AES SAURASHTRA WINDFARMS

Document Prepared By

Abhijeet S. Jog

Project Title	AES Saurashtra Windfarms
Version	04.1
Report ID	1
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Project ID	5777 (CDM registration number with UNFCCC)
Monitoring Period	07-06-2011 to 29-02-2012 (both days included)
Prepared By	Abhijeet S. Jog
Contact	MITCON Consultancy & Engineering Services Ltd. Kubera Chambers, Shivajinagar, Pune – 411005 Maharashtra, India. Ph. No. +91-20-25533309/25534322 Fax : +91-20-25533206

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1 PROJECT DETAILS

1.1 Summary Description of Project

M/s AES Saurashtra Windfarms Private Ltd. (ASW) has developed a 39.2 MW wind farm in the state of Gujarat in India. The project activity involves development, supply, commissioning and operation of 49 Wind Turbine Generators (WTGs) of rated capacity 800 kW each. The make of the machines used in the wind farm is Enercon E-53. The project activity will produce electricity which shall be supplied to the state electricity utility in the state of Gujarat. The project activity will assist in promoting sustainable development of the region by providing clean energy to the state electricity grid.

1.2 Sectoral Scope and Project Type

Sectoral scope: 1 - Energy industries (renewable - /non-renewable sources)

Project Type: Renewable projects

Project activity is not a grouped project activity.

1.3 Project Proponent

Organization:	AES Saurashtra Windfarms Private Limited
Street/P.O.Box:	Golf Course Road, Sector 54
Building:	Unit No. 202 & 203, Second Floor , Suncity Business Tower
City:	Gurgaon
State/Region:	Haryana
Postcode/ZIP:	122002
Country:	India
Telephone:	+91 – 124 – 4420999, 4300298
FAX:	+91 – 124 – 4300299
E-Mail:	surya.singh@AES.com
URL:	www.aes.com
Represented by:	-
Title:	Director
Salutation:	Mr.
Last name:	Singh

Middle name:	-
First name:	Surya Pratap
Department:	-
Mobile:	(+91) 9650855122
Direct FAX:	+91 – 124 – 4300299
Direct tel:	+91 – 124 – 4420999, 4300298
Personal e-mail:	surya.singh@aes.com

Role: Project Owner

Responsibility:

1. Internal Audits
2. Data Review
3. Corrective actions if any

Detailed Role and responsibility is mentioned in section 3.3 of the monitoring report.

1.4 Other Entities Involved in the Project

Project Consultant (Technical):	MITCON Consultancy & Engineering Services Ltd.
Division	Energy & Carbon Services
Address	Kubera Chamber, Shivajinagar, Pune – 411 005 India
Contact Person:	Mr. Deepak Zade (Sr. Vice President)
Telephone	+91-20-2553 3309, 2553 4322, +91-09822684106
Fax	+91-20–2553 3206
Personal Email	deepak.zade@mitconindia.com

Role and Responsibility: Technical Consultant:

1. Identification of GHG reduction projects.
2. Calculation of GHG emission Potential
3. Preparation of Project document.
4. Assistance for Validation & verification of project activity.
5. Preparation of Monitoring Report.
6. To pursue GHG emission reduction project on behalf of PP's

1.5 Project Start Date

07/06/2011, date of commissioning of first WTG.

1.6 Project Crediting Period

Project activity has fixed crediting period of 10 years for the CDM project.
Start date of crediting period for VCS verification: 07/06/2011 (Date of commissioning of first WTG)
End date of crediting period for VCS verification: 29/02/2012 (Date one day prior to the start date of crediting period of CDM project activity)

1.7 Project Location

Details of the location of the project activity:

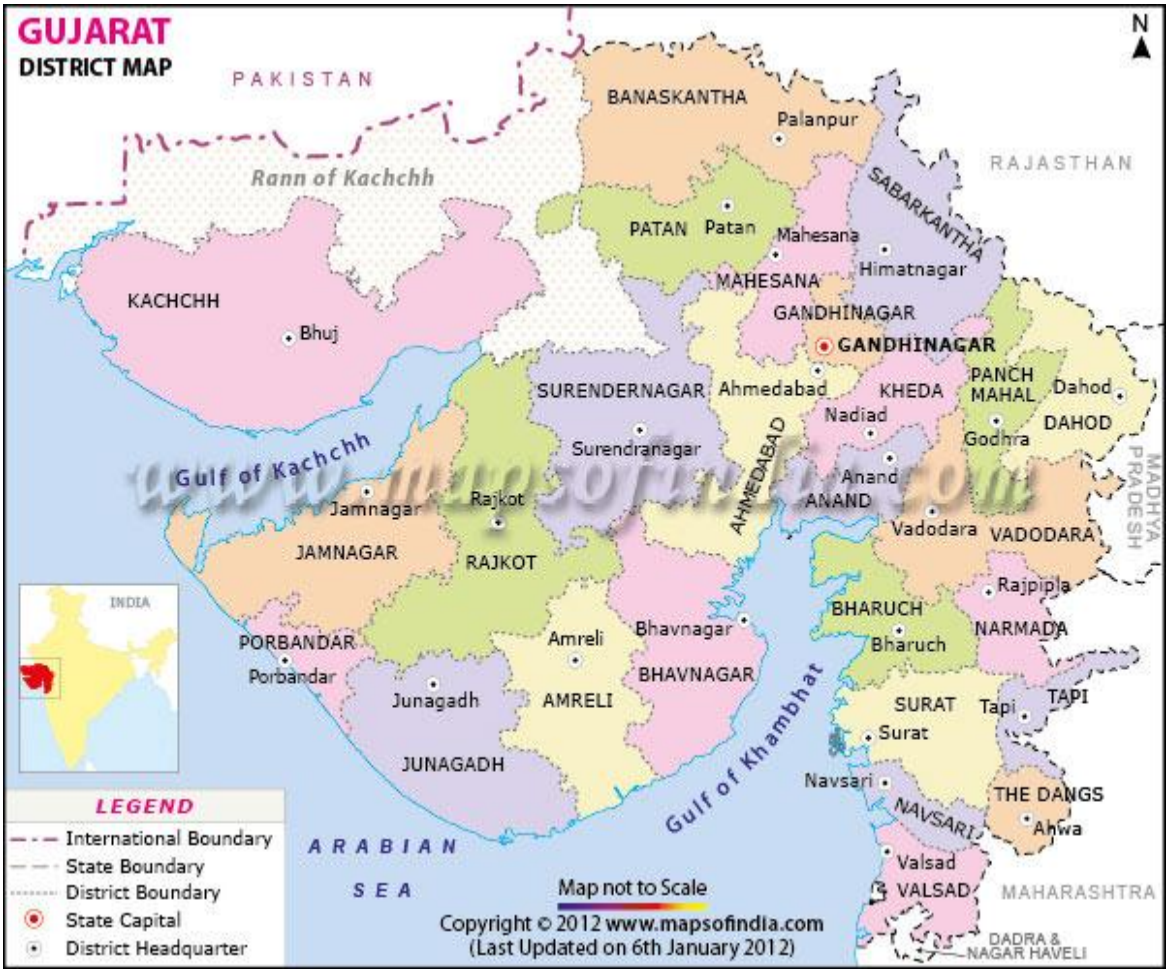
Sr. No.	Loc. No.	Latitude (N)	Longitude (E)	Survey No.	Village	Taluk
1	CH-01	21^{0}53'59.2''	69^{0}22'37.8''	416/1	Chachlana	Kalyanpur
2	CH-02	21^{0}54'6.3''	69^{0}22'35.7''	416/1	Chachlana	Kalyanpur
3	CH-03	21^{0}54'13.6''	69^{0}22'23.1''	416/1	Chachlana	Kalyanpur
4	CH-04	21^{0}54'19.0''	69^{0}22'18.6''	416/1	Chachlana	Kalyanpur
5	CH-05	21^{0}54'28.5''	69^{0}22'16.0''	416/1	Chachlana	Kalyanpur
6	CH-06	21^{0}54'33.4''	69^{0}22'12.0''	416/1	Chachlana	Kalyanpur
7	CH-07	21^{0}54'40.8''	69^{0}22'11.0''	416/1/P1	Chachlana	Kalyanpur
8	CH-09	21^{0}54'48.4''	69^{0}21'55.7''	416/1	Chachlana	Kalyanpur
9	CH-15	21^{0}54'56.0''	69^{0}21'43.3''	416/1/P1	Chachlana	Kalyanpur
10	JO-44	21^{0}59'52.2''	69^{0}17'22.6''	38	Jodhpar	Kalyanpur
11	JO-45	21^{0}59'43.6''	69^{0}17'27.2''	38	Jodhpar	Kalyanpur
12	JO-54N	21^{0}58'59.3''	69^{0}17'44.7''	8/1/P2	Jodhpar	Kalyanpur
13	JO-58	21^{0}59'28.3''	69^{0}17'24.0''	69/P1/P1	Jodhpar	Kalyanpur
14	JO-74	22^{0}0'22.1''	69^{0}16'45.3''	182/1	Hadmatiya	Kalyanpur
15	JO-75	22^{0}0'33.8''	69^{0}16'59.8''	182/P4/P1	Hadmatiya	Kalyanpur
16	GO-01	22^{0}8'19.6''	69^{0}3'19.4''	181/P1	Gorinja	Dwarka
17	GO-02	22^{0}8'26.3''	69^{0}3'17.6''	181/P1	Gorinja	Dwarka

