

**MONITORING REPORT FORM (CDM-MR) ***
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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

**MONITORING REPORT**
Version 1.0 and Date 04/10/2011**Title: Bundled Wind power project in Jaisalmer (Rajasthan in India) managed by
Enercon (India) Ltd.****Project Reference No: 0310****Monitoring Period No 2- FROM 01/07/2006 TO 31/08/2011 (including first and last day)****SECTION A. General description of the project activity****A.1. Brief description of the project activity: >>**

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The project activity involves the development and operation of grid-connected wind based electricity generation facilities with aggregate installed capacity of 58.2 MW, located within a wind park.

The project activity generates and sells electricity to the RRVPNL under 20 year power purchase agreements (PPAs) under similar tariff. Enercon (India) Limited provides operation and maintenance services under contract to the sponsors for the entire 58.2 MW capacities. All the component wind farms have been commissioned, and supplies electricity to the RRVPNL in accordance with the preferential dispatching system.

The project activity involves development, design, engineering, procurement, finance, construction, operation and maintenance of wind energy based electricity generating stations that will provide electricity to the RRVPNL grid under the PPAs.

Apart from the generation of electrical power, the Project also contributes to the following:

- Sustainable development, through utilisation of renewable wind resources available in the region where the Project will operate;
- Reduction of Green House Gases, specifically CO₂;
- Rural and Infrastructural development in the areas around the Project;
- Capacity addition to the present installed capacity and increase in the energy availability at places of scarcity;
- Strengthening the countries rural electrification coverage;
- Generation of permanent and temporary employment and production of indirect employment in the area; and
- Project contribution for community development of the local rural area.

The first machine under the project activity was commissioned on 29 September 2003 and last machine under the project activity was commissioned on 21 June 2004. The expected operational lifetime of the project is for 20 years. The total emission reductions achieved under this monitoring period (01 July 2006 to 31 Aug 2011) is **374,562 tCO₂**.

A.2. Project Participants

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- 1) Enercon (India) Limited
- 2) 'Netherlands' Ministry of Infrastructure and the Environment (IenM)
- 3) International Finance Corporation as Trustee of the IFC-Netherlands Carbon Facility (INCaF)

**A.3. Location of the project activity:**

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The wind farm is located at Soda village, in Jaisalmer District of Rajasthan state in India. The project area is located in a wind zone of geographic location 26°54'N and 70°55'E. The project area extends between 26°40'N latitude and 69°36'E longitude to 26°42'N latitude and 69°38'E longitude. The sites are located at a distance of 5 – 45 km from Jaisalmer, 300 km from Jodhpur by road. The nearest railway station is at Jaisalmer.

A.4. Technical description of the project

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The facilities included in the project activity utilize a total of 97 numbers of 600 kW rated turbines (Enercon make). These turbines are linked from individual facilities through internal electrical lines connecting the wind park to a local 33/132kV sub-station, and a 132kV Double Circuit line with the RRVPNL 220/132kV sub-station at Badabagh using the local transmission lines.

The turbines generate 3-phase power at 400V, which is stepped up to 33KV. The substations and 33KV lines are maintained by the RRVPNL. The wind farms operate as base load units and can operate in the frequency range of 47.5 – 51.5Hz. The wind farms generate data every 30 minutes on the unit of electricity generated and dispatched to the grid; such data is being monitored and tracked by EIL on a daily basis.

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 ensuring optimum efficiency at all times, having speed range of 18 to 33 RPM.
- 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 WEC 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 System.
- 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.

EIL 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.

