

1.2 MW World Institute of Sustainable Energy Wind Farm
in Karnataka
(Ist Verification Activity)

MONITORING REPORT

Monitoring Period: 01/04/2006 to 31/12/2009

(Inclusive of both days)

Version: 5.0

Date: 31/03/2011

Total Emission Reductions in the monitoring period: 10,578

VCS Project ID No: VCS 389

Enercon (India) Limited

Enercon Tower, A-9, Veera Industrial Estate, Veera Desai Road,

Andheri (West)

Mumbai – 400 053

(Maharashtra)

URL: www.enerconindia.net

Project Title:

1.2 MW World Institute of Sustainable Energy Wind Farm in Karnataka

Version: Version 3.0**Date:** 28/08/2010**Standard Followed:** VCS 2007.1**Project Participants:**

Name of Party involved ((host) indicates a host Party)	Private and/or public entity (ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host)	World Institute of Sustainable Energy	No

Project Location:

Vanivilas sagar site in Chitradurga District in the Indian state of Karnataka

Monitoring Period

Start: 01 April 2006

End: 31 December 2009

Contents

A. Project Description:.....	4
B. Project Performance:	4
C. Project Location:	4
D. Project Reference:	5
E. Monitoring Information:.....	5
Metering:.....	5Fehler! Textmarke nicht definiert.
F. Metering System:.....	5Fehler! Textmarke nicht definiert.
G. Monitoring parameters	7
H. Emission Reduction Calculations:	7
I. Roles and Responsibility:	12
Annex 1: Contact Information on Participants in the Project Activity	14

A. Project Description:

The purpose of the 1.2MW World Institute of Sustainable Energy Wind Farm in Karnataka is development, design, engineering, procurement, finance, construction, operation and maintenance by Enercon (India) Limited in the Indian state of Karnataka to provide reliable, renewable power to the Karnataka state electricity grid which is part of the Southern grid. The project is located in Elladakere village in Chitradurga District in the state of Karnataka. The project is helping in bridging the gap between demand and supply by using wind as a source of generating electrical energy.

The project activity consists of 2 E-40 Enercon make Wind Energy Generators (WEGs) with each machine capacity of 600 kW totaling to the capacity of 1.20 MW. The Project considered harness renewable resources in the region, thereby displacing non-renewable natural resources and 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

B. Project Performance:

The project has supplied 11.43 GWh of electricity to the grid in the monitoring period which indicates that the project has performed reasonably well during the monitoring period (1 April 2006 to 31 December 2009).

Comparison of Estimated performance versus Actual Performance:

The amount of net electricity projected in the validated VCS PD was 2800.397 MWh per year. The assumptions in the VCS PD were made on the basis of the offer letter from Enercon (India) Limited to WISE which specify a PLF of 26.64%. The number of VERs at 26.64% PLF was calculated as 2595 VER's per year. However, for the Monitoring period the PLF observed is 28.20%. This is primarily due to a good wind regime in the site. The difference in the observed and projected PLF is 5.8% higher which has subsequently led to an increase in the electricity generation and thereby increase in the number of VCUs.

C. Project Location:

The Project is located at Vanivilas Sagar site in Elladakere village of Chitradurga District in state of Karnataka. The location of the units is on the micrositing data to get optimum performance. The latitudinal & longitudinal as well as the unique identification details are as given in the following table:

Project	Commissioning Date	Name of Site	Unique Identification No.	Latitude	Longitude
1.2 MW WISE wind Power Project.	05 Nov 2004	Vani Vilas Sagar	WISE-01 WISE-02	North 13° 49' 57.2" and North 13° 49' 54.3"	East 76° 30' 01.2" & East 76° 30' 01.5"

D. Project Reference:

Title of the project	:	1.2 MW World Institute of Sustainable Energy Wind Farm in Karnataka
Project activity scale	:	Small
Sectoral scope	:	1, Energy Industries (renewable/- non renewable sources)
Type and Category	:	1, Renewable Energy Project D, Grid connected renewable electricity generation
Approved baseline Methodology	:	AMS I.D version 13
Approved monitoring methodology	:	AMS I.D version 13

E. Monitoring Information:

Monitoring of emission reductions are carried out following the guidance provided in the applicable methodology for the project activity i.e. AMS-ID version 13. Monitoring shall consist of metering the electricity generated by the renewable technology. Accordingly, electricity generation from the project activity; and Operating margin emission factor and build margin emission factor of the grid, where ex post determination of grid emission factor has been chosen. Since the baseline methodology is based on ex ante determination of the baseline, the monitoring of operating margin emission factor and build margin emission factor is not required and monitoring of electricity generated in described below:

The general conditions set out for metering, recording, meter readings, meter inspections, Test & Checking and communication are as per the PPA (power purchase agreement) with BESCOM.

