



**MONITORING REPORT FORM (F-CDM-MR)**  
**Version 02.0**

**MONITORING REPORT**

<b>Title of the project activity</b>	<b>Bundled wind energy power projects (2004 policy) in Rajasthan</b>
<b>Reference number of the project activity</b>	<b>1166</b>
<b>Version number of the monitoring report</b>	1.1
<b>Completion date of the monitoring report</b>	18/12/2012
<b>Registration date of the project activity</b>	30/10/2008
<b>Monitoring period number and duration of this monitoring period</b>	Monitoring period number: Fourth Monitoring period duration: 01/09/2011 to 30/09/2012 (Inclusive of both days)
<b>Project participant(s)</b>	1. Enercon (India) Limited 2. Japan Carbon Finance Ltd.
<b>Host Party(ies)</b>	India
<b>Sectoral scope(s) and applied methodology(ies)</b>	<b>Sectoral Scope:</b> 1, Energy industries (renewable / non-renewable sources)  <b>Methodology:</b> ACM0002 / Version 06  <b>Title:</b> Approved baseline and monitoring methodology title “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”
<b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b>	<b>45,313 tCO<sub>2</sub>e</b>
<b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>	<b>31,454 tCO<sub>2</sub>e</b>

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

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**Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:**

Bundled wind power project of 24.8 MW (“Project”) is installed in the state of Rajasthan and provides reliable, renewable power to the Rajasthan state electricity grid. The Project leads to reduction of greenhouse gas emissions because it displaces electricity from fossil fuel based electricity generation plants. The Project harnesses renewable resources in the region, and thereby displacing non-renewable natural resources thereby ultimately leading to sustainable economic and environmental development. Enercon (India) Ltd (“Enercon” or “EIL”) is the equipment supplier and the operations and maintenance contractor for the Project. The generated electricity is supplied to the utility (Discom) under a long-term power purchase agreement (PPA). The details of the sub-projects comprising the Project are as under:

SN	Name of the Customer	Capacity of M/C	No. of M/C	Capacity (MW)
1	CEPCO	0.8	15	12.00
2	Ushdev International	0.8	3	2.40
3	Brindavan Agro Industries	0.8	2	1.60
4	Amrit Bottlers Ltd.	0.8	1	0.80
5	Deedee Enterprises	0.8	1	0.80
6	JN Investment	0.8	1	0.80
7	Metalfab Hightech Private Limited	0.8	1	0.80
8	SE Investment	0.8	1	0.80
9	Brindavan Bottlers Ltd.	0.8	1	0.80
10	Delta Enterprises	0.8	3	2.40
11	Sankalp International	0.8	1	0.80
12	Malani Impex Inc.	0.8	1	0.80
<b>Total Capacity (MW)</b>			<b>31</b>	<b>24.80</b>

**Brief description of the installed technology and equipments:**

The Project involves 31-wind energy converters (WEGs) of Enercon make (800 kW E-48) with internal electrical lines connecting the Project with local evacuation facility. The WEGs generates 3-phase power at 400V, which is stepped up to 33 KV. The Project can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of 400 V ± 12.5%. The other salient features of the state-of-art-technology are:

- Gearless Construction - Rotor & Generator Mounted on same shaft eliminating the Gearbox.
- Variable speed function – has the speed range of 18 to 33 RPM thereby ensuring optimum efficiency at all times.
- Variable Pitch functions ensuring maximum energy capture.
- Near Unity Power Factor at all times.
- Minimum drawl (less than 1% of kWh generated) of Reactive Power from the grid.
- No voltage peaks at any time.
- Operating range of the WEG with voltage fluctuation of -20 to +20%.
- Less Wear & Tear since the system eliminates mechanical brake, which are not needed due to low speed generator, which runs at maximum speed of 33 rpm and uses Air Brakes.
- Three Independent Braking Systems.
- Generator achieving rated output at only 33 rpm.
- Incorporates lightning protection system, which includes blades.

- Starts Generation of power at wind speed of 3 m/s.

Enercon (India) Ltd has secured and facilitated the technology transfer for wind based renewable energy generation from Enercon GmbH, has established a manufacturing plant at Daman in India, where along with other components the "Synchronous Generators" using "Vacuum Impregnation" technology are manufactured.



**Technology Diagram**

#### Relevant dates for the project activity:

The first machine under the project activity was commissioned on 25<sup>th</sup> Mar 2006 and the last machine under the project activity was commissioned on 13<sup>th</sup> May 2006. The expected operational lifetime of the project is for 20 years. The crediting period of the project activity commenced on 30/10/2008. This is the fourth monitoring report. The details of issuance of CERs for the previous monitoring periods are as follows:

Monitoring Period No.	Monitoring Period (Inclusive of both days)	CERs issued	Date of Issuance
First	30/10/2008 – 30/11/2009	33,322	08/04/2011
Second	01/12/2009 – 31/08/2010	22,731	05/05/2011
Third	01/09/2010 – 31/08/2011	24,255	22/03/2012

#### Total emission reductions achieved in this monitoring period

This is the fourth monitoring report for the project activity. The total emission reductions achieved under this monitoring period 01/09/2011 to 30/09/2012 (including first and last day) is **31,454 tCO<sub>2</sub>e**.

