. of Blades	3	-	-do-
Cut in wind speed	4	m/s	Technical specification for WTG model V 100 available at Vestas' official website ¹
Cut out wind speed	20	m/s	-do-
Hub Height	80	M	Supply agreement signed with Technology Supplier, Vestas
Generator Type	Asynchronous, with wound rotor, slip rings	-	-do-

All the WTGs involved in the project activity are already commissioned and operational. The WTGs are under operation since the date of commissioning and no event has been identified which may impact GHG emission reduction. The commissioning dates of all the WTGs are provided as below.

¹ http://www.vestas.com/Files/Filer/EN/Brochures/090721_Product-brochure_V_100-1.8MW-042009-EN.pdf

WTG ID	WTG No.	Date of Commissioning
JW 01	VWT/1800/11-12/2552	25-Feb-2012
JW 29	VWT/1800/11-12/2553	25-Feb-2012
VW 49	VWT/1800/11-12/2554	25-Feb-2012
VW 54	VWT/1800/11-12/2555	25-Feb-2012
JW 02	VWT/1800/11-12/2593	21-Mar-2012
JW 05	VWT/1800/11-12/2594	21-Mar-2012
VW 80	VWT/1800/11-12/2595	21-Mar-2012
VW 66	VWT/1800/11-12/2607	30-Mar-2012
VW 67	VWT/1800/11-12/2608	27-Mar-2012
VW 79	VWT/1800/11-12/2609	27-Mar-2012
VW 48	VWT/1800/11-12/2610	30-Mar-2012
VW 62	VWT/1800/11-12/2611	30-Mar-2012
VW 63	VWT/1800/11-12/2612	30-Mar-2012
VW 71	VWT/1800/11-12/2613	30-Mar-2012

Summary of GHG emission reduction is tabulated as below;

Vintage	EG _{PG,y} (MWh)	EFGrid,CM,y (tCO ₂ /MWh)	BEy (tCO ₂)	PEy (tCO ₂)	LEy (tCO ₂)	ERy (tCO ₂)
2012	56,339	0.9528	53,679	0	0	53,679
2013	0		0	0	0	0
Total	53,679					

1.2 Sectoral Scope and Project Type

Sectoral Scope 01: Energy Industries (renewable/non-renewable sources.)

Technical area: 1.2 Renewable Energy (Wind)

This is not a grouped project.

1.3 Project Proponent

Organization name	Powerica Limited
Contact person	Mr. Qazi Aamir
Title	(General Manager - Wind Div.)
Address	Godrej Coliseum, 9th flr., C wing, Sion-Trombay Road, Sion (E), Mumbai 400022, India
Telephone	(+91-22) 4001-2673
Email	aamir.qazi@powericaltd.com

1.4 Other Entities Involved in the Project

No other project participant is involved in the project.

1.5 Project Start Date

25-Feb-2012 (This is the commissioning date of the earliest commissioned WTGs involved in the project activity)

1.6 Project Crediting Period

The project is registered under CDM and applying for pre-CDM VCS verification since commission date till the start date of crediting period of the project under CDM. The earliest commissioning date of the WTG involved in the project is 25-Feb-2012 and start date of crediting period under CDM is 31-Jan-2013.

Thus,

The crediting period (for VCS): 25-Feb-2012 to 30-Jan-2013

Length of crediting period (for VCS): 341 days

1.7 Project Location

The detail information on the WTG locations along with their individual geographical co-ordinates is provided below.

