MONITORING REPORT

Version 1, 30/01/2009

Alembic Limited

5 MW Wind Power Project of Alembic Ltd at Bhavnagar, Gujarat, India

Reference No. UNFCCC: 1456

Monitoring Period: 7th February, 2008 to 24th December, 2008

PROJECT LOCATION
Ukharla Trambak, Bhavnagar District
Gujarat

Alembic Limited
Alembic Road
Vadodra- 390003
Gujarat, India
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January 2009

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1. Title of the Project

Title: 5 MW Wind Power Project of Alembic Ltd at Bhavnagar, Gujarat, India.

Date of Registration: 7th February, 2008

2. Introduction

The purpose of the monitoring report is to calculate the Greenhouse Gas (GHG) emission reductions achieved by the project activity for periodic verification.

This is the first monitoring report and covers the activity from 07/02/2008 to 24/12/2008. As per registered PDD the start date of the project activity was 08/07/2003 and the crediting period starts from 07/02/2008[1] which is the date of registration of the Project. The CERs for 7th to 24th February 2008 period are claimed based on apportioning method.

3. Reference

3.1. Sectoral Scope

Category 1: Energy industries (renewable - / non-renewable sources)

3.2. Approved Baseline Methodology

The name of the approved baseline methodology applied to the project activity is: *"Grid connected renewable electricity generation", AMS 1D. (Version 11) dated 18th May 2007.*

3.3. Approved Monitoring Methodology

The name of the approved monitoring methodology applied to the project activity is: *"Grid connected renewable electricity generation", AMS 1D. (Version 11) dated 18th May 2007.*

3.4. Project Design Document

Title: 5 MW Wind Power Project of Alembic Ltd at Bhavnagar , Gujarat, India

[1] http://cdm.unfccc.int/Projects/DB/RWTUV1196336030.26/view

Version: 04

Date: 02nd November 2007

4. Project Description

4.1 Project Activity

The Project activity is generating 5 MW of electricity with efficient utilization of the available wind energy through adoption of the latest, efficient and modern technology. The generated electricity will displace equivalent electricity procured from Gujarat Urja Vikas Nigam Limited (GUVNL) in the Vadodara plant, the entire amount of electricity generated is used to displace an equivalent amount of electricity from the Vadodara plant, as per the Alembic Limited's requirements.

M/S Alembic Ltd., Vadodara would have the ownership rights for the project activity and would be the sole transaction entity with the Executive Board of the United Nations Framework Convention on Climate Change. The 5 MW Wind Power Project comprises of Wind Energy Generators (4 WEG's) each of capacities 1.25. MW supplied by M/S Suzlon Energy Ltd.

:

Table 1: Details of Wind Power Plant

Name of Project Participants	**No of Wind Generators**	**Capacity (MW)**
Alembic Limited (Private Entity)	**4**	**1.25**

Project Participants

The project participants is:

- Alembic Limited (Private Entity)

Project Location

The project site is located at Ukharla Trambak in the district of Bhavnagar and in the Indian state of GUJARAT. Bhavnagar is approximately at 250 kms from AHMEDABAD. The site Ukharla has a latitude and longitude of around 21° 34´ 23.2´´ N & 72° 05´ 52.1´´ E respectively. It is located at approximately 225 meters from the mean sea level. These sites have been identified as ideally suited for wind power generation based on the studies and data analysis carried out by eminent agencies like M/S Suzlon Energy Ltd. The feasibility of these sites for wind power production has been established by Ministry of Non Conventional Energy Sources, Govt. of India.

Sr.No	Turbine	Survey Number as per Power Wheeling Agreement with GETCO
1	S4	46/P1
2	S5	30/P1
3	S6	30/P2
4	S7	30/P3

Technology Employed

Alembic has procured the Wind Energy Generators (WEGs) from Indian company M/S. Suzlon Energy Ltd. The technology is a clean and safe technology since there are no GHG emissions associated with the electricity generation. A direct grid-connected high-speed horizontal axis generator, in combination with the multiple-stage combined spur / planetary gearbox delivers harmonics-free and grid-friendly power. The technical details of the WEG are as follows:

Operating Data	**S.64/1250 (50 Hz)**
Rotor diameter	64m
Hub height	65m (Variable as per requirement)
Installed elec. Output	1250 kW

Cut-in wind speed	3 m/s
Rated wind speed	12 m/s
Cut-out wind speed	25 m/s
Survival wind speed	67 m/s