Metering:

The Delivered Energy is metered by the Parties at the high voltage side of the step up transformer installed at the Project Site. The meter readings are taken jointly by the representatives of O&M contractor and transmission/distribution utility and are recorded in the Joint Meter Reading document. The net electricity supplied to the grid is calculated by the transmission/distribution utility by subtracting the transmission losses from recorded meter readings in accordance with the Power Purchase Agreement. The net electricity supplied to the grid shall be sourced from the JMR and can be cross checked from the invoice.

F. Metering Equipment:

Metering equipment shall be electronic trivector meters of accuracy class 0.2% required for the Project (both main and check meters). The main meter shall be installed and owned by the Company, whereas check meters shall be by the BESCOM. Dedicated core of both CT's and PT's of required accuracy shall be made available by the Company to BESCOM. The metering equipment are maintained in accordance with electricity standards. Such equipment has the capability of recording half-hourly and monthly readings. The meter installed is capable of recording and storing half hourly readings of all the electrical parameters for a minimum period of 35 days with digital output.

Meter Readings: The monthly meter readings (both main and check meters) are taken jointly by the parties on the first day of the following month. At the conclusion of each meter reading

an appointed representative of the BESCOM and the Company sign a document indicating the number of Kilowatt-hours indicated by the meter.

Inspection of Energy Meters: All the main and check energy meters (export and import) and all associated instruments, transformers installed at the Project are of 0.2% accuracy class. Each meter is jointly inspected and sealed on behalf of the Parties and is not interfered with by either Party except in the presence of the other Party or its accredited representatives.

Meter Test Checking: All the main and check meters are tested for accuracy every calendar year with reference to a portable standard meter which is of an accuracy class of 0.1%. The portable standard meter is owned by the BESCOM at its own cost and tested and certified at least once every year from an accepted laboratory standard meter in accordance with electricity standards. The meters are deemed to be working satisfactorily if the errors are within specifications for meters of 0.2 accuracy class.

The consumption registered by the main meters alone will hold good for the purpose of calculating emission reductions as long as the error in the main meters is within the permissible limits.

If during the annual tests, the main meter is found to be within the permissible limit of error and the corresponding check meter is beyond the permissible limits, then electricity supplied will be as per the main meter as usual. The check meter shall, however, be calibrated immediately. If during the annual tests, the main meter is found to be beyond permissible limits of error, but the corresponding check meter is found to be within permissible of error, then the net electricity generated for the month up to the date and time of such test shall be as per the check meter. There will be a revision in the bills for the period from the previous calibration test upto the current test based on the readings of the check meter. The main meter shall be calibrated immediately and net electricity supplied for the period thereafter till the next monthly meter reading shall be as per the calibrated main meter.

If during the annual tests, both the main meters and the corresponding check meters are found to be beyond the permissible limits of error, both the main meters shall be immediately calibrated and the correction applied to the reading registered by the main meter to arrive the correct reading of energy supplied for the period from the last test upto the current test. The calculation of emission reductions will be based on the net electricity generated for the period thereafter till the next monthly reading shall be as per the calibrated main meter.

If during any of the monthly meter readings, the variation between the main meter and the check meter is more than the permissible limit for meters of 0.2% accuracy class, all the meters shall be re-tested and calibrated immediately.

The Project is operated and managed by Enercon (India) Ltd. Enercon (India) limited is an ISO 9001:2000 certified Quality Management system from Germanischer Lloyd. Enercon India limited follows the documentation practices to ensure the reliability and availability of the data for all the activities as required from the identification of the site, wind resource assessment, logistics, finance, construction, commissioning and operation of the wind power project.

Calibration of instruments: The meters installed at the wind farm are calibrated annually. The meters are checked for accuracy on an annual basis. BESCO's meter testing is done by a separate division of electricity board, which takes care of meter testing in the event of any abnormality observed. As per the validated VCS PD the calibration frequency is once in year. For the project activity during the monitoring period the Meter calibration for the year 2006 was delayed as per the scheduled calibration date. This was because of the shortage of workforce at the state utilities end. Further there was delay in scheduled calibration in year 2007, 2008 & 2009, however, the meters were tested/calibrated in 2007 and were found to be working within permissible error limits.

