

वार्षिक प्रतिवेदन Annual Report

2007-2008



C-WET

ISO : 9001-2000

पवन ऊर्जा प्रौद्योगिकी केन्द्र
CENTRE FOR WIND ENERGY TECHNOLOGY

(भारत सरकार के नवीन एवं नवीकरणीय ऊर्जा मंत्रालय के अंतर्गत एक स्वायत्त अनुसंधान एवं विकास संस्था)
चेन्नई - 600 100, तमिलनाडु, भारत

(An Autonomous R & D Institution under the Ministry of New and Renewable Energy, Government of India)
Chennai - 600 100, Tamil Nadu, India

ANNUAL REPORT

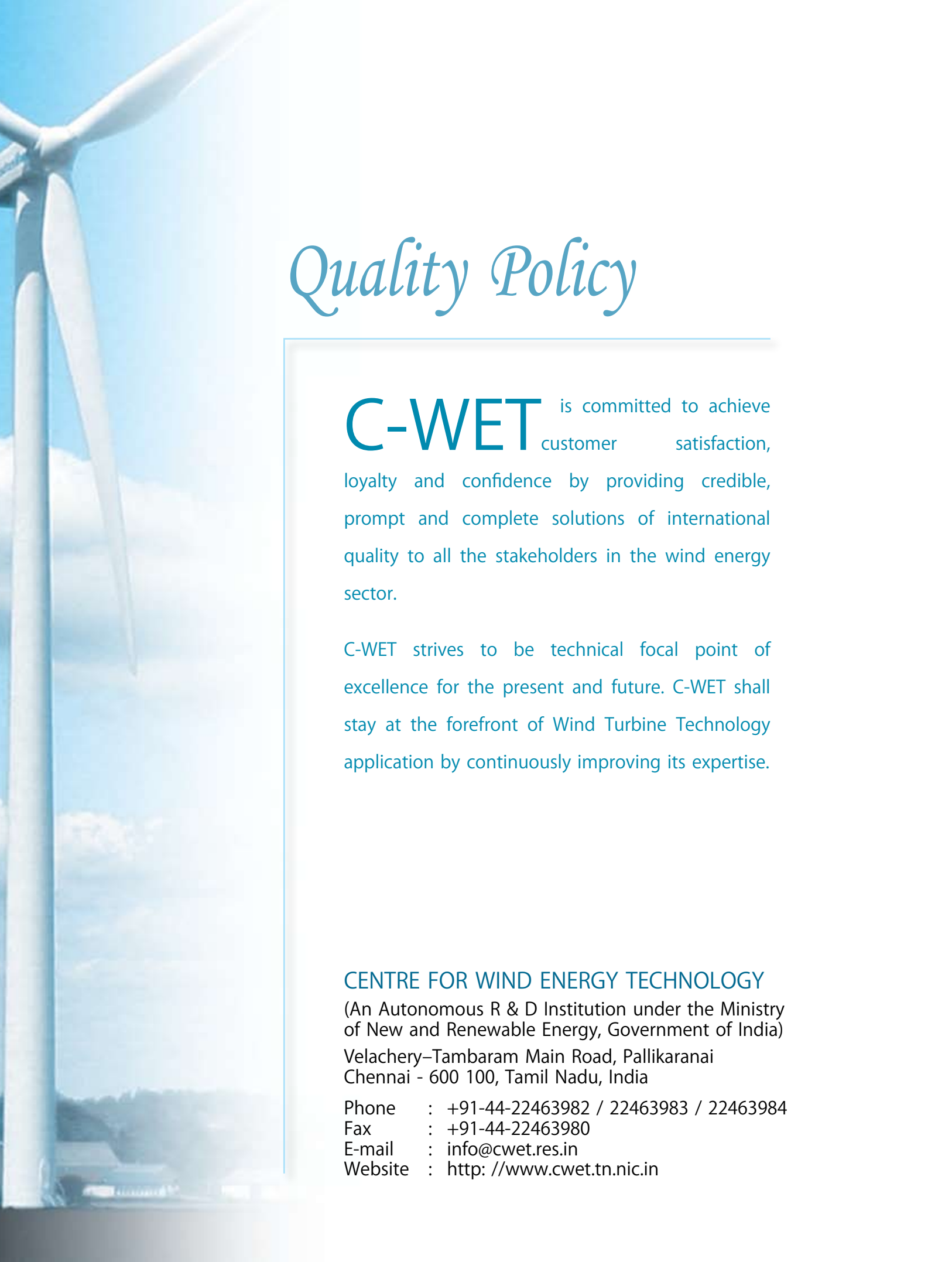
2007-2008



CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous R & D Institution under the Ministry of
New and Renewable Energy, Government of India)

Chennai - 600 100, Tamil Nadu, India



Quality Policy

C-WET is committed to achieve customer satisfaction, loyalty and confidence by providing credible, prompt and complete solutions of international quality to all the stakeholders in the wind energy sector.

C-WET strives to be technical focal point of excellence for the present and future. C-WET shall stay at the forefront of Wind Turbine Technology application by continuously improving its expertise.

CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous R & D Institution under the Ministry of New and Renewable Energy, Government of India)

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EXECUTIVE DIRECTOR'S REPORT

Centre for Wind Energy Technology (C-WET) continues to play a useful role in the development of wind power sector in the country. Towards this end, C-WET has engaged itself in providing value added services to all stakeholders, such as comprehensive data base on wind resources in various potential locations, expansion of wind resource studies to unexplored area, preparation of Indian Wind Atlas, Testing and Certification of wind turbine, consultancy in wind farm planning, preparation of Indian standards aligned to International Standards etc. Action has been initiated for assessment of the wind power potential for offshore wind farms and establishing test facility for small battery chargers at Wind Turbine Test Station (WTTS), Kayathar.