Rotor	**S.64/1250 (50 Hz)**
Swept area	3217 m^2
Blade type	3 blade horizontal axis
Rotational speed	13.9/20.8 rpm

Generator	**S.64/1250 (50 Hz)**
Type	Asynchronous 4/6 poles
Rated output	250/1250 kW
Rotational speed	1006/1506 rpm
Frequency	50 Hz

Gearbox	**S.64/1250 (50 Hz)**
Type	Integrated (1 planetary & 2 helical)
Ratio	74.917 :1

Yaw System	**S.64/1250 (50 Hz)**
Drive	4 electrical driven planetary gear box
Bearings	Polyamide slide bearings

Braking System	**S.64/1250 (50 Hz)**
Aerodynamic brake	3 independent systems with blade pitching
Mechanical brake	Hydraulic fail-safe disc brake system

Control Unit	**S.64/1250 (50 Hz)**
Type	Programmable microprocessor-based; high speed data communication, active multilevel security, sophisticated operating software, advance data collection remote monitoring & control option, UPS back up, Real time operation indication

Tower	**S.64/1250 (50 Hz)**
Type	Lattice / Tubular, Hot Dip Galvanized, Epoxy / PU coated

Erection	**S.64/1250 (50 Hz)**
Type	With Crane

4.5 Project Boundary

As per the methodology, "*the project boundary encompasses the physical, geographical site of the renewable generation source*".

In this project the project boundary would include the WEGs, main transformer, transmission lines and sub station western region grid (Presently integrated into NEWNE Grid) and the power receiving plant.

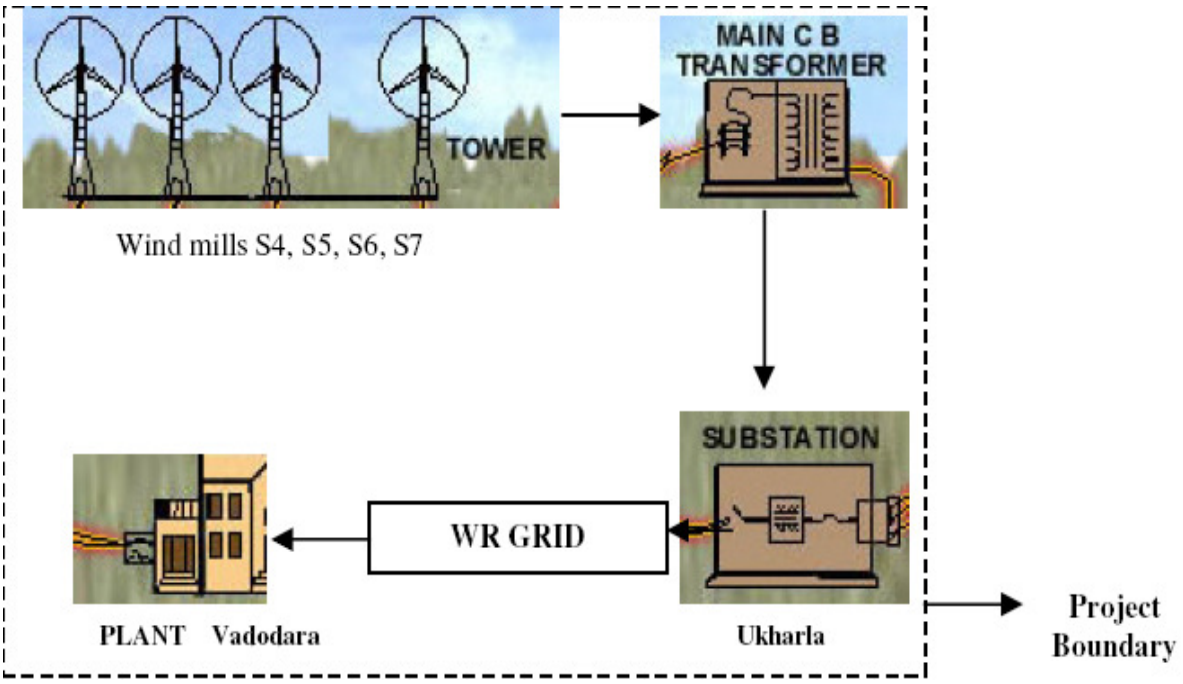


Figure 2: Pictorial Representation of Project Boundary

5.0 Statement to what extent the project has been implemented as planned

The Project has been completed as planned and described in the Project Design Document (PDD).