WTG ID	WTG No.	Village	District and State	Latitude (°N)	Longitude (°E)
JW 01 New	VWT/1800/11-12/2552	Jangi	Kutch, Gujarat	23° 11' 54"	70° 34' 54"
JW 29	VWT/1800/11-12/2553	Jangi	Kutch, Gujarat	23° 12' 01"	70° 32' 25"
VW 49	VWT/1800/11-12/2554	Lakhapar (Vandhiya)	Kutch, Gujarat	23° 12' 11"	70° 36' 52"
VW 54 New	VWT/1800/11-12/2555	Godpar (Vandhiya)	Kutch, Gujarat	23° 12' 14"	70° 36' 38"
JW 02 New	VWT/1800/11-12/2593	Jangi	Kutch, Gujarat	23° 11' 40"	70° 34' 45"
JW 05 New	VWT/1800/11-12/2594	Jangi	Kutch, Gujarat	23° 11' 49"	70° 35' 07"
VW 80	VWT/1800/11-12/2595	Modpar (Vandhiya)	Kutch, Gujarat	23° 12' 22"	70° 35' 27"
VW 66	VWT/1800/11-12/2607	Vandhiya	Kutch, Gujarat	23° 16' 03"	70° 35' 06"
VW 67	VWT/1800/11-12/2608	Vandhiya	Kutch, Gujarat	23° 15' 25"	70° 35' 45"
VW 79	VWT/1800/11-12/2609	Vandhiya	Kutch, Gujarat	23° 14' 46"	70° 37' 40"
VW 48	VWT/1800/11-12/2610	Lakhdhirga dh (Vandhiya)	Kutch, Gujarat	23° 15' 23"	70° 35' 17"
VW 62	VWT/1800/11-12/2611	Vandhiya	Kutch, Gujarat	23° 15' 45"	70° 34' 56"
VW 63	VWT/1800/11-12/2612	Vandhiya	Kutch, Gujarat	23° 15' 51"	70° 35' 21"
VW 71	VWT/1800/11-12/2613	Vandhiya	Kutch, Gujarat	23° 13' 29"	70° 36' 18"

1.8 Title and Reference of Methodology

Title	Consolidated baseline methodology for grid-connected electricity generation from renewable sources
Reference	ACM0002
Version number	13.0.0

1.9 Other Programs

- Emission Trading Programs and Other Binding Limits: The WTGs included in the Project are located at Gujarat state of India. India, as a non Annex 1 country to Kyoto Protocol, is not bound by the protocol or neither have any national caps or trading scheme wherein renewable project like this can participate in trading of emission certificate
- Other Forms of Environmental Credit: The project is only registered under Clean Development Mechanism (CDM) standard of UNFCCC (Ref. No: 8672) and has not sought or received another form of GHG-related environmental credit, including renewable energy certificates. The project is neither rejected under any other GHG-related environmental credit and the related program. A declaration for this is submitted to the DoE.
- Participation under Other GHG Programs: As stated above, the project is registered under Clean Development Mechanism (CDM) standard of UNFCCC and not seeking registration under any other GHG program. The UNFCCC reference number of the project is 8672.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

All the WTGs involved in the project activity are already commissioned and operational. The WTGs are under operation since the date of commissioning and no event has been identified which may impact GHG emission reduction. The commissioning dates of all the WTGs are provided as below.

WTG ID	WTG No.	Date of Commissioning
JW 01	VWT/1800/11-12/2552	25-Feb-2012
JW 29	VWT/1800/11-12/2553	25-Feb-2012

WTG ID	WTG No.	Date of Commissioning
VW 49	VWT/1800/11-12/2554	25-Feb-2012
VW 54	VWT/1800/11-12/2555	25-Feb-2012
JW 02	VWT/1800/11-12/2593	21-Mar-2012
JW 05	VWT/1800/11-12/2594	21-Mar-2012
VW 80	VWT/1800/11-12/2595	21-Mar-2012
VW 66	VWT/1800/11-12/2607	30-Mar-2012
VW 67	VWT/1800/11-12/2608	27-Mar-2012
VW 79	VWT/1800/11-12/2609	27-Mar-2012
VW 48	VWT/1800/11-12/2610	30-Mar-2012
VW 62	VWT/1800/11-12/2611	30-Mar-2012
VW 63	VWT/1800/11-12/2612	30-Mar-2012
VW 71	VWT/1800/11-12/2613	30-Mar-2012

2.2 Deviations

2.2.1 Methodology Deviations

There is deviation to the applied methodology noticed during the current monitoring period which may impact the quantification of GHG emission.

2.2.2 Project Description Deviations

There is no deviation in the project description; all the WTGs are commissioned and operational as it has been defined in the registered PDD.