As per the EB 52 Annex 60 "Guidelines for Assessing Compliance with the Calibration Frequency Requirements" a deduction on account of delayed calibration has been included in the Emission Reduction sheet for the Emission Reductions for the year 2006, 2007, 2008 & 2009.

Since the calibration has been uneven during entire monitoring period, for the purpose of being conservative, correction has been applied on the entire monitoring period. The export has been reduced by 0.2 and the import has been increased by 0.2 to reflect the corrections on account of Maximum Permissible error of the metering instrument. The Emission Reduction Calculation is therefore revised reflecting the changes.

Meter Calibration Details:

Name of the Project	No. of E-40 (600 kW) WECs	Meter Make & Type	Main Meter Serial No.	Check Meter Serial No	KPTCL Substation (66kV)	Date of Calibration
1.2 MW World Institute of Sustainable Energy Wind Farm in Karnataka	2	L & T Trivector type	04219535	04219530	Method	17.01.2007
						26.02.2008
						30.09.2009

Frequency of meter reading:

The BESCO officials and plant personnel take meter reading every month jointly.

Archiving of data: Data shall be archived for crediting years (10 years) + 2 years.

G. Monitoring parameters

The monitoring parameter is the electricity exported to the grid from the project and electricity imported from the grid to the project.

The monitoring parameter is given in the following table:-

Data / Parameter:	EG,export
Data unit:	kWh (kilo-watt hour)/year
Description:	Electricity exported to the grid by the project activity in year y
Source of data to be used:	Electricity supplied to the grid as per the monthly certificates issued by Bangalore Electricity Supply Company Ltd (BESCO).
Value of data	Annual electricity exported to the grid by the Project :

	Year	Energy Export, EG export in KWh
	1-Apr-06 to 31-Dec-06	2,768,862.60
	1-Jan-07 to 31-Dec-07	2,992,802.40
	1-Jan-08 to 31-Dec-08	2,897,546.40
	1-Jan-09 to 31-Dec-09	2,986,011.00
	Total	11,645,222.40

Description of measurement methods and procedures to be applied:	Net electricity supplied to grid will be measured by the billing meter (export and import). The procedures for metering and meter reading will be as per the provisions of the power purchase agreement signed between WISE and BESCOM (Bangalore Electricity Supply Company)
QA/QC procedures to be applied:	Every month these meter readings are jointly recorded by BESCOM representative and EIL plant personnel. The meters at the sub-station are the two-way meters and are in the custody of BESCOM. Since the readings are taken at the point of supply of power to the grid, the transmission and distribution losses and the minimum reactive power consumption has already been taken into account. The calibration and testing of meters are as described in power purchase agreement and is carried out annually to ensure accuracy of data.
Any comment:	

Data / Parameter:	EG, import												
Data unit:	kWh/year												
Description:	Electricity imported (consumed) by the project activity in year y.												
Source of data to be used:	Electricity supplied to the grid as per the monthly certificates issued by Bangalore Electricity Supply Company Ltd (BESCOM).												
Value of data	<table border="1"> <thead> <tr> <th>Year</th> <th>Energy Import, EG import in KWh</th> </tr> </thead> <tbody> <tr> <td>1-Apr-06 to 31-Dec-06</td> <td>1,794.69</td> </tr> <tr> <td>1-Jan-07 to 31-Dec-07</td> <td>2,744.82</td> </tr> <tr> <td>1-Jan-08 to 31-Dec-08</td> <td>4,011.66</td> </tr> <tr> <td>1-Jan-09 to 31-Dec-09</td> <td>3,589.38</td> </tr> <tr> <td>Total</td> <td>12,140.55</td> </tr> </tbody> </table>	Year	Energy Import, EG import in KWh	1-Apr-06 to 31-Dec-06	1,794.69	1-Jan-07 to 31-Dec-07	2,744.82	1-Jan-08 to 31-Dec-08	4,011.66	1-Jan-09 to 31-Dec-09	3,589.38	Total	12,140.55
Year	Energy Import, EG import in KWh												
1-Apr-06 to 31-Dec-06	1,794.69												
1-Jan-07 to 31-Dec-07	2,744.82												
1-Jan-08 to 31-Dec-08	4,011.66												
1-Jan-09 to 31-Dec-09	3,589.38												
Total	12,140.55												
Brief description of measurement methods and procedures to be applied:	Net electricity supplied to grid will be measured by the billing meter (export and import). The procedures for metering and meter reading will be as per the provisions of the power purchase agreement signed between WISE and BESCOM (Bangalore Electricity Supply Company)												
QA/QC procedures applied:	Every month these meter readings are jointly recorded by BESCOM representative and plant personnel. The meters at the sub-station are the two-way meters and are in the custody of BESCOM. Since the readings are taken at the point of supply of power to the grid, the transmission and distribution losses and the minimum reactive power consumption has already been taken into account. The calibration and testing of meters are as described in power purchase agreement and is carried out annually to ensure accuracy of data												