#### A.2. Location of project activity

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The Project is located at Kita and Bhu village, in Jaisalmer District of Rajasthan that forms part of the Northern regional electricity grid of India. The project area extends between latitude 26° 41' & 26° 46.5' North and longitude 70° 57.5' & 71° 4' East. The Project is connected to the RRVPNL 33/132/220 kV substation at Amarsagar. The sites are located at a distance of 25 km from Jaisalmer by road. The nearest railway station is at Jaisalmer. Individual WEG location numbers and coordinates are detailed out in below table: -



Sr. No.	Unique Identification No.	Location No	Latitude			Longitude		
			Degree	Minute	Second	Degree	Minute	Second
1	Cepco-01	207	26	44	23.9	71	0	4.9
2	Cepco-02	208	26	44	18.7	71	0	13.4
3	Cepco-03	209	26	44	10.1	71	0	15.1
4	Cepco-04	210	26	44	1.6	71	0	15.4
5	Cepco-05	171	26	43	16.6	70	58	53.6
6	Cepco-06	172	26	43	28.0	70	58	47.8
7	Cepco-07	173	26	43	36.5	70	58	48.8
8	Cepco-08	175	26	43	35.9	70	59	8.1
9	Cepco-09	187	26	43	35.1	70	59	34.0
10	Cepco-10	166	26	42	33.7	70	59	4.1
11	Cepco-11	165	26	42	29.2	70	59	7.9
12	Cepco-12	164	26	42	24.6	70	59	11.8
13	Cepco-13	163	26	42	20.0	70	59	15.6
14	Cepco-14	162	26	42	15.4	70	59	19.5
15	Cepco-15	189	26	43	31.6	70	59	46.1
16	DE-01	202	26	44	8.3	70	59	55.9
17	DE-02	201	26	44	2.0	70	59	59.0
18	DE-03	200	26	43	56.5	71	0	2.5
19	UIL-01	206	26	44	28.4	70	59	41.2
20	UIL-02	205	26	44	22.1	70	59	44.3
21	UIL-03	204	26	44	16.2	70	59	47.4
22	BAIL-01	199	26	43	51.0	71	0	6.0
23	BAIL-02	198	26	43	46.4	71	0	9.8
24	ABL-01	216	26	45	41.9	70	59	34.6
25	BBL-01	217	26	45	46.2	70	59	31.7
26	DDE-01	203	26	44	12.9	70	59	52.0
27	JNI-01	214	26	45	13.7	70	59	19.8
28	MII-01	212	26	45	6.9	70	59	35.1
29	MHPL-01	188	26	43	40.4	70	59	29.5
30	SI-01	211	26	45	4.2	70	59	19.8
31	SE-01	291	26	45	38.0	70	59	38.7

**A.3. Parties and project participant(s)**

Party involved (host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host Country)	Enercon (India) Limited (Private)	No
Government of Japan	Japan Carbon Finance, Ltd. (Private)	No

**A.4. Reference of applied methodology**

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**Baseline and Monitoring Methodology:** ACM0002 / Version 06, Sectoral Scope: 01, 19/05/2006**Title:** “Consolidate monitoring methodology for grid-connected electricity generation from renewable sources”

The tool used for the project is as follows: “Tool for the demonstration and assessment of additionality” version 2.0

References:

<http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT/view.html>

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v2.pdf>

**A.5. Crediting period of project activity**

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The length of the Crediting period of the project activity as per registered PDD is 10 years (Fixed) starting from 30/10/2008 to 29/10/2018 (first and last days included). This is the fourth monitoring period 01/09/2011 to 30/09/2012 (including first and last day) of the project activity.

**SECTION B. Implementation of project activity****B.1. Description of implemented registered project activity**

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The first machine under the project activity was commissioned on 25<sup>th</sup> March 2006 and last machine under the project activity was commissioned on 13<sup>th</sup> May 2006. The project activity consists of 31 machines (800 kW) of Enercon make E-48. The commissioning date for all the machines included in the project activity is given in the table below.

Serial No	Capacity	Unique Identification No.	Location No	Date of Commissioning
1	0.8	Cepco-01	207	29-Mar-06
2	0.8	Cepco-02	208	29-Mar-06
3	0.8	Cepco-03	209	29-Mar-06
4	0.8	Cepco-04	210	29-Mar-06
5	0.8	Cepco-05	171	29-Mar-06



6	0.8	Cepco-06	172	29-Mar-06
7	0.8	Cepco-07	173	31-Mar-06
8	0.8	Cepco-08	175	31-Mar-06
9	0.8	Cepco-09	187	30-Mar-06
10	0.8	Cepco-10	166	30-Mar-06
11	0.8	Cepco-11	165	30-Mar-06
12	0.8	Cepco-12	164	30-Mar-06
13	0.8	Cepco-13	163	13-May-06
14	0.8	Cepco-14	162	13-May-06
15	0.8	Cepco-15	189	13-May-06
16	0.8	DE-01	202	29-Mar-06
17	0.8	DE-02	201	29-Mar-06
18	0.8	DE-03	200	29-Mar-06
19	0.8	UIL-01	206	29-Mar-06
20	0.8	UIL-02	205	29-Mar-06
21	0.8	UIL-03	204	29-Mar-06
22	0.8	BAIL-01	199	29-Mar-06
23	0.8	BAIL-02	198	29-Mar-06
24	0.8	ABL-01	216	25-Mar-06
25	0.8	BBL-01	217	25-Mar-06
26	0.8	DDE-01	203	25-Mar-06
27	0.8	JNI-01	214	29-Mar-06
28	0.8	MII-01	212	29-Mar-06
29	0.8	MHPL-01	188	31-Mar-06
30	0.8	SI-01	211	29-Mar-06
31	0.8	SE-01	291	25-Mar-06

Enercon operation and maintenance activities are ISO 9001:2000 certified and all the events are recorded in the log book available at the project site. Referring to the data available it can be inferred that there have not been any major special events of breakdown for any of the machines of the project activity occurred during the monitoring period, which may impact the applicability of the methodology. As a part of regular maintenance the machines are stopped for mechanical and electrical maintenance for 16 to 18 hours annually and for visual inspection for 6 to 7 hours quarterly.

## **B.2. Post registration changes**

### **B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

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There is no deviation from registered monitoring plan or applied methodology during this monitoring period.

### **B.2.2. Corrections**

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There are no corrections from the registered PDD during this monitoring period.