The purpose of the project is to generate electricity by wind energy which is clean form of energy. The details for all the towers are given in Table below:

Table 2: Commissioning date of each tower

Sr. No.	Company	Tower	Commissioning date
1	Alembic Limited	**S-4**	**02/01/2003**
		S-5	**30/09/2003**
		S-6	**30/09/2003**
		S-7	**30/09/2003**

The feeder details (meter) of individual towers and its accuracy class has been given below in Table 3.

Table 3: Feeder Details for Individual Towers:

Wtg No	Present feeder	Accuracy Class	Calibration Date
S4,S5,S6,S7 (33 KV Secure meter at Alembic)	GJBO 1389	0.2 S	25.11.08
(66 KV Secure meter of M/S GETCO)	GJB 00265	0.5 S	18.01.08

Therefore there are no chances of overlapping of the generation values in this case and in effect no double accounting of emission reduction. The billing cycle of the individual towers have been included in the emission reduction sheet.

Testing of GEDA energy meter by GETCO Representatives

Calibration Report for 66 Kv Ukhrala Sub Station	Lab Ref No :	Calibration Date
UKHARLA	BRD A 0406014	25-11-08

S4,S5,S6,S7 (33 KV Secure meter at Alembic)	Lab Ref No :	Calibration Date
UKHARLA	PE/07-08/28/12A	18-01-2008 (New Meter)

Apportioning Procedure for 07/02/2008 to 24/02/2008.

The monitoring plan of registered PDD requires monthly generation reading from generation report from GEDA. The monitoring period requires apportioning of CERs for period between 07/02/2008 to 24/02/2008.

07/02/2008 to 24/02/2008: X

Generation at controller (kwh)

(24th January to 24th February 2008)

Total Generation: Y

At controller (kwh)

% Generation for 07/02/08 to : Z

24/02/08 period generation (%)

Generation as per GEDA : G

Generation report (kwh)

(07/02/2008 to 24/02/2008) as per GEDA: G * Z /100

Generation report used for emission reduction

Calculations (Kwh)

Calculation for S-4, S-5, S-6, S-7 (GEDA Report Ref No):- (GEDA/PBR/PVT – WF/2008/677)

Parameter	**Net Export (KWh)** Towers S4,S5,S7,S6
Generation at Controller (7th Feb 2008 to 24th Feb 2008) (KWh)	5,66,068
Total generation at Controller (24th January to 24th February 2008) (KWh)	8,12,148
Percentage generation (07/02/2008 to 24/02/2008)	69.70
GEDA Generation Report reading for whole month (KWh)	785,042
Generation as per GEDA Report (07/02/2008 to 24/02/2008) (KWh)	**5,47,175**

Net Exported to the Grid (Gujarat Energy Transmission Co. Ltd) (GETCO) :

Months	**Alembic Limited**
Ukhrala & Trambak	**Net Export(Kwh)**
Feb -08 (07/02/08 to 24/02/08)	547,175
March-08	731,848
April -08	618,840
May -08	1,210,519
June -08	1,610,708
July-08	1,278,905
Aug-08	1,217,963
Sep-08	840,696
Oct-08	221,201
Nov-08	519,843
Dec-08	680,887
Total	9,478,585

7.0 Monitoring Methodology and Plan

Table 4: Data to be monitored

Data / Parameter:	EGy
Data unit:	MWh
Description:	Net units of electricity substituted in the grid during the year y.
Source of data used:	Joint Meter readings
Value of data	**9,478.584**
Description of measurement methods and procedures to be applied:	Monitoring: Trivector meter will be used for monitoring Data Type: measured Frequency: hourly measured Recording: Monthly from joint meter Archiving Policy: Paper & Electronic Responsibility: Manager (Wind Project) would be responsible for regular calibration of the meter. Calibration Frequency: Once a year.
QA/QC Procedures to be applied	Yes, Quality Management System will be used and the same procedures would be available at the project site. The net electricity exported to the grid can be cross verified with the sales receipts received by electricity board.
Any comments	Data archived: Data will be archived for two years after the end of crediting period or of the last issuance of CERs for this project activity, whichever occurs later

The allocation of electricity is executed as per the following procedure:

1. Enter the value of electricity received from W/M at 33 KV (kWh).

2. Enter the value of electricity supplied to W/M at 33 KV (kWh).

3. Take the difference of electricity received and supplied to W/F at 33 KV (kWh).

4. Take the total of difference calculated as per step 3.

5. Divide individual difference by total calculated as per step 4 and multiply by 100 to find %.

6. Enter the value of electricity received from W/M at 66 KV (kWh).

7. Enter the value of electricity supplied to W/M at 66 KV (kWh).

8. Take the difference of electricity received and supply to W/F at 66 KV (kWh).

9. Multiply the value calculated as per step 8 by % allocation calculated as per step 5.

8.0 Quality Assurance (QA)/Quality Control (QC) Plan

Quality control and quality assurance mechanisms for the monitored data have been followed as mentioned in the registered PDD.