Any comments:	
---------------	--

Data / Parameter:	EG_y												
Data unit:	kWh (kilo-watt hour)												
Description:	Net electricity supplied to the grid by the Project												
Source of data to be used:	Calculated from EG _{export} and EG _{import} as (EG _{export} – EG _{import})												
Value of data	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr style="background-color: #add8e6;"> <th>Year</th> <th>Net electricity supplied to the grid in KWh</th> </tr> </thead> <tbody> <tr> <td>1-Apr-06 to 31-Dec-06</td> <td>2,720,996.31</td> </tr> <tr> <td>1-Jan-07 to 31-Dec-07</td> <td>2,942,192.78</td> </tr> <tr> <td>1-Jan-08 to 31-Dec-08</td> <td>2,841,886.37</td> </tr> <tr> <td>1-Jan-09 to 31-Dec-09</td> <td>2,930,799.34</td> </tr> <tr style="font-weight: bold;"> <td>Total</td> <td>11,435,874.81</td> </tr> </tbody> </table>	Year	Net electricity supplied to the grid in KWh	1-Apr-06 to 31-Dec-06	2,720,996.31	1-Jan-07 to 31-Dec-07	2,942,192.78	1-Jan-08 to 31-Dec-08	2,841,886.37	1-Jan-09 to 31-Dec-09	2,930,799.34	Total	11,435,874.81
Year	Net electricity supplied to the grid in KWh												
1-Apr-06 to 31-Dec-06	2,720,996.31												
1-Jan-07 to 31-Dec-07	2,942,192.78												
1-Jan-08 to 31-Dec-08	2,841,886.37												
1-Jan-09 to 31-Dec-09	2,930,799.34												
Total	11,435,874.81												
Description of measurement methods and procedures to be applied:	<p>Net electricity supplied to the grid will be calculated by the two-way export Trivector meter. The Net electricity is recorded as following: <i>(Net Electricity = Net Export – Net Import)</i></p> <p>The procedures for metering and meter reading will be as per the provisions of the power purchase agreement.</p>												
QA/QC procedures to be applied:	<p>Every month these meter readings are jointly recorded by BESCO representative and plant personnel. The meters at the sub station are the two-way meters and are in the custody of BESCO. Since the readings are taken at the point of supply of power to the grid, the transmission and distribution losses and the minimum reactive power consumption has already been taken into account. The calibration and testing of meters are as described in power purchase agreement and is carried out annually to ensure accuracy of data. The detail QA/QC is elaborated in section 3.4</p>												
Any comment:	The monthly readings of electricity generated can be cross verified with the invoice raised by WISE to BESCO every month												

H. Emission Reduction Calculations:

The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

ER_y = BE_y - PE_y - L_y

Project Emissions: The project activity uses wind power to generate electricity and hence the emissions from the project activity are taken as nil.

$$PE_y = 0$$

Leakage: Emissions Leakage on account of the project activity is considered zero.

$$L_y = 0$$

Thus, **ER_y = BE_y**

i.e. the emission reductions are the baseline emissions in this project.

Baseline Emissions:

The baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh)

$$BE_y = EF_y * EG_y$$

Baseline emission factor (EF_y) has been calculated ex-ante and will not be updated during the crediting period of ten years. As per validated PD, $EF_y=926.947 tCO_2/GWh$ or $0.926947 tCO_2/MWh$

Net electricity supplied to the grid and emission reductions by the project activity is calculated using below table:

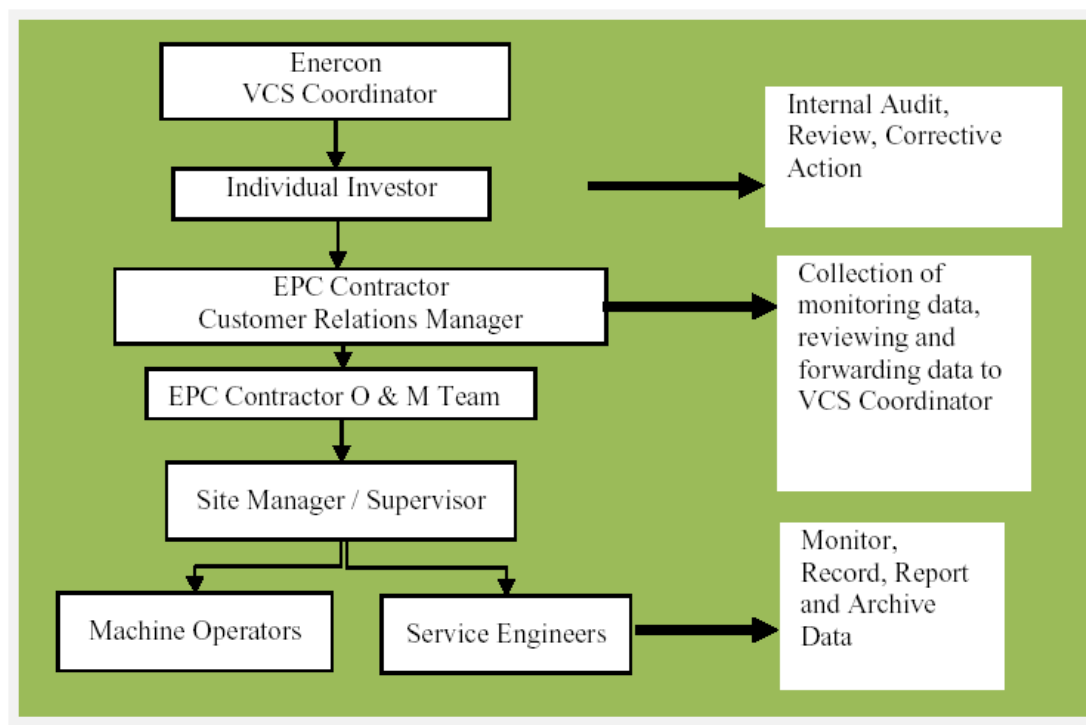
1.2 MW World Institute of Sustainable Energy Wind Farm in Karnataka		Export Energy, EG export (Sourced from Form B)	Import Energy, EG import (Sourced from Form B)	Less 115% Import (EG import*115% sourced from Form B)	Transmission Loss (Sourced from Form B)	Net Energy to be supplied sourced from Form B (Export - 115% Import-Transmission Loss) (kWh), EGy	Emission Reduction calculation
Sr. No	Generation Month						
1	Apr-06	87030	540	621.0	2105	82551	76
2	May-06	278370	180	207.0	4531	268061	248
3	Jun-06	395370	90	103.5	6840	380517	352
4	Jul-06	668430	90	103.5	11452	643504	596
5	Aug-06	586620	0	0.0	9537	565351	524
6	Sep-06	271440	180	207.0	4181	261619	242
7	Oct-06	182340	180	207.0	2506	175976	163
8	Nov-06	138870	180	207.0	2073	133808	124
9	Dec-06	216900	90	103.5	2847	209609	194
10	Jan-07	149310	90	103.5	2229	143989	133
11	Feb-07	109710	450	517.5	1867	105121	97
12	Mar-07	85140	450	517.5	1970	80939	75
13	Apr-07	82890	360	414.0	1686	79124	73
14	May-07	296640	90	103.5	4282	286320	265
15	Jun-07	399330	180	207.0	6360	384772	356
16	Jul-07	542070	90	103.5	9191	521932	483
17	Aug-07	501840	0	0.0	7189	484614	449
18	Sep-07	387000	90	103.5	5811	373343	346
19	Oct-07	133560	360	414.0	2155	128311	118
20	Nov-07	141300	90	103.5	2017	136352	126
21	Dec-07	225090	90	103.5	3107	217376	201
22	Jan-08	163350	180	207.0	2426	157446	145
23	Feb-08	75330	540	621.0	1519	71671	66
24	Mar-08	146700	360	414.0	2269	141075	130
25	Apr-08	110880	900	1035.0	2005	105601	97
26	May-08	235710	180	207.0	3283	227502	210
27	Jun-08	561510	90	103.5	9349	540825	501
28	Jul-08	478980	90	103.5	12079	457215	423