18	GO-03	22^{0}8'34.8''	69^{0}3'19.1''	181/P1	Gorinja	Dwarka
19	GO-04	22^{0}8'39.1''	69^{0}3'11.0''	181/P1	Gorinja	Dwarka
20	GO-05	22^{0}9'0.6''	69^{0}3'17.6''	181/P1	Gorinja	Dwarka
21	GO-06	22^{0}8'53.2''	69^{0}3'17.7''	181/P1	Gorinja	Dwarka
22	GO-07	22^{0}8'47.1''	69^{0}3'23.2''	181/P1	Gorinja	Dwarka
23	GO-08	22^{0}8'41.4''	69^{0}3'28.4''	181/P1	Gorinja	Dwarka
24	GO-09	22^{0}8'35.8''	69^{0}3'33.5''	181/P1	Gorinja	Dwarka
25	GO-10	22^{0}8'29.8''	69^{0}3'39.0''	181/P1	Gorinja	Dwarka
26	GO-12	22^{0}8'50.2''	69^{0}3'43.2''	181/P1	Gorinja	Dwarka
27	GO-11	22^{0}8'56.5''	69^{0}3'38.9''	181/P1	Gorinja	Dwarka
28	GO-16	22^{0}9'46.5''	69^{0}2'4.4''	278/P1	Gorinja	Dwarka
29	VA-17	22^{0}9'52.7''	69^{0}1'59.0''	351/P1	Vachhu	Dwarka
30	VG 414	21^{0}52'52.2''	69^{0}21'40.3''	180/P1	Virpur Gangadi	Kalyanpur
31	VG 415	21^{0}53'0.7''	69^{0}21'26.6''	180/P1	Virpur Gangadi	Kalyanpur
32	VG 416	21^{0}52'55.8''	69^{0}21'5.4''	180/P1	Virpur Gangadi	Kalyanpur
33	VG 422	21^{0}53'36.7''	69^{0}20'46.3''	19P	Virpur Gangadi	Kalyanpur
34	VG 423	21^{0}53'48.6''	69^{0}20'51.0''	19P	Virpur Gangadi	Kalyanpur
35	VG 424	21^{0}53'59.7''	69^{0}20'50.6''	19P	Virpur Gangadi	Kalyanpur
36	VG 426	21^{0}54'9.5''	69^{0}20'50.5''	19P	Virpur Gangadi	Kalyanpur
37	LA 448	21^{0}54'53.3''	69^{0}17'58.1''	415/1/2	Lamba	Kalyanpur
38	LA 456	21^{0}55'22.7''	69^{0}18'46.3''	30/P1	Lamba	Kalyanpur
39	HA 551	22^{0}1'2.7''	69^{0}18'27.6''	182/P1	Hadmatiya	Kalyanpur
40	HA 552	22^{0}0'48.3''	69^{0}18'27.2''	182/P1	Hadmatiya	Kalyanpur
41	HA 553	22^{0}0'40.4''	69^{0}18'28.0''	182/P1	Hadmatiya	Kalyanpur
42	HA 554	22^{0}0'38.8''	69^{0}18'42.4''	182/P1	Hadmatiya	Kalyanpur
43	JO 750	21^{0}58'14.9''	69^{0}17'26.4''	144/P7	Jodhpar	Kalyanpur
44	KU 742	22^{0}3'38.1''	69^{0}9'19.1''	125/1	Kurunga	Dwarka

45	KU 743	$22^0$3'43.3''	$69^0$9'12.4''	125/1	Kurunga	Dwarka
46	OK 744	$22^0$5'3.0''	$69^0$7'8.7''	24P	Okhamadhi	Dwarka
47	OK 745	$22^0$5'20.2''	$69^0$6'42.6''	131P	Okhamadhi	Dwarka
48	OK 746	$22^0$5'25.3''	$69^0$6'35.2''	131P	Okhamadhi	Dwarka
49	OK 747	$22^0$5'30.0''	$69^0$6'32.0''	131P	Okhamadhi	Dwarka

Location Map:

Project is located in Jamnagar district of Gujarat in India.