Measures to ensure the Results / uncertainty analysis

Monitoring and Calibration

As emission reductions from the project are determined by the number of units exported to the grid, it is mandatory to have a monitoring system in place and ensure that the project activity produces and exports. the rated power at the stipulated norms. The sole objective of having monitoring system is to have a constant watch on the emission reductions.

The delivered energy shall be metered by Suzlon and state electricity board at the high voltage side of the step up transformers. Metering is done either for two /three / more wind mills depending on the location of wind mills and service connection number. Metering equipment is electronic trivector meters. The metering equipment is maintained in accordance with electricity standards and has the capability of recording hourly and monthly readings. Records of joint meter reading are maintained at site and a copy is maintained at the head office. All the meters shall be tested for accuracy every calendar year with reference to a portable standard meter. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. Necessary records of calibration are maintained by state electricity board.

Monitoring Plan:

The sole objective of having a monitoring system is to have a constant watch on the emission reductions. The delivered energy will be metered by Alembic Ltd., Vadodara; Gujarat Energy Development Agency,

Porbandar; GETCO (66 KV S/S), Bhav Nagar; and PGVCL, Mamsa at the high voltage side of the step up transformer installed at the receiving station. Metering equipment shall be electronic trivector meters. The metering equipment shall be maintained in accordance with electricity standards and have the capability of recording half-hourly and monthly readings, which in turn are produced to Alembic Ltd., Vadodara. The meters installed should be capable of recording and storing the parameters for a minimum period of 35 days with digital output. The

monthly meter readings at the project sites and the receiving station shall be taken simultaneously and jointly by the parties. At the conclusion of each meter reading, an appointed representative of GETCO (66 KV S/S), Bhav Nagar, PGVCL Mamsa and Gujarat Energy Development Agency, Porbandar will sign a document indicating the number of kilowatt-hours indicated by the meter. Each meter shall be jointly inspected and sealed on behalf of GETCO (66 KV S/S), Bhav Nagar, PGVCL Mamsa and Gujarat Energy Development Agency, Porbandar, in the presence of its authorized representatives.

All the Main and Check meters shall be tested for accuracy every calendar year with reference to a portable standard meter. As the instruments are calibrated and marked at regular intervals, the accuracy of measurement can be assured at all times. To ensure accurate and continuous monitoring, Alembic Ltd. has a standby meter, calibrated by an authorised agency.

Roles & Responsibilities

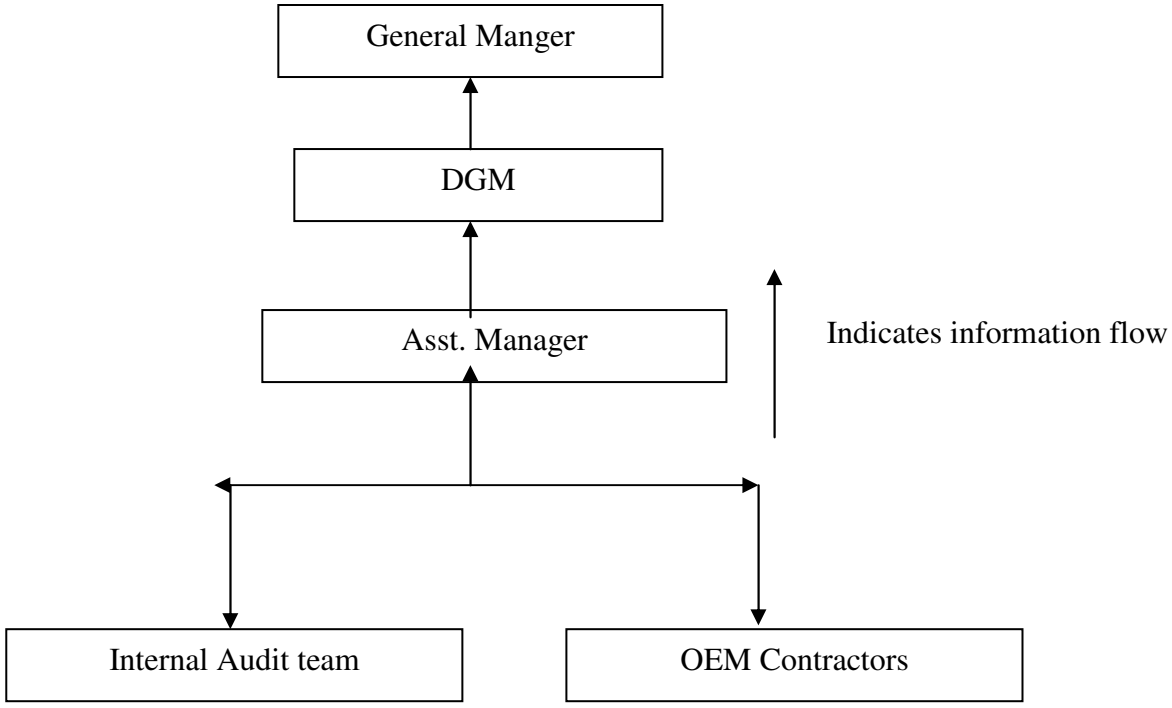
Total electricity exported is the most important parameter required for the financial reporting and sustainability of the project and monitored with due care by both the parties (project proponents and GEDA). For emission reductions project proponents proposes the following structure.