29	Aug-08	405720	90	103.5	6151	391349	362
30	Sep-08	301950	270	310.5	5094	290500	269
31	Oct-08	128970	450	517.5	2271	123592	114
32	Nov-08	165150	90	103.5	2491	159250	147
33	Dec-08	182430	180	207.0	2711	175859	163
34	Jan-09	198450	270	310.5	2807	191358	177
35	Feb-09	114210	180	207.0	1856	109859	101
36	Mar-09	79830	630	724.5	1700	75794	70
37	Apr-09	114390	450	517.5	2091	109483	101
38	May-09	230400	180	207.0	3705	221876	205
39	Jun-09	366930	90	103.5	5618	353868	328
40	Jul-09	730080	0	0.0	17923	697555	646
41	Aug-09	385920	180	207.0	4075	373915	346
42	Sep-09	256770	270	310.5	2989	248329	230
43	Oct-09	216540	360	414.0	3582	208205	192
44	Nov-09	166950	180	207.0	2683	160717	148
45	Dec-09	186480	270	310.5	2594	179840	166
Total						11,435,875	10,578
						11,435.87	MWh
						11.44	GWh

Vintage	VERs
1-Apr-2006 to 31-Dec-2006	2,519
1-Jan-2007 to 31-Dec-2007	2,722
1-Jan-2008 to 31-Dec-2008	2,627
1-Jan-2009 to 31-Dec-2009	2,710
Total	10,578

I. Roles and Responsibility:

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



Training Procedures of the site officials:

Enercon Training Academy:

The Enercon Training Academy provides need-based training, to meet the Global Training requirements of Enercon Worldwide. The training is contemporary, which results in imparting focused knowledge leading to value addition to the attitude and skills of all trainees. At the end of the training, ETA will ensure that all individuals are mentally awake, morally straight, physically fit and agile, fully motivated with a great sense of pride in the jobs being undertaken by them.

ETA inculcates amongst all trainees, certain core values that are extremely essential for the nature of job that they have to undertake. These values include courage, innovativeness, integrity, loyalty and dependability. A brief description of the training imparted to the site officials can be understood by visiting the following link: <http://www.enerconindia.net/index.jsp>

Total Quality Management at ETA:

In order to attain the highest levels of training standards, ETA has adopted the TQM concept. The foundation of “commitment” lies in the well-conceived vision; which acts as a driving force to achieve excellence in training. This necessitates the need to ensure that the training is contemporary by keeping technologically updated to meet futuristic needs.

Having established the commitment, “Planning” is the next stage. This would encompass the design of need based training curriculum for well-defined technical behaviour and scheduling of various training courses, keeping in view the required administrative support. The equipment training based on a systems approach, will adopt corrective measures emerged out of feedback, right at the planning stage. Once planning is done, its execution will ensure an efficient conduct of training using models and simulators to ensure proper comprehension. Skills and competence enhancement will be a focus point, not only for the students, but also the staff for whom “Quality Improvement Programs” will be organized. Interview and counselling techniques will be used to ensure desired standards are achieved. At the evaluation stage, the end product is compared to the laid down terminal behaviours, to analyze and adopt corrective measures, so that Total Quality Management objectives and commitments are attained and retained.

Spectrum of Training

The Enercon Training Academy conducts specific need based courses covering all aspects of Electrical, Electronics and Mechanical Engineering for the technical personnel and Management capsules for managerial level.

Apart from conducting tailor-made capsules for foreign students, separate training profiles are followed for technical personnel entering the folds of Enercon at different entry levels, to include Industrial Training Institutes(ITI)Certificate holders, Diploma Entry and Engineering Graduate Entry. The levels of courses range from the basic entry-level course, upgrading capsules, diploma courses, the technical supervisors’ courses and the refresher capsules.

The range of equipment that is covered includes all Enercon WEC variants. All training requirements for various departments of Production, Projects & Service of Enercon (India) Limited, are met by this Academy.

Annex 1: Contact Information on Participants in the Project Activity

Organization:	World Institute of Sustainable Energy
Street/P.O.Box:	49, Hindustan Estate, Road No.2
Building:	Surya Suman
City:	Pune
State/Region:	Maharashtra
Postfix/ZIP:	411 006
Country:	India
Telephone:	91-20-26613832/55
FAX:	91-20-26611438
E-Mail:	cwp@wisein.org , wiseinfo@wisein.org
URL:	www.wisein.org
Represented by:	Rajendra Vilas Kharul
Title:	Fellow & Head,
Salutation:	Mr.
Last Name:	Kharul
Middle Name:	Vilas
First Name:	Rajendra
Department:	Centre for wind power
Mobile:	09372407383
Direct FAX:	91-20-26611438
Direct tel:	91-20-26613832/55, Extn. 24
Personal E-Mail:	rajendra.kharul@gmail.com