1.8 Title and Reference of Methodology

Title: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"

Reference: Approved consolidated baseline methodology ACM0002 (Version 12.3.0[1], EB 66, Annex 35)[2]
ACM0002 (Version 12.3.0, EB 66, Annex 35) draws upon the following tools which have been used in the PD.

- Tool to calculate the emission factor for an electricity system – Version 2.2
- Tool for the demonstration and assessment of additionality – Version 5.2.1

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Start date is 07/06/2011 (commissioning date of first WTG)

Details of the project activity are as follows;

Sr. No.	Name of Project Participant	Location No.	Survey No.	Commissioning date	Capacity per WTG (MW)	WTG Location
1	M/s AES Saurashtra	CH-01	416/1	07-06-2011	0.8	Chachlana
2		CH-02	416/1	10-06-2011	0.8	Chachlana
3		CH-03	416/1	07-06-2011	0.8	Chachlana
4		CH-04	416/1	07-06-2011	0.8	Chachlana
5		CH-05	416/1	13-06-2011	0.8	Chachlana
6		CH-06	416/1	07-06-2011	0.8	Chachlana
7		CH-07	416/1/P1	30-06-2011	0.8	Chachlana
8		CH-09	416/1	07-06-2011	0.8	Chachlana
9		CH-15	416/1/P1	30-06-2011	0.8	Chachlana

[1] Version 12.2.0 of the methodology ACM002 is available at the time of registration of the project activity. But in version 12.3.0 minor editorial improvements are done, so latest available version i.e. 12.3.0 is applied.

[2] http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT.

10	Windfarms Private Limited	JO-44	38	10-08-2011	0.8	Jodhpar
11		JO-45	38	10-08-2011	0.8	Jodhpar
12		JO-54N	8/1/P2	30-11-2011	0.8	Jodhpar
13		JO-58	69/P1/P1	30-11-2011	0.8	Jodhpar
14		JO-74	182/1	22-11-2011	0.8	Hadmatiya
15		JO-75	182/P4/P1	22-11-2011	0.8	Hadmatiya
16		GO-01	181/P1	15-06-2011	0.8	Gorinja
17		GO-02	181/P1	15-06-2011	0.8	Gorinja
18		GO-03	181/P1	15-06-2011	0.8	Gorinja
19		GO-04	181/P1	15-06-2011	0.8	Gorinja
20		GO-05	181/P1	15-06-2011	0.8	Gorinja
21		GO-06	181/P1	15-06-2011	0.8	Gorinja
22		GO-07	181/P1	15-06-2011	0.8	Gorinja
23		GO-08	181/P1	15-06-2011	0.8	Gorinja
24		GO-09	181/P1	15-06-2011	0.8	Gorinja
25		GO-10	181/P1	15-06-2011	0.8	Gorinja
26		GO-12	181/P1	15-06-2011	0.8	Gorinja
27		GO-11	181/P1	15-06-2011	0.8	Gorinja
28		GO-16	278/P1	01-07-2011	0.8	Gorinja
29		VA-17	351/P1	01-07-2011	0.8	Vachhu
30		VG 414	180/P1	22-11-2011	0.8	Virpur Gangadi
31		VG 415	180/P1	22-11-2011	0.8	Virpur Gangadi
32		VG 416	180/P1	22-11-2011	0.8	Virpur Gangadi

33		VG 422	19 P	12-01-2012	0.8	Virpur Gangadi
34		VG 423	19 P	12-01-2012	0.8	Virpur Gangadi
35		VG 424	19 P	12-01-2012	0.8	Virpur Gangadi
36		VG 426	19 P	16-01-2012	0.8	Virpur Gangadi
37		LA 448	415/1/2	22-11-2011	0.8	Lamba
38		LA 456	30/P1	22-11-2011	0.8	Lamba
39		HA 551	182/P1	28-12-2011	0.8	Hadmatiya
40		HA 552	182/P1	28-12-2011	0.8	Hadmatiya
41		HA 553	182/P1	28-12-2011	0.8	Hadmatiya
42		HA 554	182/P1	30-12-2011	0.8	Hadmatiya
43		JO 750	144/P7	23-01-2012	0.8	Jodhpar
44		KU 742	125/1	18-10-2011	0.8	Kurunga
45		KU 743	125/1	18-10-2011	0.8	Kurunga
46		OK 744	24 P	19-07-2011	0.8	Okhamadhi
47		OK 745	131 P	04-07-2011	0.8	Okhamadhi
48		OK 746	131 P	04-07-2011	0.8	Okhamadhi
49		OK 747	131 P	04-07-2011	0.8	Okhamadhi
				Total	**39.2**	

The project promoter signed operation and maintenance agreements with the O & M contractor of the wind turbines. The performance of the turbines, safety in operation and scheduled / break down maintenances is the responsibility of O & M contractor and are organized and monitored by them, hence the authority and responsibility of project management on site lies with the O & M contractor will maintains all the data / records for the project monitoring. EIL is the O&M contractor for the project activity.

During the monitoring period no such events or situations occurred which will cause impact on the actual operation of the project activity.

Machines shut down details are now included in Annexure – 3

2.2 Project Description Deviations

During the current monitoring period it is observed that, accuracy class of the meter mentioned in the registered monitoring plan is 0.2s and actual meter installed at site is of 0.5s accuracy class. So as per the project standard (EB 70 – A02, Version 02.1) para 4 (a), baseline emission is calculated by applying correction factor. As per project standard (EB – 70, Version 02.1) Appendix 1, Para 4 (a), the difference between the accuracy level of the installed monitoring equipment and the accuracy prescribed by the applied methodology and/or the registered monitoring plan is deducted from the measured value. In case of project activity, Project Participant directly receive share certificates which gives net electricity exported to the grid, and no separate reading of export and import is available. So Project Participant has applied correction factor of 0.006 on conservative side to the share certificate value.

As GETCO meters which are connected to the wind turbines installed by the Project Participant (through the PPs cluster meters) and wind turbines installed by other project owners also. So GETCO meters gives the total reading of all wind turbines connected to that meter, which is not used for calculation of emission reductions. So correction factor is not applied for the GETCO meter readings. Details of the apportioning procedure used to calculate net electricity exported to the grid is provided in section 3.3 of the monitoring report.

Accuracy class of the meter is as per the para 7.3.4 of Gujarat Electricity Regulation Commission (GERC) notification 6 of 2004, dated August 25, 2004 and project proponent is not having any control over it.