### **B.2.3. Permanent changes from registered monitoring plan or applied methodology**

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The monitoring plan of the project activity has been revised. The revision for monitoring plan was approved by UNFCCC on 02/08/2010 (Link: <http://cdm.unfccc.int/Projects/DB/SGS-UKL1181723770.26/view>). The revision in monitoring plan was done to describe the allocation plan transparently.

#### **B.2.4. Changes to project design of registered project activity**

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There are no changes to project design of the registered project activity.

#### **B.2.5. Changes to start date of crediting period**

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There are no changes to the start date of the crediting period.

#### **B.2.6. Types of changes specific to afforestation or reforestation project activity**

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Not applicable to the project activity.

### **SECTION C. Description of monitoring system**

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Approved monitoring methodology ACM0002 / Version 06 Sectoral Scope: 1, “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, by CDM - Meth Panel is proposed to be used to monitor the emission reductions.

The electricity supplied to the grid will be metered at the 33/132/220 kV level at the RRVPNL substation at Amarsagar. Representatives of RRVPNL/Jodhpur Discom and Enercon will jointly take the main reading and sign the meter reading on the first day of every month. Simultaneously, the joint meter reading at 33/132/220 kV level of the backup metering system at Temdarai substation will also be taken by representatives of RRVPN/Jodhpur Discom and Enercon. The meter reading is recorded during the daytime and hence leads to the overlapping of end/start dates of monthly measured data as is seen in the joint meter reading records (JMR). Hence there will be overlapping of end/start dates of joint reading record but there is no double counting of electricity import & export figures.

The meters used are Tri-vector and the manufacturer is the Secure Meter. The meters are two-way meter and measure the electricity import and export and give the net electricity. In case the meters are found to operate outside the permissible limits, the meters will be either replaced immediately or calibrated. Error correction will be applied to the meter reading. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred. The details of the malfunctioning along with date and time and snaps shot parameters along with load survey will be retrieved from the main meter. The exact nature of the malfunctioning will be determined after analyzing the data so retrieved and the consumption recorded by the main meter will be assessed accordingly.

If main as well as back up metering system becomes defective, the assessment of energy consumption for the outage period will be done from the backup meters by the concerned parties as mutually agreed or at the level of Metering Committee set up under the Metering Code. The main and the backup metering systems will be sealed in presence of representatives of Enercon and RRVPN/Jodhpur Discom.

The main meter readings are apportioned based upon the LCS meter readings from the individual WEGs to compute net electricity supplied from individual WEGs. The LCS meter readings are archived electronically on continuous basis. Joint meter reading at the EB substation and at the pooling substation

of Enercon is noted each month. Therefore cumulative LCS meter reading for each month is used for purpose of allocation of net electricity supplied to the grid from the project activity.

The LCS meters are 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 WEGs. 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. The operations and maintenance staff will calibrate the meter immediately and correction factor will be determined.

EG<sub>y</sub> for the project activity is derived as follows:-

The project activity is located in Bhu and is connected to Amarsagar substation. In addition to the project activity, the wind farms located at Temdarai, Sodabandhan, Korwan, Asloi and other wind turbines at Bhu are also connected to the Amarsagar substation. Electricity delivered by all these wind farms is metered at a common metering point. The common metering point comprises two main meters i.e. Main meter 1 and Main meter 2 that are installed at 132 kV metering point at the Amarsagar substation. Consequently, the main meter readings reflect the aggregate electricity supplied by all these wind farms, including the project activity. The net electricity supplied by individual wind turbines is determined by following a process of allocating the total electricity (recorded at the main meters M1 and M2) to the individual turbines in proportion of the electricity generation recorded by the LCS meters at the individual wind turbines. The procedure for allocation is detailed below:

$E_{JMR, Export}$  = Electricity exported, as recorded by the main meter at the substation

$E_{JMR, Import}$  = Electricity imported, as recorded by the main meter at the substation

$E_{Controller, Export}$  = Electricity exported by a WEG, as measured at the controller

$\Sigma E_{Controller, Export}$  = Electricity exported by all the WEGs connected to the main meter at the substation, measured at the controller of each WEG

$E_{WEG, Export}$  = Electricity exported by a WEG to the grid, calculated

$E_{WEG, Import}$  = Electricity imported by a WEG from the grid, calculated

Electricity exported by each WEG is apportioned on the basis of electricity exported recorded at the controller of each WEG and the electricity exported at the main meter and mentioned in the JMR. The export multiplication factor is calculated as follows-

$$\text{Export Multiplication factor} = E_{JMR, Export} / \Sigma E_{Controller, Export} \dots\dots\dots (1)$$

Thus the energy exported by a WEG to the grid is given by the equation-

$$E_{WEG, Export} = \text{Export Multiplication factor} \times E_{Controller, Export} \dots\dots\dots (2)$$

As the controller meter doesn't record import, the apportioning of energy imported by each WEG is also done on the basis of electricity exported recorded at the controller of each WEG and the electricity imported at the main meter and mentioned in the JMR. The import multiplication factor is calculated as follows-

$$\text{Import Multiplication factor} = E_{JMR, Import} / \Sigma E_{Controller, Export} \dots\dots\dots (3)$$

Thus the energy imported by a WEG to the grid is given by the equation-

$$E_{WEG, Import} = \text{Import Multiplication factor} \times E_{Controller, Export} \dots\dots\dots (4)$$