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Baseline Methodology: *“Consolidated baseline methodology for zero-emissions grid-connected electricity generation from renewable sources”, ACM0002, Version 4.*



Monitoring Methodology: “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, **ACM0002, Version 4**

A.6. Registration date of the project activity:

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29/05/2006¹
A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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01 Jul 04 - 30 Jun 14 (Fixed)

A.8. Name of responsible person(s)/entity(ies):

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Contact Information of responsible person(s)/entity(ies) is given in the table below:

Organization:	Enercon (India) Ltd.
Street/P.O.Box:	A-9, Veera Industrial Estate, Veera Desai Road, Andheri (West)
Building:	Enercon Towers
City:	Mumbai
State/Region:	Maharashtra
Postfix/ZIP:	400 053
Country:	India
Telephone:	+91-22-66924848
FAX:	+91-22-66921175
E-Mail:	yogesh.mehra@enerconindia.net
URL:	
Represented by:	
Title:	Managing Director
Salutation:	Mr.
Last Name:	Mehra
Middle Name:	
First Name:	Yogesh
Department:	Corporate
Mobile:	
Direct FAX:	+91-22-66921175
Direct tel:	+91-22-66924848
Personal E-Mail:	yogesh.mehra@enerconindia.net

SECTION B. Implementation of the project activity
B.1. Implementation status of the project activity

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The first machine under the project activity was commissioned on 29 September 2003 and last machine under the project activity was commissioned on 21 June 2004.

¹ <http://cdm.unfccc.int/Projects/DB/DNV-CUK1143050217.74/view>



During the present monitoring period project capacity has been changed from 58.2 MW to 54.0 MW. The capacity distribution has changed as follows:-

- 1) The ownership of 31 machines owned by different customers has changed to Enercon Wind Farm (Temdarai) Pvt. Ltd (“EWFTPL”) and
- 2) The ownership of 1 machines owned by Dempo Industries Pvt Ltd has changed to Enercon (India) Limited (“EIL”) and
- 3) The ownership of 7 machines owned by Shriram Transport Finance Co. Ltd has changed to NU Power Renewables Ltd.

List of the machines for which ownership has changed is given below:-

S.No.	Customers	Number of Machines	Capacity [MW]	Remark
1	R.K. Marbles Group	10	6.0	The following 31 number of machines are transferred to EWFTPL
	Revathi Equipment Ltd.	4	2.4	
	Rannaisance Asset Management Co. Pvt. Ltd.	2	1.20	
	Texmo Group	7	4.2	
	Venlon Polyester Film Ltd.	5	3.0	
	Dinesh Pouches Ltd.	3	1.8	
2	Dempo Industries Pvt. Ltd	1	0.60	The 01 number of machine are transferred to EIL
3	Shriram Transport Finance Co. Ltd	7	4.2	Ownership of following 7 WEGs has been changed to NU power Renewables Ltd.
	Total	39	23.4	

Out of these 31 machines for which ownership has been changed to EWFTPL, 6 WEGs have been decommissioned by EWFTPL. For one machine ownership has been changed from Dempo Industries Pvt. Ltd to EIL which was further decommissioned. The total installed capacity is therefore decreased from 58.2 MW to 54.0 MW.

The 7 machines with a capacity of 4.2 MW, for which ownership has changed to NU Power Renewables Ltd. which were originally belonged to Shriram Transport Finance Co. Ltd.

B.2. Revision of the monitoring plan

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Not Applicable

B.3. Request for deviation applied to this monitoring period

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Not Applicable

B.4. Notification or request of approval of changes

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Not Applicable

SECTION C. Description of the monitoring system

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The monitoring methodology is used in conjunction with the adopted baseline methodology (ACM0002) that is applicable to electricity capacity additions from wind sources.

The methodology requires monitoring of the following:

- Electricity generation from the proposed project activity;
- Operating margin emission factor, if needed based on choice of methodology
- Build margin emission factor of the grid, if needed based on choice of methodology

For the project activity to establish its creditable emission reduction, it has to record the actual electricity generation, which would displace equivalent units of electricity at the operating and build margin of the Northern regional grid. Since the simple OM emission factor is calculated based on a 3 year average, based on the most recent statistics available at the time of PDD preparation, its updation based on ex post monitoring is not required. For BM calculation, option 1 (refer ACM 0002) has been chosen, which is calculated ex ante based on the most recent information, hence its monitoring is also not required. Thus, under the monitoring protocol for the project it is required to:

- Monitor and record the actual units of electricity supplied to the grid by the wind farms

Calculation of Net Electricity Supplied to the grid by project activity:

The project activity is located in Sodabandhan and Temdarai. The WEC's are connected to Amarsagar substation. In addition to the project activity, the wind farms of non project activity 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 and non 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 (Local Control System) LCS meters at the individual wind turbines.