Also as per the project standard (EB 70 – A02, Version 02.1) para 5 (b); PPA is signed between project proponent and Gujarat Urja Vikas Nigam Limited (GUVNL) & GUVNL will follow the guidelines set by GERC, so the decision on accuracy class is as per GERC notification only.

2.3 Grouped Project

Not applicable

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	$\mathbf{EF_{grid,OM,y}}$
Data unit:	tCO_2e/MWh
Description:	Operating Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data:	"CO_2 Baseline Database for Indian Power Sector", version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

Value applied:	1.0049
Purpose of the data:	The data is used for Baseline emission calculations.
Any comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data Unit / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2e/MWh
Description:	Build Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data:	"CO_2 Baseline Database for Indian Power Sector" version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value applied:	0.6752
Purpose of the data:	The data is used for Baseline emission calculations.
Any comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

Data Unit / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2e/MWh
Description:	Combined Margin Emission Factor of NEWNE Regional Electricity Grid
Source of data:	The "CO_2 Baseline Database for Indian Power Sector" version 5 published by the Central Electricity Authority, Ministry of Power, Government of India. The "CO_2 Baseline Database for Indian Power Sector" is available at http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm
Value applied:	0.9225
Purpose of the data:	The data is used for Baseline emission calculations.
Any comment:	The value is calculated on ex-ante basis and it will remain same throughout the crediting period.

3.2 Data and Parameters Monitored

Data Unit / Parameter:	$EG_{PJ,y}$
Data unit:	MWh
Description:	Net Quantity of Electricity exported to the grid
Source of data:	Share certificate issued by SLDC/GETCO
Description of measurement methods and procedures to be applied:	The procedures for metering is as per the provisions of the power purchase agreement. The WTGs of a single customer (ASW in this case) at a particular site are connected to a cluster meter at the Vacuum Circuit Breaker metering yard (VCB) which in turn connects to a feeder that ultimately leads to the shared main GETCO meter (also known as revenue meter) at the substation maintained by EIL in Bhogat. Data monitoring takes place at the cluster meters at the VCB metering yard and GETCO meter at the Bhogat substation. The electricity metered at the GETCO meter is proportionally divided by GEDA among the customers connected to the Bhogat substation on the basis of the prorated readings taken at the VCB end. The net electricity generated is calculated by GEDA on the basis of GETCO main meter reading (the net electricity supplied to the grid for the wind farm) and the meter readings taken at VCB metering yard after adjusting transmission loss. GEDA gives this data to GETCO/SLDC who certifies this data. The net electricity generated by the project activity is taken directly from the share certificate issued by SLDC/GETCO on monthly basis.
Frequency of monitoring/recording:	Continuous monitoring and monthly recording
Value monitored:	34,721.073
Monitoring equipment:	Please refer Annexure - 2
QA/QC procedures to be applied:	Calibration of all the meters is carried out at least once in three years as per PPA. Faulty meters will be duly replaced. During current monitoring period no meter found faulty, so meters are not replaced. The ASW CDM co-ordinator oversee that the calibration is done as per the appropriate time frequency and proper procedures as mentioned in the PDD.
Calculation method:	The procedures for metering is as per the provisions of the power purchase agreement. The WTGs of a single customer (ASW in this case) at a particular site are connected to a cluster meter at the Vacuum Circuit Breaker metering yard (VCB) which in turn connects to a feeder that

	ultimately leads to the shared main GETCO meter (also known as revenue meter) at the substation maintained by EIL in Bhogat. Data monitoring takes place at the cluster meters at the VCB metering yard and GETCO meter at the Bhogat substation. The electricity metered at the GETCO meter is proportionally divided by GEDA among the customers connected to the Bhogat substation on the basis of the prorated readings taken at the VCB end. The net electricity generated is calculated by GEDA on the basis of GETCO main meter reading (the net electricity supplied to the grid for the wind farm) and the meter readings taken at VCB metering yard after adjusting transmission loss. GEDA gives this data to GETCO/SLDC who certifies this data. The net electricity generated by the project activity is taken directly from the share certificate issued by SLDC/GETCO on monthly basis. The calculation procedure is sole responsibility of GEDA & PP has no role in the same.
Any comment:	The data will be archived for the entire crediting period plus two years.

Data Unit / Parameter:	$EG_{cluster\ meter,\ Export}$
Data unit:	kWh
Description:	Electricity export recorded at the 0.2s accuracy class cluster meter at the Vacuum Circuit Breaker (VCB) yard
Source of data:	Daily generation from individual cluster meter is recorded by EIL and is provided to GEDA on monthly basis.
Description of measurement methods and procedures to be applied:	The WTGs of the individual project owners at a particular site connect to a cluster meter at the VCB metering yard. Each project owner have exclusive cluster meter at VCB metering yard.
Frequency of monitoring/recording:	Continuous monitoring and monthly recording
Value monitored:	3,56,50,942.000
Monitoring equipment:	Please refer Annexure - 2
QA/QC procedures to be applied:	Calibration of all the cluster meters are carried out at least once in three years in accordance with the PPA and all faulty meters will be duly replaced. During current monitoring period no

	meter found faulty, so meters are not replaced. The ASW CDM co-coordinator oversee that the calibration is done as per the appropriate time frequency and proper procedures as mentioned in the PDD.
Calculation method:	Not Applicable
Any comment:	The data will be archived for the entire crediting period plus two years.

Data Unit / Parameter:	$EG_{cluster\ meter,\ Import}$
Data unit:	kWh
Description:	Electricity import recorded at the 0.2s accuracy class cluster meter at the Vacuum Circuit Breaker (VCB) yard
Source of data:	Daily generation from individual cluster meters is recorded by EIL and is provided to GEDA on monthly basis.
Description of measurement methods and procedures to be applied:	The WTGs of the individual project owners at a particular site connect to a cluster meter at the VCB metering yard. Each project owner have exclusive cluster meters.
Frequency of monitoring/recording:	Continuous monitoring and monthly recording
Value monitored:	16,643.000
Monitoring equipment:	Please refer Annexure - 2
QA/QC procedures to be applied:	Calibration of the cluster meters are carried out atleast once in three years in accordance with PPA and all faulty meters will be duly replaced. During current monitoring period no meter found faulty, so meters are not replaced. The ASW CDM coordinator oversee that the calibration is done as per the appropriate time frequency and proper procedures as mentioned in the PDD.
Calculation method:	Not Applicable
Any comment:	The data will be archived for the entire crediting period plus two years.