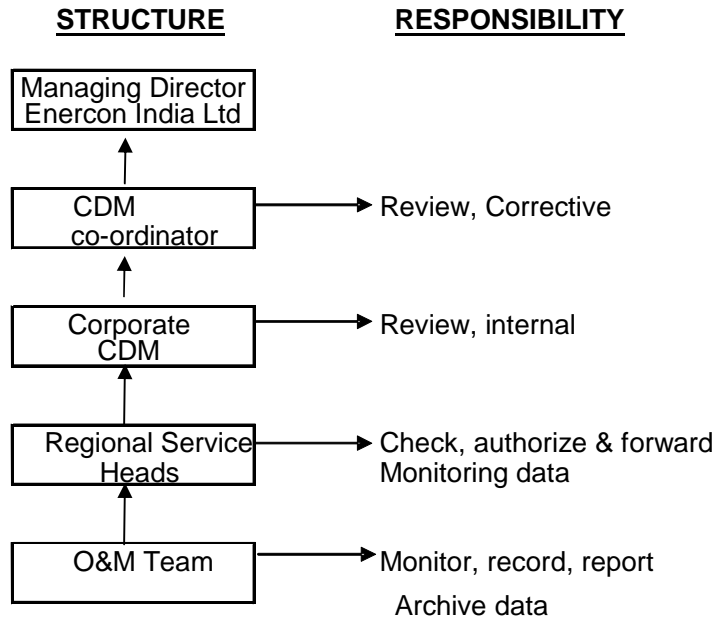


The net electricity exported by the WEGs of the project is given by the equation-

$$EG_y = \sum_{\text{Project}} E_{\text{WEG, Export}} - \sum_{\text{Project}} E_{\text{WEG, Import}} \dots\dots\dots (5)$$

The summation is done on the WEGs belonging to the project activity.

The operational and management structure implemented by Enercon is as follows:



### Training and maintenance:

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 Energy Converters (WEGs), it is extremely essential, that the engineers and technicians understand the machines and keep them in good health. In order to ensure, that Enercon's service staffs is 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 Enercon Training Academy provides need-based training to meet the training requirements of Enercon 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.

### Calibration Details

The metering equipments were inspected & calibrated by state utility. Meter details for the all the main and backup meters are as follows:-

Meter description	Serial No.	Make	Accuracy class	Metering point	Calibration before monitoring period	Calibration during monitoring period	Validity
Main meter (Line I)	TNU00946	Secure	0.2	Amarsagar Substation	26-03-2011	19-03-2012	18-03-2013
Backup meter (Line I)	RJB00052	Secure	0.2	Temdarai Substation	28-03-2011	23-03-2012	22-03-2013



Meter description	Serial No.	Make	Accuracy class	Metering point	Calibration before monitoring period	Calibration during monitoring period	Validity
Main meter (Line II)	TNU00945	Secure	0.2	Amarsagar Substation	26-03-2011	19-03-2012	18-03-2013
Backup meter (Line II)	ABB00691	Secure	0.2	Temdarai Substation	28-03-2011	23-03-2012	22-03-2013

The main and the backup meters are calibrated once each year. 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 WEGs. 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. Therefore there is no data uncertainty. The line diagrams showing all relevant monitoring points are appendix 1.

## SECTION D. Data and parameters

### D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	$EF_{OM,y}$						
Unit	tCO <sub>2</sub> e/MWh						
Description	Operating Margin Emission Factor of Northern Regional Electricity Grid						
Source of data	“CO <sub>2</sub> Baseline Database for Indian Power Sector” version 1.1 published by the Central Electricity Authority, Ministry of Power, Government of India.  The “CO <sub>2</sub> Baseline Database for Indian Power Sector” version 1.1 is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>						
Value(s) applied	<table border="1"> <tr> <td>2002 – 03</td><td>0.9993</td></tr> <tr> <td>2003 – 04</td><td>0.9869</td></tr> <tr> <td>2004 – 05</td><td>0.9756</td></tr> </table>	2002 – 03	0.9993	2003 – 04	0.9869	2004 – 05	0.9756
2002 – 03	0.9993						
2003 – 04	0.9869						
2004 – 05	0.9756						
Purpose of data	Baseline Emissions						
Additional comment	None						

Data/Parameter	$EF_{BM,y}$
Unit	tCO <sub>2</sub> e/MWh
Description	Build Margin Emission Factor of Northern Regional Electricity Grid
Source of data	“CO <sub>2</sub> Baseline Database for Indian Power Sector” version 1.1 published by the Central Electricity Authority, Ministry of Power, Government of India.  The “CO <sub>2</sub> Baseline Database for Indian Power Sector” version 1.1 is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a>
Value(s) applied	0.5335
Purpose of data	Baseline Emissions
Additional comment	None



<b>Data/Parameter</b>	$EF_{CM,y}$
<b>Unit</b>	tCO <sub>2</sub> e/GWh
<b>Description</b>	Combined Margin Emission Factor of North East West North-east (NEWNE)
<b>Source of data</b>	<p>“CO<sub>2</sub> Baseline Database for Indian Power Sector” version 1.1 published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The “CO<sub>2</sub> Baseline Database for Indian Power Sector” version 1.1 is available at <a href="http://www.cea.nic.in">www.cea.nic.in</a></p>
<b>Value(s) applied</b>	873.87
<b>Purpose of data</b>	Baseline Emissions
<b>Additional comment</b>	None

## D.2. Data and parameters monitored

<b>Data/Parameter</b>	<b>EGy</b>
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Net electricity supplied to the grid by the Project
<b>Measured/Calculated /Default</b>	Calculated by applying apportioning procedure better described in C.
<b>Source of data</b>	Electricity supplied to the grid as per the tariff invoices raised on RRVPNL/Jodhpur Discom.
<b>Value(s) of monitored parameter</b>	35994.739 MWh
<b>Monitoring equipment</b>	Calculated as per the procedures shown in section C.
<b>Measuring/Reading/ Recording frequency</b>	Monthly: The apportioning is done as per the procedure described in section C.
<b>Calculation method (if applicable)</b>	$EGy = \sum_{\text{Project}} E_{\text{WEG, Export}} - \sum_{\text{Project}} E_{\text{WEG, Import}}$ <p>Refer section C for details and description of the above variables</p>
<b>QA/QC procedures</b>	<p>QA/QC procedures will be as implemented by state utility (Discom) pursuant to the provisions of the power purchase agreement and the Metering Code of Rajasthan and there will be no additional QA/QC procedures. Refer Section C for an illustration of the provisions for QA/QC procedures.</p> <p>The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>
<b>Purpose of data</b>	Calculation of Baseline Emissions
<b>Additional comment</b>	None