The net electricity supplied to the grid will be calculated on monthly basis at the State utility (State utility) substations (Amarsagar) wherein the billing meter is connected. The monthly joint meter readings are taken by the representatives of state utility and Enercon (PP's representative) who also signs the JMR. Simultaneously, the monthly joint meter reading of backup meters available at EIL pooling sub-stations (Temedari) is also taken by representatives of state utility and Enercon. The copy of JMR at backup meters is available with Enercon.

Since the project activity WEGs are connected through common metering system along with non project activity WEGs of other customers, apportioning of net electricity recorded at billing meter is indicated



in JMR sheet. JMR will be apportioned to calculate the net electricity supplied WEGs of the project activity.

Based on the monthly JMR reading, which is signed by representative of state utility and PP's representative (Enercon); Enercon prepares the monthly breakup generation sheets which indicate the net electricity supplied by individual customers to the grid. An apportioning procedure is used by PP's representative to arrive at net electricity supplied to the grid by individual investors.

The monthly generation sheet is submitted to both, state utility as well as individual investors. PP raises the invoice based on the monthly breakup sheet corresponding to the net electricity generation value indicated in the monthly breakup sheet. DISOM based on the JMR reading along with monthly breakup sheet prepared by Enercon and the invoice raised by investors, conduct the audit to cross check the net electricity values and in case all the values are found to be correct, state utility release the payment against the invoice raised by individual investors.

The values of the net electricity supplied to grid by project activity can be cross checked with invoices raised by the PP on state utility and/or RTGS transaction or cheque copy. Please refer annex 1 for detailed monitoring information.

Allocation plan for calculating net electricity exported to the grid as used by PP's representative to prepare monthly breakup sheets for project activity is as follows:-

The monthly JMR reading contains the net electricity supplied by all the WEGs, project activity as well as non project activity connected to the metering system at state utility substation. Hence in order to arrive at the net electricity supplied by WEGs of the project activity, following procedure is used by O&M contractor (Enercon):-

Electricity Export to the grid by the sub-project included in the project activity,

$$EG_{Export,y,M} = \frac{EG_{JMR,Export} * \sum EG_{Controller,N,M}}{\sum EG_{Controller,i}^2} \dots\dots\dots(1)$$

Electricity Import from the grid by the sub-project activity included in the project activity,

$$EG_{Import,y,M} = \frac{EG_{JMR,Import} * \sum EG_{Controller, N,M}}{\sum EG_{Controller,i}} \dots\dots\dots(2)$$

Wherein,

$\sum EG_{Controller, N,M}$ = Electricity exported by the sub project included in the project activity, as recorded at LCS where N is number of WEGs in the sub project M included in the project activity

$\sum EG_{Controller,i}$ = Electricity exported by project activity as well as non project activity

² The report detailing the value of $\sum EG_{Controller}$ can be provided to the verifying DOE on request.



WEGs, as recorded at the LCS where ‘i’ is number of WEGs including project and non project.

$EG_{\text{Controller},i}$ = Electricity exported by an WEG (project or non project), as recorded at the LCS

$EG_{\text{JMR,Export}}$ = Electricity export recorded at respective billing meters located at state utility sub-station

$EG_{\text{JMR,Import}}$ = Electricity import recorded at respective billing meters located at state utility sub-station

Therefore net electricity supplied to grid by WEGs of the project activity is calculated as:

$$EG_y = \sum EG_{\text{Export},y,M} - \sum EG_{\text{Import},y,M}$$

Even though the above mentioned of apportioning is done by the PP’s representative and submitted to respective state utility, the same undergoes the series of audit by the hierarchy of auditors (Asst. Auditors, divisional auditors & account auditors) and then finally authorised by the Superintending engineer (SE) of the circle office of respective state utility.