2.3 Grouped Project

This is not a grouped project, hence this is not applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	EF _{grid,CM,y}
Data unit:	tCO ₂ /MWh
Description:	Combined Margin Grid emission factor
Source of data:	CEA website Version :07 (Valid from 01/01/2012)
Value applied:	0.9528
Justification of choice of data or description of measurement methods and procedures applied	No measurement method has been applied; the value has been directly sourced from the registered CDM PDD.
Purpose of the data:	Baseline emission calculation
Comment:	No comment

Data Unit / Parameter:	EF _{grid,OM,y}
Data unit:	tCO ₂ /MWh
Description:	Weighted average of 3 years (2008-09, 2009-10, 2010-11) CO ₂ Operating Margin emission factor of the grid
Source of data:	CEA website Version :07 (Valid from 01/01/2012)
Value applied:	0.9842
Justification of choice of data or description of measurement methods and procedures applied	No measurement method has been applied; the value has been directly sourced from the registered CDM PDD.
Purpose of the data:	Baseline emission calculation
Comment:	No Comment

Data Unit / Parameter:	EF _{grid,BM,y}
Data unit:	tCO ₂ /MWh
Description:	CO ₂ Built Margin emission factor of the grid
Source of data:	CEA website Version :07 (Valid from 01/01/2012)
Value applied:	0.8588
Justification of choice of data or description of measurement methods and procedures applied	No measurement method has been applied; the value has been directly sourced from the registered CDM PDD.
Purpose of the data:	Baseline emission calculation
Comment:	No Comment

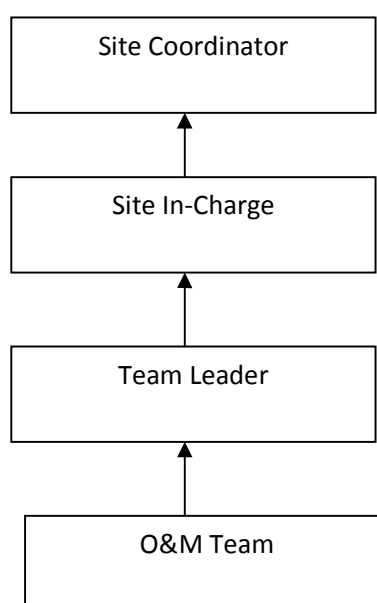
3.2 Data and Parameters Monitored

Data Unit / Parameter:	EG_{facility,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:	Certificate for share of electricity generated by Wind farm provided by GETCO								
Description of measurement methods and procedures to be applied:	<u>Monitoring equipments:</u> Electrical Energy Meters. <u>Data type:</u> Measured & Calculated <u>Archiving:</u> Paper & Electronic <u>Responsibility:</u> The O&M site-in-charge is for the regular recording of data. <u>Energy meters:</u> <u>Serial number:</u> Please refer appendix-1. <u>Accuracy class:</u> 0.2s of the meter at respective substations that are used for the exported electricity metering. 0.5s of the meter at respective WTG yards that would be used for the electricity metering <u>Calibration:</u> The meters are calibrated once every year. Please refer appendix-1 for calibration details of the energy meters.								
Frequency of monitoring/recording:	Continuous measurement and at least monthly recording								
Value monitored:	<table border="1"> <thead> <tr> <th>Vintage (Year)</th><th>Value (MWh)</th></tr> </thead> <tbody> <tr> <td>2012</td><td>56,339</td></tr> <tr> <td>2013</td><td>0</td></tr> <tr> <td>Total</td><td>56,339</td></tr> </tbody> </table>	Vintage (Year)	Value (MWh)	2012	56,339	2013	0	Total	56,339
Vintage (Year)	Value (MWh)								
2012	56,339								
2013	0								
Total	56,339								
Monitoring equipment:	The details of the energy meters used are provided in appendix-1.								
QA/QC procedures to be applied:	The Quantity of net electricity generation from the certificates for share of electricity are cross-checked with the invoices for the sale of power by Powerica. The Energy Meters are calibrated once every year.								