<b>Data/Parameter</b>	<b>E<sub>JMR, Export</sub></b>
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Electricity exported, as recorded by the main meter at the EB substation
<b>Measured/Calculated/Default</b>	Measured: The Export reading is jointly noted from the main meter installed at the EB substation.
<b>Source of data</b>	Export value from Joint meter reading taken at Substation in the presence of representatives of Enercon and state utility.
<b>Value(s) of monitored parameter</b>	203698.250 MWh
<b>Monitoring equipment</b>	<p>Line I Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00946 Serial Number of Backup Meter: RJB00052</p> <p>Line II Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00945 Serial Number of Backup Meter: ABB00691</p> <p>Line I and Line II Main Meter Last date of Test-19 March 2012 Validity of Test-18 March 2013</p> <p>Line I and Line II Check Meter Last date of Test-23 March 2012 Validity of Test-22 March 2013</p> <p>Frequency of Calibration- Annual</p>
<b>Measuring/Reading/Recording frequency</b>	Measured in continuous basis and recorded on Monthly basis. The reading is jointly noted by the representatives of state utility and Enercon.
<b>Calculation method (if applicable)</b>	Not Applicable
<b>QA/QC procedures</b>	<p>The meters will be calibrated once each year by the state utility. Refer Section C for an illustration of the provisions for QA/QC procedures.</p> <p>The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None



<b>Data/Parameter</b>	<b>E<sub>JMR, Import</sub></b>
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Electricity imported, as recorded by the main meter at the EB substation
<b>Measured/Calculated/Default</b>	Measured: The import reading is jointly noted from the main meter installed at the EB substation.
<b>Source of data</b>	Import value from Joint meter reading taken at Substation in the presence of representatives of Enercon and state utility.
<b>Value(s) of monitored parameter</b>	379.000 MWh
<b>Monitoring equipment</b>	<p>Line I Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00946 Serial Number of Backup Meter: RJB00052</p> <p>Line II Type- Tri-vector Meter Accuracy Class-0.2 Serial Number of Main Meter: TNU00945 Serial Number of Backup Meter: ABB00691</p> <p>Line I and Line II Main Meter Last date of Test-19 March 2012 Validity of Test-18 March 2013</p> <p>Line I and Line II Check Meter Last date of Test-23 March 2012 Validity of Test-22 March 2013</p> <p>Frequency of Calibration- Annual</p>
<b>Measuring/Reading/Recording frequency</b>	Measured in continuous basis and recorded on Monthly basis. The reading is jointly noted by the representatives of state utility and Enercon.
<b>Calculation method (if applicable)</b>	Not Applicable
<b>QA/QC procedures</b>	<p>The meters will be calibrated once each year by the state utility. Refer Section C for an illustration of the provisions for QA/QC procedures.</p> <p>The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None



<b>Data/Parameter</b>	<b>E</b> Controller, Export
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Electricity exported by a WEG, as measured at the controller (LCS).
<b>Measured/Calculated/Default</b>	Measured: The value is recorded continuously by the online monitoring station. This value can also be checked from the electronic panel installed inside the WTG tower.
<b>Source of data</b>	This reading is monitored continuously by the online monitoring station at the project site. This reading can also be seen in the electronic panel installed inside the WTG tower.
<b>Value(s) of monitored parameter</b>	37701.036 MWh
<b>Monitoring equipment</b>	<p>Meter Type: Refer Appendix 2  Accuracy Class: Refer Appendix 2  Serial Number: Refer Appendix 2</p> <p>The LCS meters are 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 WEGs. 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. Therefore there is no data uncertainty.</p>
<b>Measuring/Reading/Recording frequency</b>	Monthly: The value is recorded continuously by the online monitoring station. This value can also be checked from the electronic panel installed inside the WTG tower.
<b>Calculation method (if applicable)</b>	Not applicable
<b>QA/QC procedures</b>	<p>The LCS meters are 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 WEGs. 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. Therefore there is no data uncertainty.</p> <p>The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None



<b>Data/Parameter</b>	<b>E<sub>WEG, Export</sub></b>
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Electricity exported by a WEG to the grid
<b>Measured/Calculated /Default</b>	Calculated: <b>E<sub>WEG Export</sub></b> denotes the electricity exported by a WEG to the grid. The value is calculated based on the formula mentioned in Section C
<b>Source of data</b>	Calculated using formula mentioned in Section C.
<b>Value(s) of monitored parameter</b>	36104.238 MWh
<b>Monitoring equipment</b>	Calculated as per the procedures shown in section C.
<b>Measuring/Reading/ Recording frequency</b>	Monthly basis: Calculated using the formulas better described under section C.
<b>Calculation method (if applicable)</b>	$E_{WEG, Export} = \text{Export Multiplication factor} \times E_{\text{Controller, Export}}$ Refer to Section C for details and description of the above variables.
<b>QA/QC procedures</b>	The value is calculated. Please refer Section C for QA/QC procedures.  The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None

<b>Data/Parameter</b>	<b>E<sub>WEG, Import</sub></b>
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Electricity imported by a WEG from the grid.
<b>Measured/Calculated /Default</b>	Calculated: <b>E<sub>WEG Import</sub></b> denotes the electricity imported by a WEG to the grid. The value is calculated based on the formula mentioned in Section C
<b>Source of data</b>	Calculated as per the procedures shown in section C.
<b>Value(s) of monitored parameter</b>	1112.768 MWh
<b>Monitoring equipment</b>	Calculated as per the procedures shown in section C.
<b>Measuring/Reading/ Recording frequency</b>	Monthly basis: Calculated using the formulas better described under section C.
<b>Calculation method (if applicable)</b>	$E_{WEG, Import} = \text{Import Multiplication factor} \times E_{\text{Controller, Export}}$ Refer to Section C for details and description of the above variables.
<b>QA/QC procedures</b>	The value is calculated. Please refer Section C for QA/QC procedures.  The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None