The above method of apportioning is not conducted by the PP but is described in details only to provide the clear description of entire procedure by relevant authority. Further values of $\sum EG_{\text{Export},y,M}$ & $\sum EG_{\text{Import},y,M}$ will be directly sourced from generation breakup sheets.

Details of metering equipment:

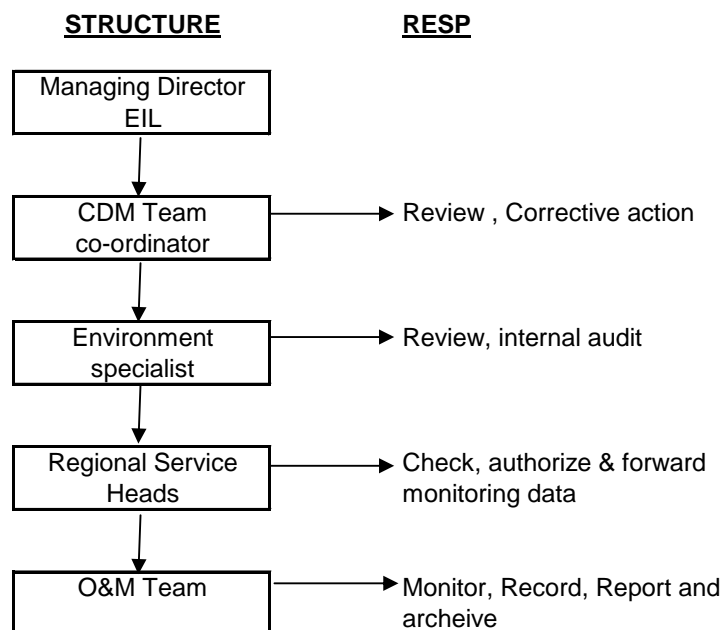
The metering equipments (main & back up meters) were tested by State Utility on annual basis. There are two main meters at Amarsagar sub-station & 2 backup meters as Temdari sub-station. Meter details for the all the meters are as follows:-

Sub-Station	Meter Description	Meter Serial No.	Make	Accuracy	Type	Meter Calibration Details	
						Date of Last calibration	Due date of calibration
Amarsagar	Main Meter – Line 1	TNU00946	Secure Meters Ltd.	0.2 s	Two-way tri-vector meters capable of recording export and import.	26/03/2011	25/03/2012
	Main Meter – Line 2	TNU00945		0.2 s		26/03/2011	25/03/2012
Temdari	Backup Meter – Line 1	RJB00052		0.2 s		28/03/2011	27/03/2012
	Backup Meter – Line 1	ABB00691		0.2 s		28/03/2011	27/03/2012



All the billing & Back meters are calibrated by state utility annually and the records are available with PP.

The Project is operated and managed by Enercon (India) Ltd. The operational and management structure implemented by Enercon is as follows:



ORGANOGRAM OF THE CDM PROJECT MONITORING

SECTION D. Data and parameters

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D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	$EF_{CM,v}$
Data unit:	tCO ₂ e/MWh
Description:	Combined Margin Emission Factor of Southern Regional Electricity Grid Grid
Source of data used:	“CO ₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India. The “CO ₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in
Value(s) :	= 0. 90852
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions



Additional comment:	None
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Data / Parameter:	$EF_{OM,y}$		
Data unit:	tCO ₂ e/MWh		
Description:	Operating Margin Emission Factor of Southern Regional Electricity Grid		
Source of data used:	<p>“CO₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The “CO₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in</p>		
Value(s) :	2001 – 02	1.12172	
	2002 – 03	1.12260	
	2003 – 04	1.09083	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions		
Additional comment:	None		