General Manager: In the project management structure General Manager is responsible for the project management. He is responsible to plan and allocate the annual budget for operation, estimation of the likely operating cost, electricity dispatch, organizing third party contractors, revenue collection etc. General Manager will check the monthly electricity generated and annual emission reduction calculations. He is responsible for any leakage of emissions in the project boundary. Operation and maintenance of wind generators will be done by Suzlon energy Limited and they will be responsible to General Manager.

Deputy General Manager: DGM is assisting to General Manager for completing the task discussed above. He is responsible for the electricity generations at the individual wind turbine installations. He will crosscheck the log book regularly and report to General Manager for any abnormality.

Sr. Executive/Ass Manager: Sr. Executive/asst. manger is responsible for recording the electricity meter reading.

Record Handling: OEM contractors are collecting daily report obtained from hourly monitoring with all the related parameters. All the records are given to General Manager every month. The GM has final responsibility for record keeping.



Internal Audits and performance review:

These records are regularly audited and checked by the senior officials from Alembic Limited during their visits to the site. The senior officials visit once in a year and audit the records. The officials will crosscheck the emissions reductions claimed in PDD with respect to actual emissions reduction. For any deviation from the actual emission reduction values and reported values corrective action will be suggested by senior official to calculate the conservative emission reduction. All corrective actions will be recorded in the logbook.

Table 5: Internal audit and performance review-Alembic limited

Sr.No.	**Month**	**Site Visit Dates**
1	November	22nd November 2008

8.0 GHG Calculations

8.1 Project Emission Calculations

The project uses wind energy only for power generation which leads to zero net GHG on-site emissions. Hence there is no net emission within the project boundary.

8.2 Baseline Emission Calculations

Baseline emissions will be calculated by multiplying the Net electricity exported to the grid with net baseline emission factor, as given in the PDD.

BEy = Net carbon emission factor of the grid x Net units exported to Grid

Where,

BEy – Baseline Emissions per annum (tones/year)

Baseline methodology for project category I.D has been detailed in paragraphs 7-11 of the approved small scale methodology AMS I.D. (Version 11, date: EB31) Paragraph 9 of the approved methodology applies to this project activity, which states that: 'For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build

margin (BM) according to the procedures prescribed in the approved methodology ACM0002.

Any of the four procedures to calculate the operating margin can be chosen, but the restrictions

to use Simple OM and the Average OM calculations must be considered.

OR

b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix.' Project proponent has opted for option (a) to calculate grid emission coefficient i.e Combined Margin (CM) consisting of the combination of operating margin (OM) and build margin (BM). CM has been estimated based on guidance in 'Baseline' section detailed between page no. 4 to page no. 10 of approved methodology ACM0002, Version 06.