Data Unit / Parameter:	$EG_{GETCO,\ Export}$
Data unit:	kWh
Description:	Net Electricity export recorded at 0.5s & / or 0.2s accuracy class GETCO meter at the EIL Bhogat

	Substation
Source of data:	Joint Meter Reading (JMR)
Description of measurement methods and procedures to be applied:	The meter reading is taken jointly by the representatives of EIL and GEDA/GETCO in the form of JMR at the Bhogat Substation
Frequency of monitoring/recording:	Continuous monitoring and monthly recording
Value monitored:	23,17,90,480.000
Monitoring equipment:	Please refer Annexure - 2
QA/QC procedures to be applied:	Calibration of the GETCO meter is carried out at least once in three years as per the PPA and all faulty meters will be duly replaced. The ASW CDM coordinator oversee that the calibration is done as per the appropriate time frequency and proper procedures as mentioned in the PDD.
Calculation method:	Not Applicable
Any comment:	The data will be archived for the entire crediting period plus two years.

Data Unit / Parameter:	$EG_{GETCO, Import}$
Data unit:	kWh
Description:	Net Electricity import recorded at 0.5s & / or 0.2s accuracy class GETCO meter at the EIL Bhogat Substation
Source of data:	Joint Meter Reading (JMR)
Description of measurement methods and procedures to be applied:	The meter reading is taken jointly by the representatives of EIL and GEDA/GETCO in the form of JMR at the Bhogat Substation.
Frequency of monitoring/recording:	Continuous monitoring and monthly recording
Value monitored:	1,04,968.000
Monitoring equipment:	Please refer Annexure - 2
QA/QC procedures to be applied:	Calibration of the GETCO meter is carried out at least once in three years as per the PPA and all faulty meters will be duly replaced. The ASW CDM coordinator oversee that the calibration is done as per the appropriate time frequency and proper procedures as mentioned in the PDD.
Calculation method:	Not Applicable
Any comment:	The data will be archived for the entire crediting period plus two years.

3.3 Description of the Monitoring Plan

Approved monitoring methodology ACM0002 (Version 12.3.0, EB 66, Annex 35) Sectoral Scope: 1, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", by CDM - Meth Panel is used to monitor the emission reductions.
EIL is the O&M contractor for the project activity. EIL is responsible for the maintaining all the monitoring data on behalf of ASW in respect of the project activity. EIL has implemented the management structure for managing the monitored data.

The approved monitoring methodology requires monitoring of the following:

- Electricity generation from the project activity; and
- Operating margin emission factor and build margin emission factor of the grid, where ex post determination of grid emission factor has been chosen

Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required. Further, wind based electricity generation is not associated with any kind of leakages.

The project activity will have exclusive cluster meters at the VCB metering yard(s) and the meter reading taken at this metering point will be provided by the representatives of EIL to GEDA. These meters are sealed by GEDA and also be calibrated atleast once in three years.

EIL substation at Bhogat has main meter(s) known as GETCO meters (also known as revenue meter) which are connected to the wind turbines installed by the Project Participant (through the PP"s cluster meters) and wind turbines installed by other project owners (through the other project owner"s cluster meters). Gujarat Electricity Development Authority (GEDA) apportions the net electricity supplied to the grid at the EIL substation at Bhogat to all the project owners after adjusting transmission loss using the cluster meter reading taken at VCB metering yard. GEDA provides this data to GETCO/SLDC who certifies the data and issues a monthly statement of share of electricity.

The net electricity generated by the project owners is provided by SLDC/GETCO in the form of a share certificate of electricity generated. The value of the net electricity generated by the project activity is taken directly by the Project Participant from the share certificate provided by SLDC/GETCO for calculation of emission reductions.

The GETCO meters at the EIL Bhogat Substation is of 0.5s & / or 0.2s accuracy class and are calibrated at least once in three years. If during meter testing the main meter at the EIL Bhogat substation is found beyond the permissible limit of error, the meter reading is taken from the GETCO meter located at the utility substation (at Bhatia) after addition of average historical transmission loss.

If during meter testing the cluster meter (0.2 accuracy class) at VCB metering yard is found beyond the permissible limit of error, the sum LCS meter readings located at each wind turbine of the project activity is provided to GEDA for purpose of apportioning net electricity supplied to the grid.

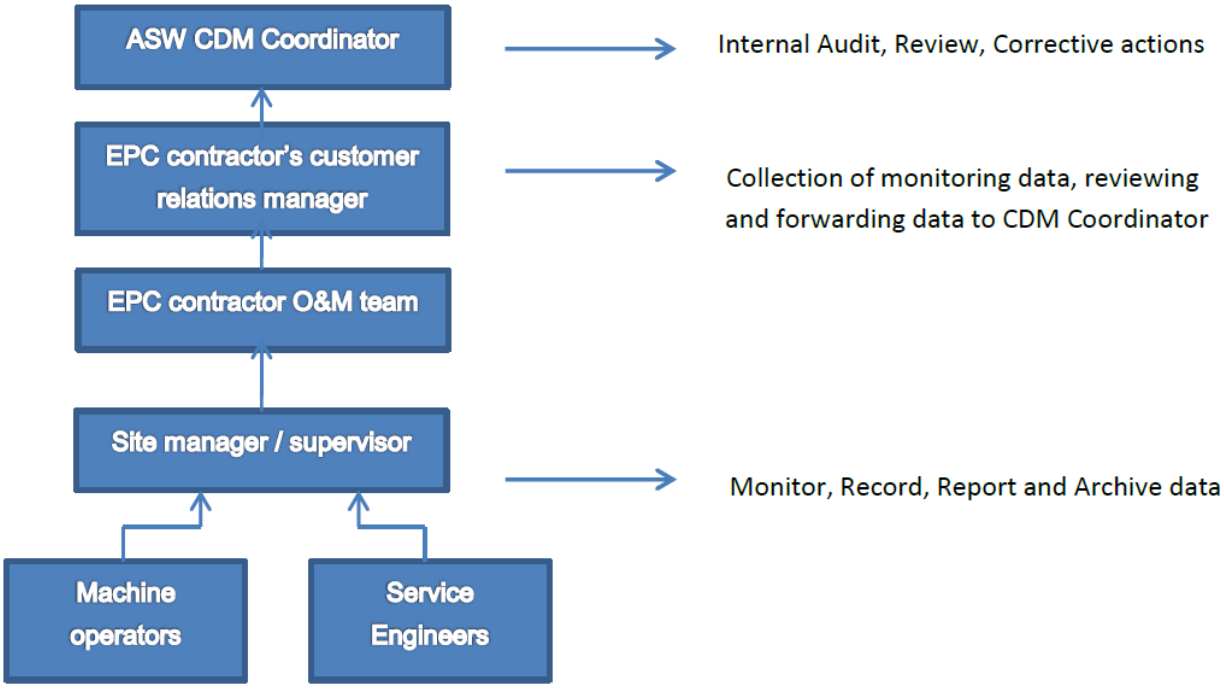
The Project is operated by EIL (O&M contractor for the project activity) and managed by the PP. The operational and maintenance contract for the project is with EIL. EIL is an ISO 9001:2008 certified Quality Management system from Germanischer Lloyd. EIL follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

The accuracy of monitoring parameter is ensured by adhering to the calibration and testing of the metering equipment. EIL is Operation and Maintenance contractor for the project activity and provides the daily generation report to the Project Participant. The Project Participant also maintains the records of daily generation report and joint meter report.