Data / Parameter:	$EF_{BM,y}$		
Data unit:	tCO ₂ e/MWh		
Description:	Build Margin Emission Factor of Southern Regional Electricity Grid		
Source of data used:	<p>“CO₂ Baseline Database for Indian Power Sector” published by the Central Electricity Authority, Ministry of Power, Government of India.</p> <p>The “CO₂ Baseline Database for Indian Power Sector” is available at www.cea.nic.in</p>		
Value(s) :	2003 – 04	0.72621	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions		
Additional comment:	None		

D.2. Data and parameters monitored

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Data / Parameter:	EG_y
Data unit:	MWh (Mega-Watt hour)
Description:	Net electricity supplied to the grid by the Project activity
Measured /Calculated /Default:	Calculated
Source of data:	Generation break-up sheets prepared by the O&M contractor which is based on the monthly JMR reading and the LCS reading.



Value(s) of monitored parameter:	=412,279.326
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please refer section C of Monitoring Report for the information on Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report for calculation method.
QA/QC procedures applied:	Value of EG_y can be cross checked with the tariff invoices raised on the state utility . Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	$EG_{Export,y,M}$
Data unit:	MWh (Mega-watt hour)
Description:	Electricity export to the grid by the sub-Project included in the project activity, where M is any sub project included the project activity.
Measured /Calculated /Default:	Calculated
Source of data:	Generation break-up sheets prepared by the O&M contractor which is based on the monthly JMR reading and the LCS reading.
Value(s) of monitored parameter:	Refer CER calculation sheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please refer section C of Monitoring Report for the information on Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report for calculation method.
QA/QC procedures applied:	Value of $EG_{Export,y,M}$ can be cross checked with the tariff invoices raised on the state utility . Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.



Data / Parameter:	$\sum EG_{\text{Export},y,M}$
Data unit:	MWh (Mega-watt hour)
Description:	Summation of Electricity export to the grid by all the sub-Projects included in the project activity.
Measured /Calculated /Default:	Calculated
Source of data:	Generation break-up sheets prepared by the O&M contractor which is based on the monthly JMR reading and the LCS reading.
Value(s) of monitored parameter:	=412,988.142
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please refer section C of Monitoring Report for the information on Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report for calculation method.
QA/QC procedures applied:	Value of $EG_{\text{Export},y,M}$ can be cross checked with the tariff invoices raised on the state utility . Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	$EG_{\text{Import},y,M}$
Data unit:	MWh (Mega-watt hour)
Description:	Electricity import from the grid by the sub-Project included in the project activity, where M is any sub project included the project activity.
Measured /Calculated /Default:	calculated
Source of data:	Generation break-up sheets prepared by the O&M contractor which is based on the monthly JMR reading and the LCS reading.
Value(s) of monitored parameter:	Refer CER calculation sheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last	Please refer section C of Monitoring Report for the information on Monitoring equipment.



calibration, validity)	
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report for calculation method.
QA/QC procedures applied:	Value of $EG_{Import,y,M}$ can be cross checked with the tariff invoices raised on the state utility. Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	$\sum EG_{Import,y,M}$
Data unit:	MWh (Mega-watt hour)
Description:	Summation of Electricity import from the grid by all the sub-Projects included in the project activity.
Measured /Calculated /Default:	Calculated
Source of data:	Generation break-up sheets prepared by the O&M contractor which is based on the monthly JMR reading and the LCS reading.
Value(s) of monitored parameter:	=708.816
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please refer section C of Monitoring Report for the information on Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report for calculation method.
QA/QC procedures applied:	Value of $EG_{Import,y,M}$ can be cross checked with the tariff invoices raised on the state utility. Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	$EG_{JMR, Export}$
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity export by all the WTGs (project and non-project) recorded at state utility sub-station at Amarsagar.
Measured /Calculated /Default:	Measured
Source of data:	Monthly JMR sheets recorded by representative of both state utility & Enercon



Value(s) of monitored parameter:	Refer CER calculation sheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please refer section C of Monitoring Report for the information on Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report.
QA/QC procedures applied:	Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	EG_{JMR, Import}
Data unit:	MWh (Mega-Watt hour)
Description:	Electricity import by all the WTGs (project and non-project) recorded at state utility sub-station at Amarsagar.
Measured /Calculated /Default:	Measured
Source of data:	Monthly JMR sheets recorded by representative of both state utility& Enercon
Value(s) of monitored parameter:	Refer CER calculation sheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Please refer section C of Monitoring Report for the information on Monitoring equipment.
Measuring/ Reading/ Recording frequency:	Monthly.
Calculation method (if applicable):	Please refer section C of Monitoring Report.
QA/QC procedures applied:	Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic and hard paper format for crediting period + 2 years.