<b>Data/Parameter</b>	$\Sigma_{\text{Project}} E_{\text{WEG, Export}}$
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Summation of electricity exported to the grid by all the WEGs included in the project activity.
<b>Measured/Calculated /Default</b>	$\Sigma_{\text{Project}} E_{\text{WEG, Export}}$ denotes summation of the electricity exported to the grid by a WEGs included in the project activity. The value is calculated based on the formula mentioned in section C.
<b>Source of data</b>	Summation of data values of $E_{\text{WEG, Export}}$ for all the WEGs included in the project activity.
<b>Value(s) of monitored parameter</b>	36058.993 MWh
<b>Monitoring equipment</b>	Calculated as per the procedures shown in section C.
<b>Measuring/Reading/Recording frequency</b>	Monthly basis: Calculated using the formulas better described under section C.
<b>Calculation method (if applicable)</b>	$\Sigma_{\text{Project}} E_{\text{WEG, Export}}$ denotes summation of the electricity exported to the grid by a WEGs included in the project activity. Refer to Section C for details and description.
<b>QA/QC procedures</b>	<p>The value is calculated and can be cross checked from the invoices raised on the state utility. Please refer Section C for QA/QC procedures.</p> <p>The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.</p>
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None





<b>Data/Parameter</b>	$\Sigma_{\text{Project}} E_{\text{WEG, Import}}$
<b>Unit</b>	MWh (Mega-Watt hour)
<b>Description</b>	Summation of electricity imported from the grid by all the WEGs included in the project activity.
<b>Measured/Calculated /Default</b>	$\Sigma_{\text{Project}} E_{\text{WEG, Import}}$ denotes the summation of electricity imported from the grid by a WEGs included in the project activity. The value is calculated based on the formula mentioned in section C.
<b>Source of data</b>	Summation of data values of $E_{\text{WEG, Import}}$ for all the WEGs included in the project activity.
<b>Value(s) of monitored parameter</b>	64.254 MWh
<b>Monitoring equipment</b>	Calculated as per the procedures shown in section C.
<b>Measuring/Reading/Recording frequency</b>	Monthly basis: Calculated using the formulas better described under section C.
<b>Calculation method (if applicable)</b>	$\Sigma_{\text{Project}} E_{\text{WEG, Import}}$ denotes the summation of electricity imported from the grid by a WEGs included in the project activity. Refer to Section C for details and description.
<b>QA/QC procedures</b>	The value is calculated and can be cross checked from the invoices raised on the state utility. Please refer Section C for QA/QC procedures.  The data will be archived electronically as well as on paper. The data will be kept for the period up to two years after the completion of the crediting period.
<b>Purpose of data</b>	Calculation of Baseline emissions
<b>Additional comment</b>	None

### D.3. Implementation of sampling plan

&gt;&gt;

Not applicable to the project activity.

## SECTION E. Calculation of emission reductions or GHG removals by sinks

### E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

&gt;&gt;&gt;

“The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO<sub>2</sub>e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO<sub>2</sub>e/kWh) as described in registered PDD.

$$BE_y = EG_y * EF_y$$

Where,

**BE** is baseline emissions in year y, t CO<sub>2</sub>e

**EG<sub>y</sub>** is the net electricity supplied to the grid in year y and is applied directly from JMR certified by state utility. This value can also be cross checked from the invoice. Refer Appendix 3 for detail.

**EF<sub>y</sub>** is the CO<sub>2</sub> emission factor of the grid (873.87 tCO<sub>2</sub>e/GWh fixed ex-ante).

Baseline Emission reduction calculation for the period 01/09/2011 to 30/09/2012:

$$\begin{aligned}\text{Baseline Emission Reductions (BE}_y\text{)} &= 35.994739 \text{ (GWh)} * 873.87 \text{ (tCO}_2\text{e/GWh)} \\ &= \mathbf{31,454 \text{ tCO}_2\text{e}}\end{aligned}$$

Therefore, total baseline emissions are **31,454 tCO<sub>2</sub>**.

Total project emissions: Zero

Total leakages: Zero

$$\begin{aligned}\text{Total Emission reductions, ER} &= \text{Baseline Emissions} - \text{Project Emissions} - \text{Leakages} \\ &= 31,454 - 0 - 0 \\ &= \mathbf{31,454 \text{ tCO}_2}\end{aligned}$$

## E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

Since the project activity is a renewable energy project which generates electricity using wind power and hence does not result in project emissions.

## E.3. Calculation of leakage

>>

No leakage is considered from the project activity as per approved methodology ACM0002.

## E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO <sub>2</sub> e)	Project emissions or actual net GHG removals by sinks (tCO <sub>2</sub> e)	Leakage (tCO <sub>2</sub> e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO <sub>2</sub> e)
01/09/2011 to 30/09/2012	31,454	0	0	31,454
<b>Total</b>	<b>31,454</b>	<b>0</b>	<b>0</b>	<b>31,454</b>

## E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
<b>Emission reductions or GHG removals by sinks (tCO<sub>2</sub>e)</b>	45,313 (396 days equivalent of annually 41,766 emission reductions estimated in the registered PDD)	31,454

**E.6. Remarks on difference from estimated value in registered PDD**

&gt;&gt;