Purpose of the data	Calculation of baseline emissions.
Calculation method:	NA
comment:	NA

3.3 Monitoring Plan

Since the baseline emission factor is based on an ex-ante determination, monitoring of this parameter is not required. The sole parameter for monitoring is the electricity exported to the grid. The Project is operated and managed by Vestas Wind Technology India Private Limited (Vestas). Vestas has a designated Site-In-Charge (O&M) on site who is responsible for monitoring the electricity exported from the project activity. The organizational structure of the O&M team by Vestas is as follows:



The roles and responsibilities of the O&M team may be elaborated as follows:

O&M Team: The team comprises of site engineers who are directly responsible for carrying out the O & M activity of WTG. They execute the preventive maintenance and attend to break downs as per O&M Manual & Procedures. They respond to breakdown calls and resolve customer complaints. They record all the readings and prepare documentations for Reports, Logs and Daily Generation Reports.

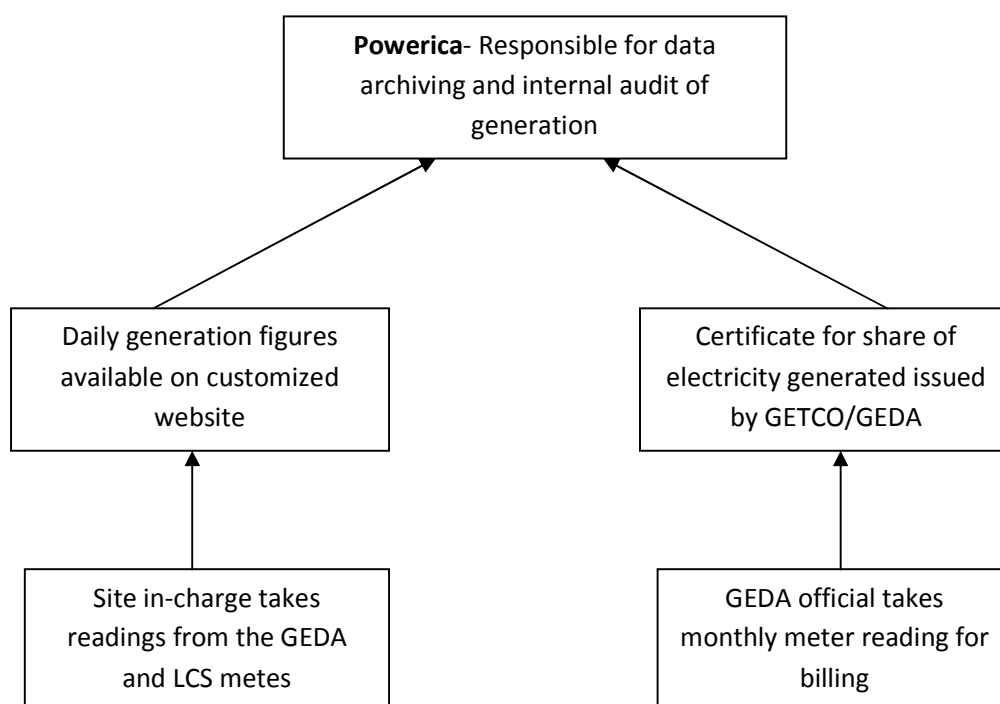
Team Leader: He leads the O&M team and is responsible for attending to the unscheduled breakdown of WTGs and for ensuring that WTG should be restored at earliest. He ensures the proper reading, recording and monitoring of the Generation.

Site-Incharge: He is responsible for the entire site. He has to take timely corrective measures/action to ensure that overall performance of site is met and delivered. He is responsible for the individual site. He executes the preventive maintenance and attends to break downs as per O&M Manual & Procedures. He also checks the daily Generation reports for all the WTGs.

Site Co-ordinator: He is in-charge of overall O&M activities of site. The responsibilities include ensuring complete documentation of the Generation of the site, on-time service delivery, timely response to breakdowns and efficient manpower management for the site.

Further, all new technicians on site are trained by Vestas. Also, the O&M personnel are trained regularly in order to improve their technical skills.

The overall flow of information has been depicted using the following hierarchical structure:



Monitoring Process at Site:

Metering of wind power is done at site as under:

- Joint meter reading is taken at Vandhiya substation meter by representative of GETCO (Gujarat Electricity Transmission Company) and O&M service provider (on behalf of individual wind farm owners). The check meters are located in the sub-station yard. Let the total generation recorded for particular month is 'X' units in sub-station meter.
- Joint meter reading is taken at Local Meter-(transformer yard meter of each WTG) by representative of GETCO (Gujarat Electricity Transmission Company) and O&M service provider (on behalf of individual wind farm owners). Let us assume total generation of Powerica recorded for particular month is 'Y1' units.
- Similarly joint meter reading for other wind farm owners is also taken. Let the generation of individual owner recorded for particular month are 'Y2, Y3,.....Yn' units.
- GETCO distributes 'X' to individual wind farm owners using following formula and issues monthly certificates.