Data / Parameter:	$\sum EG_{\text{Controller}, N, M}$
Data unit:	MWh (Mega-Watt hour)
Description:	Net Electricity exported by all the WEGs of sub-project (M) included in the project activity, as measured at the LCS where M is any sub



	project included in the project activity.
Measured /Calculated /Default:	Measured
Source of data:	Monthly generation report (LCS) sourced from SCADA provided by Enercon.
Value(s) of monitored parameter:	-
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately.
Measuring/ Reading/ Recording frequency:	The value is monitored continuously and recorded daily by the online monitoring station at the site. In addition to the daily generation report and monthly generation report are also available at monitoring station.
Calculation method (if applicable):	-
QA/QC procedures applied:	Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic format for crediting period + 2 years.

Data / Parameter:	$\sum EG_{\text{Controller } i}$
Data unit:	MWh (Mega-Watt hour)
Description:	Net Electricity exported by all the WEGs (project activity and non-project activity) at site connected at main metering system of state utility, as measured at the LCS
Measured /Calculated /Default:	Measured
Source of data:	Monthly generation report (LCS) sourced from SCADA provided by Enercon.
Value(s) of monitored parameter:	-
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	All the LCS meters are auto calibrated. In case of any fault WEG stops automatically and meter is replaced immediately.
Measuring/ Reading/ Recording frequency:	The value is monitored continuously and recorded daily by the online monitoring station at the site. In addition to the daily generation report and monthly generation report are also available at monitoring station.
Calculation method (if applicable):	-



QA/QC procedures applied:	Please refer annex 1 for detailed monitoring information. The data will be archived both in electronic format for crediting period + 2 years.
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The data will be stored in hard format and soft format by PP (Enercon) at the project site office. Joint meter reading is taken in the presence of the persons representing Enercon [Operation and Maintenance Contractor]. The archive will be kept for the period up to two years after the completion of the crediting period.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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“The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO₂e/kWh) calculated in a transparent and conservative manner as the weighted average emissions (in kg CO₂e/kWh) as described in registered PDD.

$$BE_y = EG_y * EF_y$$

Where,

BE is baseline emissions in year y, tCO₂e

EG_y is the net electricity supplied to the grid in year y and is applied directly from JMR (Form B) certified by state utility. This value can also be cross checked from the invoice.

EF_y is the CO₂ emission factor of the grid (908.52 tCO₂e/GWh fixed ex-ante).

Baseline emission reductions for project activity:-

Duration	Export (kWh)	Import (kWh)	Net Export to grid (kWh)	Baseline Emission Factor (tCO ₂ e/MWh)	Baseline Emission Reductions (tCO ₂ e)
	[EG _{export}]	[EG _{import}]	[EG _y]	[EF _y]	[BE _y]
Jul 06 to Dec 06	36,957,502	100,174	36,857,328	0.9085	33,485
Jan 07 to Dec 07	80,428,287	145,941	80,282,346	0.9085	72,938
Jan 08 to Dec 08	86,444,363	113,792	86,330,571	0.9085	78,433
Jan 09 to Dec 09	81,433,905	107,106	81,326,799	0.9085	73,887
Jan 10 to Dec 10	68,975,453	172,117	68,803,336	0.9085	62,509
Jan 11 to Aug 11	58,748,632	69,686	58,678,946	0.9085	53,310
Total	412,988,142	708,816	412,279,326		374,562

E.2. Project emissions calculation

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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. Leakage calculation



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

E.4. Emission reductions calculation / table

>>

The total emission reductions achieved during the monitoring period is **374,562 tCO₂**.