Baseline emissions are calculated as the kWh produced by the renewable generating unit multiplied by an emission co-efficient for the Western region Grid, calculated in a

transparent and conservative manner. ACM0002 provides two options for calculation of grid emission co-efficient for such project activities: The baseline emission (BEy in tCO2) is the product of the baseline emission factor (EFy in tCO2/MWh) times the electricity supplied by the project activity to the grid (EGy in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities (EG baseline in MWh), as follows:

BEy = (EGy – EGbaseline) x EF,y

Since the following project does not involve any modification or retrofit of the existing generation facility hence EGbaseline = 0

EFgrid,y is determined as follows:

EFy = 0.75 x EF,OM + 0.25 x EF,BM,

Where

EF, OM, = Operating Margin Emission Factor

EF, BM = Build Margin Emission Factor

1. Calculation of operating margin emission factor for the region based on simple OM

For calculation of operating margin four options are available:

(a) Simple operating margin;

(b) Simple adjusted operating margin;

(c) Dispatch data analysis operating margin;

(d) Average operating margin.

According to ACM0002 / version 06 dispatch data analysis should be the first choice but for the current project, dispatch data analysis cannot be used because of unavailability of data. The simple OM method was used as the low-cost/must run resources constitute less than 50% of the total grid generation of Western and Southern Grid in average of the five most recent years. The simple OM emission factor (EFOM, simple, y) is calculated as the generation-weighted average emissions

per electricity unit (tCO2/MWh or MU) of all generating sources serving the system, not including low- operating cost and must-run power plants.

$$EF, OM = \frac{\Sigma F\, i, j, y * COEF\, i,j\, y}{\Sigma GENj, y}$$

Where:

Fi, j, y -is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y, j refers to the power sources delivering electricity to the grid, not including low- operating cost and must run power plants, and including imports to the grid.

COEFi,j y -is the CO2 emission coefficient of fuel i (tCO2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y, and

GENj,y -is the electricity (MWh or MU) delivered to the grid by source j. The CO2 emission coefficient COEFi is obtained as

COEFi = NCVi * EFCO2,i * OXIDi

Where:

NCVi - is the net calorific value (energy content) per mass or volume unit of a fuel i,

OXIDi - is the oxidation factor of the fuel.

EFCO2 , i - is the CO2 emission factor per unit of energy of the fuel i.

2. Calculation of build margin Factor for the region (ex ante):

Build margin can be calculated as the generation weighted average emission factor (tCO2/MWh or MU) of a sample of power plant *m, as follows:*

EF, BM = Σ Fi,m, y * COEFi, m

Σ GENm, y

Where,

Fi,m,,y, COEFi,**m** are analogous to the variables described for the simple OM method for plants *m.*

Baseline emission factor (EF y)

The baseline emission factor EFy is calculated as the weighted average of the operating margin emission factor (EFOM, simple) and the build margin emission factor (EF, BM,), where the weights wOM and wBM, by default, are 75% wOM and 25% wBM and EF,OM, and EF,BM, are calculated as described in Steps 1 and 2 of consolidated methodology ACM0002 and are expressed in tCO2/MWh or MU.

EF GRID,Y = 0.75 x EF,OM, + 0.25 x EF, BM

Emission factor = (0.75 x OM + 0.25 x BM)

= (0.75 x 0.998 + 0.25 x 0.63)

= 0.906 kg CO2/kWh

The baseline calculations are CEA data base "CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE".

Appendix 1: Monitored Data (7th February 2008 -24th December 2008)

The net electricity exported per month during the monitoring period are as given below:

Table 7: Export details for year 2008 (7th February 2008 to 24th December 2008)

Months	**Alembic Limited**
Ukhrala & Trambak	**Net Export(Kwh)**
Feb -08 (07/02/08 to 24/02/08)	547,175
March-08	731,848
April -08	618,840
May -08	1,210,519
June -08	1,610,708
July-08	1,278,905
Aug-08	1,217,963
Sep-08	840,696
Oct-08	221,201
Nov-08	519,843
Dec-08 (24.12.08)	680,887
Total	**9,478,585**

Appendix 2: Emission Reduction Calculation

	Units	(7th February to 24th December) **2008**
Electricity Exported from Alembic Limited	KWH	9,478,585
Total electricity exported	KWH	9,478,585
Emission Factor	$kgCO_2/KWh$	0.906
Emission Reductions	tCO_2	**8588**

Annexure 1: Contact Information

Organization:	Alembic limited.
Street/P.O.Box:	Alembic Road
Building / Location:	---
City:	Vododara
State/Region:	Gujarat
Postfix/ZIP:	390003
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E-Mail:	infoal@alembic.co.in
URL:	http://www.alembic-india.com
Represented by:	
Title:	Director & President
Salutation:	Mr.
Last Name:	Baheti
Middle Name:	K
First Name:	R
Department:	Finance
Direct FAX:	0091 –265 – 228 2506
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