Net units calculated for billing = $X * Y_i / \sum Y_n$

- For Powerica, net units calculated for billing = $X * Y_1 / \sum Y_n$
- It must be noted here that the meter readings as mentioned above are calculated as the product of meter multiplication factor and the difference of the current and previous meter readings

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

The baseline emissions are calculated using the following formula

Baseline Emissions (BE_y) = $EF_{Grid,CM,y} \times EG_{Facility,y}$

Where,

$EG_{PG,y}$: Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)

The monthly monitored values of the parameter, $EG_{Facility,y}$ are as below,

Months	Generation (MWh)					
	7.2 MW ²	After applying calibration error ³	10.8 MW ⁴	5.4 MW ⁵	Shikarpur 1.8 MW ⁶	Total
Feb-12	220.329	NA	0.000	0.000	0.000	220.329
Mar-12	1,118.347	NA	0.000	0.000	2.749	1,121.096
Apr-12	1,369.104	NA	1,866.606	983.902	342.457	4,562.069
May-12	2,712.167	NA	3,489.418	2,157.190	604.130	8,962.905
Jun-12	3,175.625	NA	4,389.871	2,266.780	743.935	1,0576.211
Jul-12	3,117.100	NA	4,339.812	2,312.222	730.487	1,0499.621
Aug-12	2,372.413	NA	3,450.225	1,812.796	615.188	8,250.622
Sep-12	979.930	NA	1,492.408	768.063	269.607	3,510.008
Oct-12	532.741	NA	1,303.098	439.381	208.800	2,484.020
Nov-12	442.038	439.828	1,126.637	348.842	175.706	2,091.013
Dec-12	892.136	887.675	2,157.133	659.542	356.573	4,060.923
Jan-13 ⁷	-	-	-	-	-	0.000
Total						56,339

² Commissioned in Jul 2011

³ Since calibration of some energy meter was not valid for some intervals, in line with Clean development mechanism project standard, version 05.0, maximum permissible error of the energy meters is applied in the readings during which calibration was not valid. Maximum error has been applied as the errors observed during the post calibration were within maximum permissible errors of the energy meters.

⁴ Commissioned in Dec 2011

⁵ Commissioned in Dec 2011

⁶ Commissioned in Dec 2011

⁷

This is to be noted that in line with the registered CDM PDD, as the end date of the monitoring period falls inside the billing cycle, Project proponent has forgone the emission reduction for the month of January 2013.

$EF_{Grid,CM,y}$: Combined Margin Grid emission factor (tCO_2/MWh) which has been fixed ex-ante in the registered CDM PDD.

Therefore, $EF_{Grid,CM,y} = 0.9528 tCO_2/MWh$

Vintage wise baseline emission is thus calculated as below;

Vintage	EG _{PG,y} (MWh)	EF _{Grid,CM,y} (tCO ₂ /MWh)	BE _y (tCO ₂) EF _{grid,CM,y} x EG _{facility,y} (Rounded down)
2012	56,339	0.9528	53,679
2013	-		-
TOTAL			53,679

4.2 Project Emissions

Project Emissions for the project activity are zero.

Hence, $PE_y = 0$

4.3 Leakage

The project proponents have identified no anthropogenic greenhouse gases by sources outside the project boundary that are significant, measurable and attributable to the project activity. Hence, no leakage is considered from the project activity.