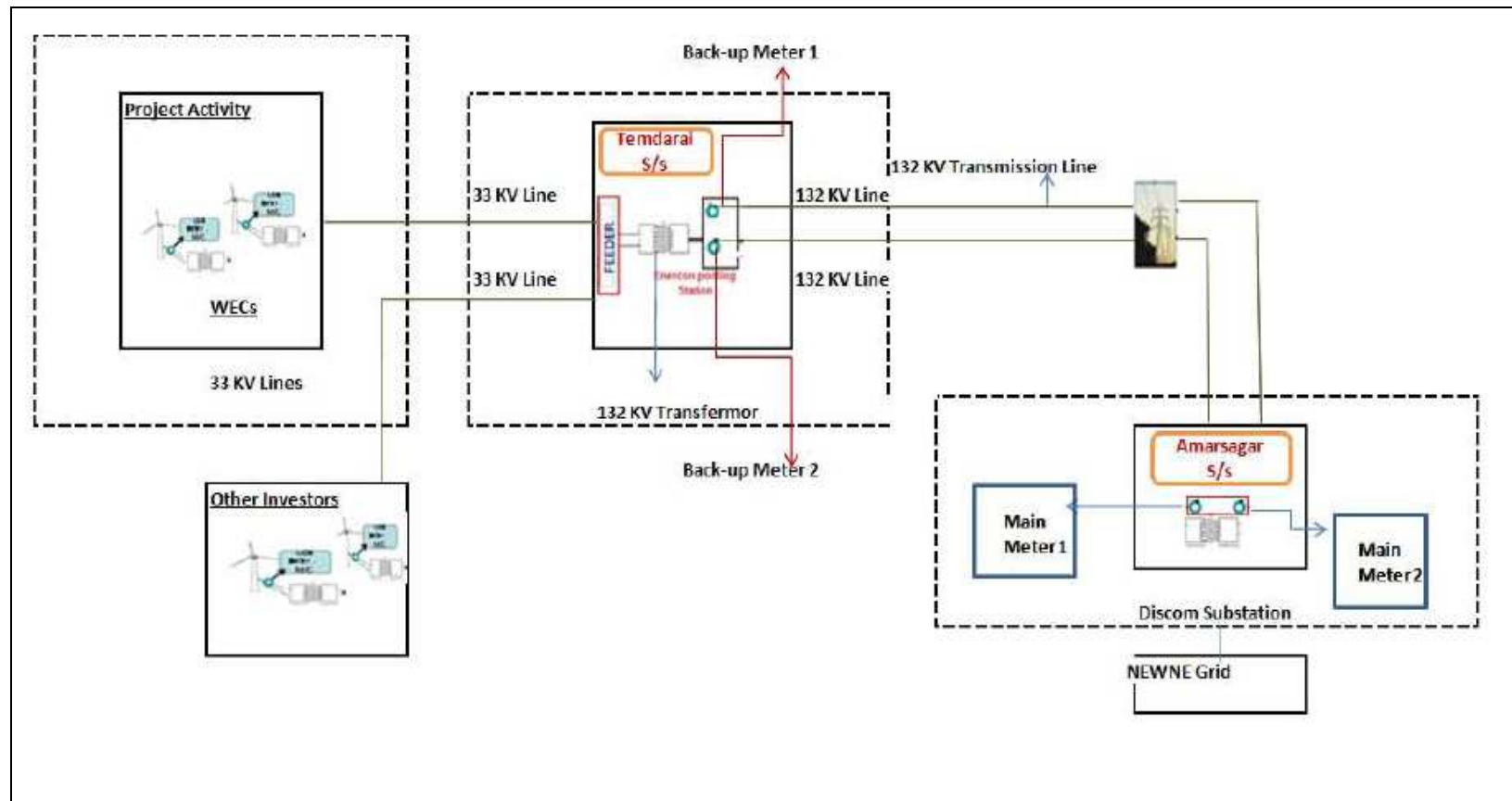
There is change of 30.59 % (downside) in the expected and actual emission reductions. The difference in the total CERs is due to low wind availability leading to low plant load factor.



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## History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
<b>Decision Class:</b> Regulatory <b>Document Type:</b> Form <b>Business Function:</b> Issuance		

**Appendix 1: Line Diagram Showing Relevant Metering Points**

**Appendix 2: Controller Meter Details**

Serial No	Project Proponent	Unique Identification No.	Accuracy Class	Panel Meter Serial No	Supplier	Type
1	Cepco Industries Private Limited	Cepco-01	Class-I	466706	NZR	ITZR
2		Cepco-02	Class-I	466699	NZR	ITZR
3		Cepco-03	Class-I	466657	NZR	ITZR
4		Cepco-04	Class-I	466690	NZR	ITZR
5		Cepco-05	Class-I	466694	NZR	ITZR
6		Cepco-06	Class-I	466683	NZR	ITZR
7		Cepco-07	Class-I	466382	NZR	ITZR
8		Cepco-08	Class-I	466385	NZR	ITZR
9		Cepco-09	Class-I	466303	NZR	ITZR
10		Cepco-10	Class-I	466689	NZR	ITZR
11		Cepco-11	Class-I	466398	NZR	ITZR
12		Cepco-12	Class-I	466269	NZR	ITZR
13		Cepco-13	Class-I	466659	NZR	ITZR
14		Cepco-14	Class-I	466408	NZR	ITZR
15		Cepco-15	Class-I	466693	NZR	ITZR
16	Delta Enterprises	DE-01	Class-I	466685	NZR	ITZR
17		DE-02	Class-I	466390	NZR	ITZR
18		DE-03	Class-I	466532	NZR	ITZR
19	Ushdev International Limited	UIL-01	Class-I	466702	NZR	ITZR
20		UIL-02	Class-I	466404	NZR	ITZR
21		UIL-03	Class-I	466670	NZR	ITZR
22	Brindavan Agro Industries Limited	BAIL-01	Class-I	466478	NZR	ITZR
23		BAIL-02	Class-I	466701	NZR	ITZR