Training and maintenance requirements:

Training on the machine is an essential pre-requisite, to ensure necessary safety of man and machine. Further, in order to maximize the output from the Wind Turbine Generators (WTGs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that EIL"s service staffs are deft at handling technical snags on top of the turbine, the necessity of ensuring that they are capable of climbing the tower with absolute ease and comfort has been established. The EIL Training Academy provides need-based training to meet the training requirements of EIL projects. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. This ultimately leads to creativity in problem solving.

Organization structure, responsibilities and competencies:



Monitoring Procedure:

The procedures for metering is as per the provisions of the power purchase agreement. The WTGs of a single customer in this case ASW are divided into clusters and each cluster has dedicated metering system. Different clusters are connected to different Vacuum Circuit Breaker metering yards (VCB) which ultimately lead to the shared & sealed main GETCO meter (also

known as revenue meter) at the EIL Bhogat substation maintained by EIL. Data monitoring takes place at the cluster metering points and GETCO main meter at the EIL Bhogat substation.

The net electricity supplied to the grid by the wind farm is calculated by Gujarat Energy Development Agency (GEDA) and certified by State Load Dispatch Centre SLDC (GETCO) on the basis of GETCO main meter reading and the meter readings taken at individual cluster meters after adjusting transmission loss. For adjustment of transmission loss, the electricity metered at the GETCO meter is proportionally divided by GEDA among the customers connected to the revenue meter on the basis of the pro rata readings taken at the cluster meters metering points connected to the Bhogat Substation.

The net electricity generated by this project activity is taken directly from the share certificate issued by SLDC/GETCO on monthly basis.

The meter reading at EIL substation is taken jointly by the representatives of EIL and GEDA/GETCO EIL in the form of JMR. The electricity from EIL's substation is finally supplied to the utility's substation at Bhatia. The net electricity generated by the project owners is provided by SLDC/GETCO in the form of a share certificate.

Frequency of meter reading

The meter reading at the individual WTGs, Cluster meter and main meter at GETCO Bhogat substation is recorded on a monthly basis.

Data collection

- The meter reading of the main meter at the GETCO Bhogat substation and the cluster meters at VCB metering yard of the project activity is taken each month.
- The SLDC/GETCO share certificate which is the source of the data for emission reduction calculation is available at the wind farm site office, as well as at ASW's office.
- In addition, the LCS meter reading is recorded continuously by the online monitoring system provided by EIL. All the monitored data is recorded and filed electronically and in hard format for 2 years beyond the crediting period or last issuance whichever is later.
- The CDM co-ordinator of ASW is responsible for overall review of the monitoring process, including collection of the monthly SLDC/GETCO certificates and ensuring quality of data.

Data archiving

Data is archived electronically. The data would be archived two years after crediting period or last issuance whichever is later.

Meter Testing

- Main meter at EIL Bhogat Substation is tested and calibrated atleast once in three years as per the PPA.
- If during meter testing the main meter at the EIL substation (at Bhogat) is found beyond the permissible limit of error, the meter reading is taken from the main meter located at the utility (GETCO) substation at Bhatia after addition of average historical transmission losses. During current monitoring period the main meter at EIL substation is not found beyond the permissible limit of error.

- The main meter at utility substation at Bhatia is also calibrated atleast once in three years by utility.
- All cluster meters connected to the EIL Bhogat substation is calibrated atleast once in three years as per PPA.
- If during meter testing, any cluster meter is found beyond the permissible limit of error, the sum of LCS meter reading located at each wind turbine of that cluster is provided to GEDA for purpose of apportioning net electricity supplied to the grid. During current monitoring period the cluster meter is not found beyond the permissible limit of error.
- The LCS meters do not require calibration as the energy readings of electricity generated at the LCS meter is cross verified by the energy calculated by inverting system installed in the WTGs. In case there is any mismatch in the energy values recorded by the LCS meter and the energy values calculated by the inverting system; the machine will stop working and generate the error report
.
- Billing for the failure Period will be adjusted from the month preceding test.

Emergency Preparedness

During the calibration if the cluster meter at the VCB metering yard or the Bhogat substation is found to be outside the permissible limit of error then the meter will be replaced immediately. The error is applied to the monitored data from the date of last calibration. During current monitoring period cluster meter at VCB metering yard is not found outside or beyond the permissible limit of error, so there is no meter replacement take place.

Routine Maintenance Services:

Routine maintenance labor work involves making available suitable manpower for operation and maintenance of the equipment and covers periodic preventive maintenance, cleaning and upkeep of the equipment. Technical assistance including checking of various technical, safety and operational parameters of the equipment, trouble shooting and relevant technical services.

Apportioning mechanism followed by GEDA

Transmission losses are incurred from the cluster meters to the GETCO metering point at the Bhogat Substation. The electricity sent out to the GETCO substation meter is lesser than the sum of the electricity generated by all the cluster meters connected to the substation. Therefore, for adjustment of transmission loss, the electricity metered at the GETCO (revenue) meter is proportionally divided by GEDA among the customers connected to the revenue meter on the basis of the pro rata readings taken at the cluster meters metering points connected to the meter
Based on the generation recorded in the monthly JMR reports of the primary metering points at the Bhogat substation and the power generation recorded from each of the cluster meters at the VCB metering yards, the transmission losses are proportionally divided to all the cluster meters by GEDA. GEDA provides this apportioned data to GETCO/SLDC and GETCO/SLDC issues monthly share certificates for each individual cluster meter.

This accounts for the transmission losses incurred from the cluster meter to the substation meter. The GETCO/SLDC share certificates are taken as the basis for net electricity supplied to the grid by this project activity.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the approved methodology ACM0002 (Version 12.3.0, EB 66, Annex 35) Emission Reductions are calculated as:-

$$\mathbf{ER_y = BE_y - PE_y}$$

Where:

$BE_{y=}$ Baseline Emissions in year *y* (t CO_2e/yr)
PE_y = Project Emissions in year *y* (t CO_2e/yr)

Estimation of Baseline Emissions:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$\mathbf{BE_y = EG_{PJ,\,y} * EF_{grid,\,CM,\,y}}$$

Where:

BE_y = Baseline emissions in year *y* (tCO_2/yr)

$EG_{PJ,y}$ = 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/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)

Since the project activity is the installation of a new grid connected renewable power plant the $EG_{PJ,y}$ is calculated as :

$$\mathbf{EG_{PJ,y} = EG_{facility,y}}$$

Where:

$EG_{PJ,y}$ = 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/yr)

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

The project activity is in the state of Gujarat which falls under NEWNE grid, baseline emission factor is calculated as combined margin, consisting of a combination of operating margin and build margin factors according to the procedures prescribed in the latest tool for calculating the emission factor for an electricity system.