Hence, $LE_y = 0$

4.4 Net GHG Emission Reductions and Removals

Summary of GHG emission reduction is tabulated as below;

Vintage	EG _{PG,y} (MWh)	EFGrid,CM,y (tCO ₂ /MWh)	BEy (tCO ₂)	PEy (tCO ₂)	LEy (tCO ₂)	ERy (tCO ₂)
2012	56,339	0.9528	53,679	0	0	53,679
2013			-	0	0	0
Total	53,679					

APPENDIX 1: DETAILS OF THE ENERGY METERS USED

WTG LOCATION METERS ⁸								
WTG	Meter Serial No ⁹	1st Calibration	Meter Change? If yes, new meter serial No.	If Yes, date of meter change	2nd Calibration	Duration in which calibration was not valid	Meter Change? If yes, new meter serial No.	If Yes, date of meter change
JW 01	GJU64156	28/11/2011 (Valid till 27/11/2012)	NO	-	28/01/2013 (Valid till 27/01/2014)	28/11/2012 to 27/01/2013	NO	-
JW 29	GJU64155	28/11/2011 (Valid till 27/11/2012)	NO	-	26/11/2012 (Valid till 25/11/2013)	-	NO	-
VW 49	GUJ64157	28/11/2011 (Valid till 27/11/2012)	NO	-	26/11/2012 (Valid till 25/11/2013)	-	NO	-
VW 54	GJU64158	28/11/2011	NO	-	26/11/2012	-	NO	-

⁸ Accuracy class of the WTG location (main) meters is 0.5S.

⁹ Since the main energy meters were working properly during monitoring period and readings are only considered from main energy meters, details of check meters are not provided.

		(Valid till 27/11/2013)			(Valid till 25/11/2013)			
JW 02	GJU64814	30/01/2012 (Valid till 29/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	-	NO	-
JW 05	GJU64802	30/01/2012 (Valid till 29/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	-	NO	-
VW 48	GJU64809	02-01-2012 (Valid till 01/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	01/01/2013 to 27/01/2013	NO	-
VW 62	GJU64805	30/01/2012 (Valid till 29/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	-	NO	-
VW 63	GJU64812	02-01-2012 (Valid till 01/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	01/01/2013 to 27/01/2013	NO	-
VW 66	GJU64804	30/01/2012 (Valid till	NO	-	28/01/2013 (Valid till	-	NO	-

		29/01/2013)			27/01/2014)			
VW 67	GJU64807	02-01-2012 (Valid till 01/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	01/01/2013 to 27/01/2013	NO	-
VW 71	GJU64813	02-01-2012 (Valid till 01/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	01/01/2013 to 27/01/2013	NO	-
VW 79	GJU64806	30/01/2012 (Valid till 29/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	-	NO	-
VW 80	GJU64803	30/01/2012 (Valid till 29/01/2013)	NO	-	28/01/2013 (Valid till 27/01/2014)	-	NO	-

SUB STATION METERS¹⁰

Location	Serial No	1st Calibration	1st calibration due date	2nd Calibration	Duration in which calibration was not valid	2nd calibration due date
Vandhya 220 kV-Line-1	GJ-0670-A	15/10/2009	14/10/2010	17/01/2012	15/10/2010 to 16/01/2012	16/01/2013
Vandhya 220 kV-Line-2	GJ-0671-A	15/10/2009	14/10/2010	17/01/2012	15/10/2010 to 16/01/2012	16/01/2013
Sikharpur 132 kV - Line 1	GJ-2144-A	13/01/2012	12/01/2013	-	13/01/2013 to 30/01/2013	-
Sikharpur 132 kV - Line 1	GJ-2136-A	13/01/2012	12/01/2013	-	13/01/2013 to 30/01/2013	-

¹⁰ Accuracy class of substation meter is 0.2S.

APPENDIX 2: LIST OF ABBREVIATION

ACM	Approved Consolidated Methodology
CDM	Clean Development Mechanism
CO₂	Carbon Dioxide
ER	Emission Reduction
GEDA	Gujarat Energy Development Agency
GETCO	Gujarat Energy Transmission Corporation Limited
GHG	Green House Gas/ses
kV	Kilo Volt
kW	Kilo Watt Hour
LCS	Local Control System
MR	Monitoring Report
MWh	Mega Watt Hour
NEWNE	Northern, Eastern, Western and North-Eastern grids
PD	Project Description
PDD	Project Design Document
SLDC	State Load Dispatch Centre
UNFCCC	United Nation Framework Convention on Climate Change
VCS	Verified Carbon Standard
WTG	Wind Turbine Generator