24	Amrit Bottlers Ltd.	ABL-01	Class-I	466704	NZR	ITZR
25	Brindavan Bottlers Ltd.	BBL-01	Class-I	466678	NZR	ITZR
26	Deedee Enterprises	DDE-01	Class-I	266705	NZR	ITZR
27	JN Investment	JNI-01	Class-I	466397	NZR	ITZR
28	Malani Impex Inc.	MII-01	Class-I	466526	NZR	ITZR
29	Metalfab Hightech Private Limited	MHPL-01	Class-I	466281	NZR	ITZR
30	Sankalp International	SI-01	Class-I	466304	NZR	ITZR
31	SE Investment	SE-01	Class-I	466389	NZR	ITZR



## Appendix 3: Net Electricity Exported to Grid (EGy)

Sr No	Name of the Customer	M/C Model	Capacity of M/C	No. of M/C	Capacity (MW)	Sep-11			Oct-11			Nov-11		
						E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy
1	CEPCO	E-48	0.8	15	12.00	1104099	1010	1103089	667104	4432	662672	312620	5878	306742
2	Ushdev International	E-48	0.8	3	2.40	227420	208	227212	150099	997	149102	66089	1243	64846
3	Brindavan Agro Industries	E-48	0.8	2	1.60	134864	123	134741	93810	623	93187	41722	785	40937
4	Amrit Bottlers Ltd.	E-48	0.8	1	0.80	85259	78	85181	58745	390	58355	25026	471	24555
5	Deedee Enterprises	E-48	0.8	1	0.80	82440	75	82365	52041	346	51695	20998	395	20603
6	JN Investment	E-48	0.8	1	0.80	88612	82	88530	53902	358	53544	24091	453	23638
7	Metalfab Hightech Private Limited	E-48	0.8	1	0.80	67971	62	67909	46931	312	46619	18983	357	18626
8	SE Investment	E-48	0.8	1	0.80	80542	74	80468	54282	361	53921	24656	464	24192
9	Brindavan Bottlers Ltd.	E-48	0.8	1	0.80	84064	77	83987	60044	399	59645	25247	475	24772
10	Delta Enterprises	E-48	0.8	3	2.40	247828	227	247601	158704	1055	157649	67091	1262	65829
11	Sankalp International	E-48	0.8	1	0.80	86325	79	86246	53258	354	52904	21441	403	21038
12	Malani Impex Inc.	E-48	0.8	1	0.80	88080	81	87999	51093	339	50754	23203	436	22767
	<b>Total</b>			<b>31</b>	<b>24.80</b>	<b>2377504</b>	<b>2176</b>	<b>2375328</b>	<b>1500013</b>	<b>9966</b>	<b>1490047</b>	<b>671167</b>	<b>12622</b>	<b>658545</b>





Dec-11			Jan-12			Feb-12			Mar-12			Apr-12		
E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy
530089	2879	527210	621479	2533	618946	772638	1402	771236	1082073	2241	1079832	1036000	1519	1034481
118103	642	117461	117353	478	116875	159032	288	158744	243877	505	243372	231906	339	231567
74602	405	74197	81214	331	80883	112545	204	112341	163421	340	163081	136578	200	136378
47875	260	47615	47136	192	46944	59349	108	59241	94704	196	94508	88177	129	88048
37808	205	37603	37791	154	37637	43992	80	43912	49836	103	49733	73715	108	73607
40974	223	40751	44810	183	44627	50931	92	50839	87873	182	87691	81754	120	81634
30389	165	30224	40976	167	40809	54780	99	54681	83881	175	83706	75602	111	75491
48631	264	48367	45584	186	45398	57573	104	57469	87807	182	87625	85261	125	85136
43956	239	43717	47005	192	46813	60830	110	60720	79590	165	79425	84697	124	84573
116789	634	116155	123768	505	123263	172445	312	172133	260917	540	260377	231048	339	230709
31726	172	31554	29071	119	28952	48920	89	48831	72496	151	72345	65656	96	65560
43092	234	42858	43317	176	43141	53532	97	53435	86587	179	86408	76565	112	76453
<b>1164034</b>	<b>6322</b>	<b>1157712</b>	<b>1279504</b>	<b>5216</b>	<b>1274288</b>	<b>1646567</b>	<b>2985</b>	<b>1643582</b>	<b>2393062</b>	<b>4959</b>	<b>2388103</b>	<b>2266959</b>	<b>3322</b>	<b>2263637</b>



May-12			Jun-12			Jul-12			Aug-12			Sep-12		
E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy	E WEG, Export	E WEG. Import	EGy
1662442	757	1661685	3491047	585	3490462	3197920	338	3197582	1403221	2351	1400870	658091	3599	654492
389369	177	389192	738918	124	738794	613436	65	613371	320646	537	320109	152276	833	151443
244706	111	244595	405214	68	405146	405367	43	405324	206428	346	206082	95913	525	95388
141866	65	141801	266840	45	266795	240947	25	240922	115549	194	115355	60860	331	60529
134100	61	134039	259809	44	259765	233797	25	233772	100905	169	100736	25162	138	25024
143421	65	143356	266322	45	266277	255918	27	255891	120376	202	120174	44236	242	43994
124395	57	124338	250644	42	250602	226404	24	226380	106341	178	106163	45904	251	45653
140815	64	140751	250452	42	250410	226786	24	226762	107518	180	107338	56748	310	56438
146184	67	146117	274518	45	274473	258412	27	258385	122656	206	122450	60047	328	59719
400439	182	400257	759949	127	759822	699384	74	699310	331840	557	331283	87620	479	87141
137176	63	137113	273407	46	273361	249787	26	249761	118137	198	117939	54814	299	54515
142458	65	142393	278755	47	278708	255536	27	255509	120533	202	120331	57424	314	57110
<b>3807371</b>	<b>1734</b>	<b>3805637</b>	<b>7515875</b>	<b>1260</b>	<b>7514615</b>	<b>6863694</b>	<b>725</b>	<b>6862969</b>	<b>3174150</b>	<b>5320</b>	<b>3168830</b>	<b>1399095</b>	<b>7649</b>	<b>1391446</b>