Total baseline emissions: tCO₂

Total project emissions: Zero

Total leakage: Zero

$$\begin{aligned} \text{Emission reductions } E_{Ry} &= B_{Ey} - P_{Ey} \\ &= \mathbf{374,562 \text{ tCO}_2} \end{aligned}$$

Months	Baseline Emissions [tCO ₂ e]	Project Emissions [tCO ₂ e]	Emission Reductions [tCO ₂ e]
	[B _{Ey}]	[P _{Ey}]	[E _{Ry}] = [B _{Ey}] - [P _{Ey}]
Jul 06 to Dec 06	33,485	0	33,485
Jan 07 to Dec 07	72,938	0	72,938
Jan 08 to Dec 08	78,433	0	78,433
Jan 09 to Dec 09	73,887	0	73,887
Jan 10 to Dec 10	62,509	0	62,509
Jan 11 to Aug 11	53,310	0	53,310
Total	374,562	0	374,562

Total Emission Reductions for the monitoring period are **374,562**

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO ₂ e)	478,790 (62 months equivalent of annually 92,669 emission reductions estimated in the registered PDD)	374,562

E.6. Remarks on difference from estimated value in the PDD

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There is change of 21.76% (downside) in the expected and annual emission reductions. The difference in the total CERs is due to low wind availability leading to low plant load factor.

History of the document

Version	Date	Nature of revision
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**CDM – Executive Board**

EB 54
Report
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01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Guideline, Form Business Function: Issuance		



Annex 1

MONITORING INFORMATION

Metering and Monitoring Plan details

The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication shall be applicable as per the PPA (Power purchase agreement) with the State electricity board.

Metering information for the project activity is as follows:-

- There are two billing main metering points located at 132kV State utility's sub-station at Amarsagar.
- In addition to main metering points there are two backup metering points located at 132kV Enercon's sub-station at Temedarai.
- All the above meters are 0.2% accuracy class. There are other WEGs apart from the project activity WEGs, which are connected to these meters at respective sub-station.
- The electricity supplied to the grid will be metered at the 132 kV level at the RRVPN substation at Amarsagar. Representatives of state utility 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 the 132 kV level of the backup metering system at Temedarai substation will also be taken by representatives of state utility and Enercon.
- Monthly Joint Meter Recording recorded is done at billing metering point at both Amarsagar sub-station & Temedarai sub-station by state utility in the presence of PP's representative (Enercon).
- Joint meter reading records the values of export, import based on which the net export by all the WEGs (Project as well as non-project) connected to billing metering point at the state utility sub-station (Amarsagar) is calculated.
- Based on the monthly JMR reading and the LCS reading of Project as well as non-project WEGs the PP representative prepares the breakup sheet which indicates the energy Exported, Imported & net electricity supplied by the individual WEGs. This breakup sheet is then submitted to State utility authority as well as the individual investors.
- Based on this breakup sheet the PP raises an invoice and submits to the State utility.
- The State utility authority conducts a thorough review based on the JMR readings, breakup sheets and the invoice raised by individual investors. The audits are conducted by senior official based at the circle office of individual State utility and only after the authorisation of submitted documents/ records by the superintending engineer of the respective State utility, are the payments released to the individual investor.

Metering Equipment and Metering Arrangement Information



- The entire main & back meters are of 0.2 accuracy class. The meters used are Trivector 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.
- If main meter goes defective and the backup meter is working within the permissible limits of error, the consumption recorded by the backup meter will be referred. If backup meter goes defective and the main meter is working within the permissible limits of error, the consumption recorded by the main meter will be referred. If main as well as back up metering system becomes defective, 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.
- The main and the backup metering systems will be sealed in presence of representatives of Enercon and state utility.
- The LCS meter readings recorded at the WEGs are used for allocation of the net electricity exported to the grid from the project activity. The LCS meter readings are archived electronically on hourly 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 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. The correction factor will be applied to the LCS meter reading up to the last months meter reading.