4.2 Project Emissions

The project activity involves harnessing of wind energy and its conversion to electricity. Hence according to ACM0002 (Version 12.3.0, EB 66, Annex 35), there will be zero project emissions in the project activity

PEy = 0

4.3 Leakage

As per ACM0002 (Version 12.3.0, EB 66, Annex 35), zero leakage has been considered for the calculation of emission factor
LEy =0.

4.4 Summary of GHG Emission Reductions and Removals

$\mathbf{BE_y = EG_{PJ,\,y} * EF_{grid,\,CM,\,y}}$
= 34,721.073 * 0.9225
= 32,030 (Value is rounded down, please refer ER calculation sheet for the same)

According to the approved methodology ACM0002 (Version 12.3.0, EB 66, Annex 35) Emission Reductions are calculated as:-

$\mathbf{ER_y = BE_y – PE_y}$
= 32,030 – 0
= 32,030 tCO_2e

Vintage wise break up of generated VCU's:

Sr. No.	Vintage from 07/06/2011 to 31/12/2011 (tCO_2e)	Vintage from 01/01/2012 to 29/02/2012 (tCO_2e)
1	21,947	10,083

5 ADDITIONAL INFORMATION

The emission reduction in this monitoring period briefly illustrated in following table:

Monitoring Period	Total Baseline Emissions (tCO_2 e)	Total Project Emission	Total Leakage (tCO_2e)	Total Emission Reduction (tCO_2e)
07/06/2011 to 29/02/2012 (first and last days included)	32,030	0	0	32,030

Emission reduction calculation table:

Detailed emission reduction calculation table is provided in separate excel sheet.

Annexure - 1

Technical Specifications (E 53):

Turbine model	Enercon E- 53
Rated power	800 KW
Rotor diameter	53 m
Hub height	75 m
Turbine Type	Direct driven, horizontal axis wind turbine with variable rotor speed
Power regulation	Independent pitch system for each blade
Cut in wind speed	3 m/s
Rated wind speed	12.6 m/s
Cut out Wind speed	28 m/s
Extreme Wind Speed	59.5 m/s
Rated rotational speed	29 rpm
Operating range rot. speed	11-29.5 rpm
Orientation	Upwind
No of Blades	3
Blade Material	Fiber Glass Epoxy reinforced
Gear box type	Gear less
Generator type	Synchronous generator
Braking	Aerodynamic
Output Voltage	400 V
Yaw System	Active yawing with 4 electric yaw drives with brake motor
Tower	74 m concrete

Annexure - 2

Details of the Meters:

Cluster Meter Details:

Meter Serial number	Type	Accuracy class	Calibration frequency	Date of last calibration	Validity till
GJU-61703	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-61697	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-62452	Secure Make	0.2s	Once in three year	05/07/2011[3]	04/07/2014
GJU-64391	Secure Make	0.2s	Once in three year	24/12/2011	23/12/2014
GJU-62455	Secure Make	0.2s	Once in three year	05/07/2011	04/07/2014
GJU-62456	Secure Make	0.2s	Once in three year	05/07/2011	04/07/2014
GJU-61683	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-61686	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-61324	Secure Make	0.2s	Once in three year	16/12/2010	15/12/2013
GJU-62458	Secure Make	0.2s	Once in three year	05/07/2011	04/07/2014
GJU-62462	Secure Make	0.2s	Once in three year	30/06/2011	29/06/2014
GJU-62466	Secure Make	0.2s	Once in three year	30/06/2011	29/06/2014
GJU-64393	Secure	0.2s	Once in three year	24/12/2011	23/12/2014

[3] For all the meters that are having meter calibration date after the start date of crediting period i.e. 07/06/2011; all these meters are manufactured in year 2011 so the previous calibration is not possible. Email received from Wind World India (i.e. Previously Enercon) is submitted herewith revised MR for verification.

	Make				
GJU-61704	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-61687	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-61695	Secure Make	0.2s	Once in three year	29/01/2011	28/01/2014
GJU-60940	Secure Make	0.2s	Once in three year	03/09/2010	02/09/2013
GJU-61329	Secure Make	0.2s	Once in three year	16/12/2010	15/12/2013

Substation / GETCO meter details:

Meter Serial number	Type	Accuracy class	Calibration frequency	Date of last calibration	Validity till
GJB00486	Secure Make	0.5s	Once in three year	23/11/2010	22/11/2013
GJU60938	Secure Make	0.2s	Once in three year	15/06/2011	14/06/2014
GJU07452	Secure Make	0.2s	Once in three year	23/11/2010	22/11/2013

Annexure – 3

Machines shut down details:

Sr. No.	Equipment	Fault Detail	Fault start Date	Fault Start Time (Hour:Min :Sec)	Fault End Date	Fault end Time (Hour:Min :Sec)	Downtime (Hour:Min: Sec)
1	GO-05	Fault capacitor charging error	24.06.2011	15:30:00	24.06.2011	19:30:00	04:00:00
2	CH-05	Fault wind measurement	26.06.2011	08:00:00	26.06.2011	19:40:00	11:40:00
3	CH-05	Fault for capacitor charging error	27.06.2011	10:05:00	27.06.2011	21:30:00	11:25:00
4	CH-02	Fault pitch control error	27.06.2011	00:00:00	27.06.2011	15:30:00	15:30:00
5	GO-02	Fault capacitor charging error	28.06.2011	00:00:00	28.06.2011	13:00:00	13:00:00
6	GO-05	Fault feeding	28.06.2011	12:00:00	28.06.2011	18:00:00	06:00:00
7	GO-01	Fault feeding	29.06.2011	09:00:00	29.06.2011	15:00:00	06:00:00
8	CH-01	Fault mains failure	30.06.2011	21:19:00	01.07.2011	04:24:00	07:05:00
9	CH-02	Fault capacitor charging error	03.07.2011	03:47:00	03.07.2011	12:27:00	08:40:00
10	CH-05	Fault pitch control error	07.07.2011	00:00:00	08.07.2011	23:59:59	24:00:00
11	GO-11	Fault emergency stop capacitor	08.07.2011	00:00:00	08.07.2011	10:00:00	10:00:00
12	GO-11	Fault emergency stop capacitor	11.07.2011	12:00:00	11.07.2011	19:00:00	07:00:00
13	GO-11	Fault excitation error	12.07.2011	13:00:00	12.07.2011	17:30:00	04:30:00
14	CH-05	Fault turbine control bus error	14.07.2011	07:30:00	14.07.2011	19:05:00	11:35:00
15	CH-05	Fault turbine control bus error	17.07.2011	00:00:00	17.07.2011	19:00:00	19:00:00
16	CH-05	Fault pitch control error	19.07.2011	11:20:00	19.07.2011	18:10:00	06:50:00
17	CH-05	Fault turbine control bus error	20.07.2011	05:25:00	20.07.2011	13:30:00	08:05:00
18	CH-05	Fault turbine control bus error	21.07.2011	07:45:00	21.07.2011	19:00:00	11:25:00
19	CH-05	Fault capacitor charging error	23.07.2011	04:00:00	23.07.2011	11:25:00	07:25:00
20	CH-05	Fault pitch control error	25.07.2011	07:00:00	25.07.2011	21:45:00	14:45:00
21	CH-05	Fault pitch control error	25.07.2011	07:00:00	25.07.2011	21:45:00	14:45:00
22	GO-05	Fault excitation error	25.07.2011	18:10:00	27.07.2011	18:00:00	46:50:00
23	CH-05	Fault turbine control bus error	01.08.2011	06:00:00	01.08.2011	19:00:00	13:00:00

24	OK 744	Fault wind measurement	03.08.2011	14:00:00	03.08.2011	18:00:00	04:00:00
25	CH-05	Fault pitch control error	06.08.2011	00:00:00	06.08.2011	17:45:00	17:45:00
26	CH-15	fault turbine control bus error	12.08.2011	13:00:00	12.08.2011	17:50:00	04:50:00
27	OK 744	Fault emergency stop capacitor	15.08.2011	08:30:00	15.08.2011	18:30:00	10:00:00
28	JO-45	fault speed sensor error	16.08.2011	17:00:00	16.08.2011	21:00:00	04:00:00
29	GO-11	emergency stop 75'- 1117033	24.08.2011	00:00:00	24.08.2011	13:00:00	13:00:00
30	CH-03	fault Torque monitoring	03.09.2011	19:30:00	03.09.2011	23:30:00	04:00:00
31	OK 744	Pitch control error	18.10.2011	06:50:00	18.10.2011	18:20:00	11:30:00
32	GO-08	Turbine control bus error	23.10.2011	06:00:00	26.10.2011	19:00:00	61:00:00
33	OK 745	Turbine control bus error	01.11.2011	08:10:00	01.11.2011	14:10:00	06:00:00
34	GO-02	Yaw inverter	10.11.2011	10:50:00	10.11.2011	17:50:00	07:00:00
35	VG 416	Fault capacitor charging error	02.12.2011	11:50:00	02.12.2011	23:59:00	12:09:00
36	VG 414	Fault blade load control	02.12.2011	14:00:00	02.12.2011	18:00:00	04:00:00
37	VG 416	Battery charging error	03.12.2011	22:00:00	04.12.2011	02:45:00	04:45:00
38	VG 416	BATTERY CHARGING ERROR	04.12.2011	07:40:00	04.12.2011	11:55:00	04:15:00
39	JO-58	Feeding Fault	10.12.2011	00:00:00	10.12.2011	21:35:00	21:35:00
40	JO-58	Turbine control bus error (Bus-Off)	15.12.2011	06:20:00	15.12.2011	22:30:00	16:10:00
41	GO-06	Mains failure	17.12.2011	15:00:00	17.12.2011	23:59:00	08:59:00
42	VG 416	Air gap monitoring	19.12.2011	18:35:00	19.12.2011	23:35:00	05:00:00
43	VG 415	Capacitor charging error	19.12.2011	06:00:00	19.12.2011	12:30:00	06:30:00
44	JO-74	Timeout angle encoder	28.12.2011	10:30:00	28.12.2011	15:20:00	04:50:00
45	JO-58	Battery charging error	29.12.2011	21:15:00	30.12.2011	04:00:00	06:45:00
46	JO-58	Battery charging error	29.12.2011	21:15:00	30.12.2011	04:00:00	06:45:00
47	JO-74	Speed sensor error	01.01.2012	11:20:00	01.01.2012	19:15:00	07:55:00
48	GO-06	Yaw control fault	10.01.2012	06:30:00	10.01.2012	13:00:00	06:30:00
49	JO-74	Data bus error (Timeout)	12.01.2012	05:20:00	12.01.2012	19:15:00	13:55:00
50	OK 746	Fault emergency stop capacitor	17.01.2012	09:45:00	17.01.2012	18:08:00	08:23:00
51	OK 746	Fault emergency stop capacitor	20.01.2012	12:11:00	20.01.2012	16:58:00	04:47:00
52	VG 424	Speed sensor error	20.01.2012	09:34:00	20.01.2012	17:52:00	08:18:00

53	HA 552	Feeding fault	22.01.2012	00:00:00	22.01.2012	13:36:00	13:36:00
54	HA 551	Capacitor charging error	22.01.2012	08:07:00	22.01.2012	15:20:00	07:13:00
55	OK 745	Fault emergency stop capacitor	23.01.2012	12:10:00	23.01.2012	16:32:00	04:22:00
56	VG 422	Semiconductor fuse blown	24.01.2012	11:21:00	24.01.2012	15:32:00	04:11:00
57	JO-74	Battery charging error	26.01.2012	01:31:00	26.01.2012	12:14:00	10:43:00
58	GO-03	Fault emergency stop capacitor	26.01.2012	04:30:00	26.01.2012	19:00:00	14:30:00
59	CH-01	Battery charging error	26.01.2012	04:24:00	26.01.2012	11:30:00	07:06:00
60	JO 750	Yaw control fault	27.01.2012	12:25:00	27.01.2012	18:00:00	05:35:00
61	VG 414	Fault emergency stop capacitor	27.01.2012	08:00:00	27.01.2012	17:03:00	09:03:00
62	OK 745	Fault emergency stop capacitor	30.01.2012	12:26:00	30.01.2012	20:28:00	08:02:00
63	GO-03	Battery charging error	03.02.2012	06:56:00	03.02.2012	13:39:00	06:43:00
64	KU 742	Fault emergency stop capacitor	04.02.2012	01:00:00	04.02.2012	16:10:00	15:10:00
65	GO-05	Fault emergency stop capacitor	04.02.2012	10:43:00	04.02.2012	18:57:00	08:14:00