Three draft Indian Standards on wind energy corresponding to International Standards have been modified by taking input obtained from TC88 Meeting and the same was sent to ET42 Wind Turbine Sectional Committee of Bureau of Indian Standards. During the year, a number of training programmes was organized wherein a Special Training Course for Cuban Scientists covering larger aspects of Wind Turbine Technology and Applications were successfully conducted.

Research and Development unit

There was a strong need to establish a database system for wind turbine performance scattered over several states. To address this issue, the Unit has initiated a project for the development, implementation and hosting of an online data collection system for

wind turbines. This would help in faster and well informed decision making in the wind power sector, resource sharing, better planning and management. In order to decide the safety philosophy of small wind turbine, the R&D unit has very recently taken testing assignment of 5 kW Aero-generator, which is the first of its kind in India. Mainly three tests will be carried out viz.. Power Performance, Safety Function and Duration tests strictly in accordance with IEC 61400-12-1 and 61400-2. Also, setting up of an experimental R&D facility at WTTS, Kayathar was initiated, which will be used to conduct various experiments. The result will be applicable to the larger population of wind turbine developers. During the year, the R & D unit was involved in setting up of a 5 kW Wind-Solar-Battery-Diesel Hybrid System, which serves as a pilot project to demonstrate the utility of renewable energy devices to supply uninterrupted electricity. The system supplies a constant load of about 3 kW in the Campus. Other activities of the unit includes publication of Monograph, which will be by and large helpful to the wind industry for addressing O&M and other related issues pertaining to wind turbine gearbox.

Wind Resource Assessment unit

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The preparation of Indian Wind Atlas in association with RISO National Laboratory, Denmark is in the final stage. To begin with, three pilot areas were selected covering topography and climate types. The wind monitoring data collected from the pilot areas was used for validation exercise. Just to have a feel of offshore wind resources, parts of the sea surrounding

the country was also included in the said project. To facilitate this two Scientists and one Meteorologist have undergone training on Karlsruhe Atmospheric Mesoscale Model (KAMM). Wind monitoring programme in uncovered areas is making progress in 48 stations in 14 States. In addition to the wind monitoring project, the unit has also carried out 32 consultancy projects, thereby helping private sectors and State Nodal Agencies by providing micrositing services and preparation of due diligence reports. During the year 18 consultancy projects were completed and 14 projects are ongoing.

Wind Turbine Testing unit

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The testing unit has successfully completed the Surveillance Audit as per the ISO/IEC 17025-2005 by National Accreditation Board for Laboratories (NABL) during the year. Also the unit has applied for MEASNET Membership in the area of power performance. The Unit has developed an analysis code for load measurements as per IEC stipulations. The Type Test of Suzlon 1500 kW and Enercon 800 kW wind turbine have been completed at Moti Sindhodi and Jodhapar respectively. The type test of Chettinad 600 kW wind turbine has been initiated at Thirumangalakurichi in Tamil Nadu.

Standards and Certification unit

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The S&C unit plays a key role in preparation of Indian Standards on Wind Energy. In this regard, the unit has active interaction with Bureau of Indian Standards (BIS), New Delhi and International Electrotechnical

Commission (IEC). The unit has played an important role in creating confidence among various stakeholders such as Wind Turbine Manufacturers, Developers and State Electricity Boards, State Nodal Agencies and others. Provisional Type Certificate was issued to M/s Vestas RRB India Ltd., for Pawan Shakthi – 600 kW and two Provisional Type Certificates has been renewed during 2007-08. In addition, two projects for Category-I, three projects for Category-II and four projects for Category-III are ongoing.

Information, Training and Commercial Services unit

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Two residential training programs for International participants were organized during the year. Delegates from Jordan,

Mauritius, Mozambique, Sri Lanka, China and Maldives participated during the first program. The second training program was specifically conducted for 20 Cuban scientists on “Wind Turbine Technology and Applications” covering all aspects related to wind resource assessment, system assembly, standards, testing, certification and Operation & Maintenance of wind energy system. A similar national training program was organized on “Wind Farm Development and Related Issues”. In order to give the participants an exposure on the possibilities in wind a field visit to WTTS, Kayathar and wind farming areas was also organized. C-WET library has been named as “Professor Anna Mani Information Centre” in recognition of her contribution to the Indian Wind Sector.



THE CHARTER

The Centre for Wind Energy Technology is a technical focal point for wind energy technologies and was established at Chennai in 1998 by the then union Ministry of Non-Conventional Energy Resources; presently renamed as Ministry of New and Renewable Energy (MNRE). A Wind Turbine Test Station has also been established at Kayathar, Tamil Nadu, with the technical support and partial finance assistance from DANIDA, Denmark.

Mission

C-WET, a knowledge based institution of high quality and dedication, offers services and seeks to find total solutions for the major stakeholders across the entire spectrum of the wind energy sector. It will support the wind turbine industry in achieving and sustaining quality such that products of the highest quality and reliability are installed, harnessing maximum energy available in the wind. C-WET will strongly support the wind turbine industry in developing the know-how and know-why and promoting export of products and services.

Objectives

- To serve as the technical focal point for wind power development in India, for promoting and accelerating the pace of utilization of wind energy and support the growing wind power sector in the country.
- To develop and strengthen the facilities and capabilities, evolve strategies, promote, conduct, co-ordinate and

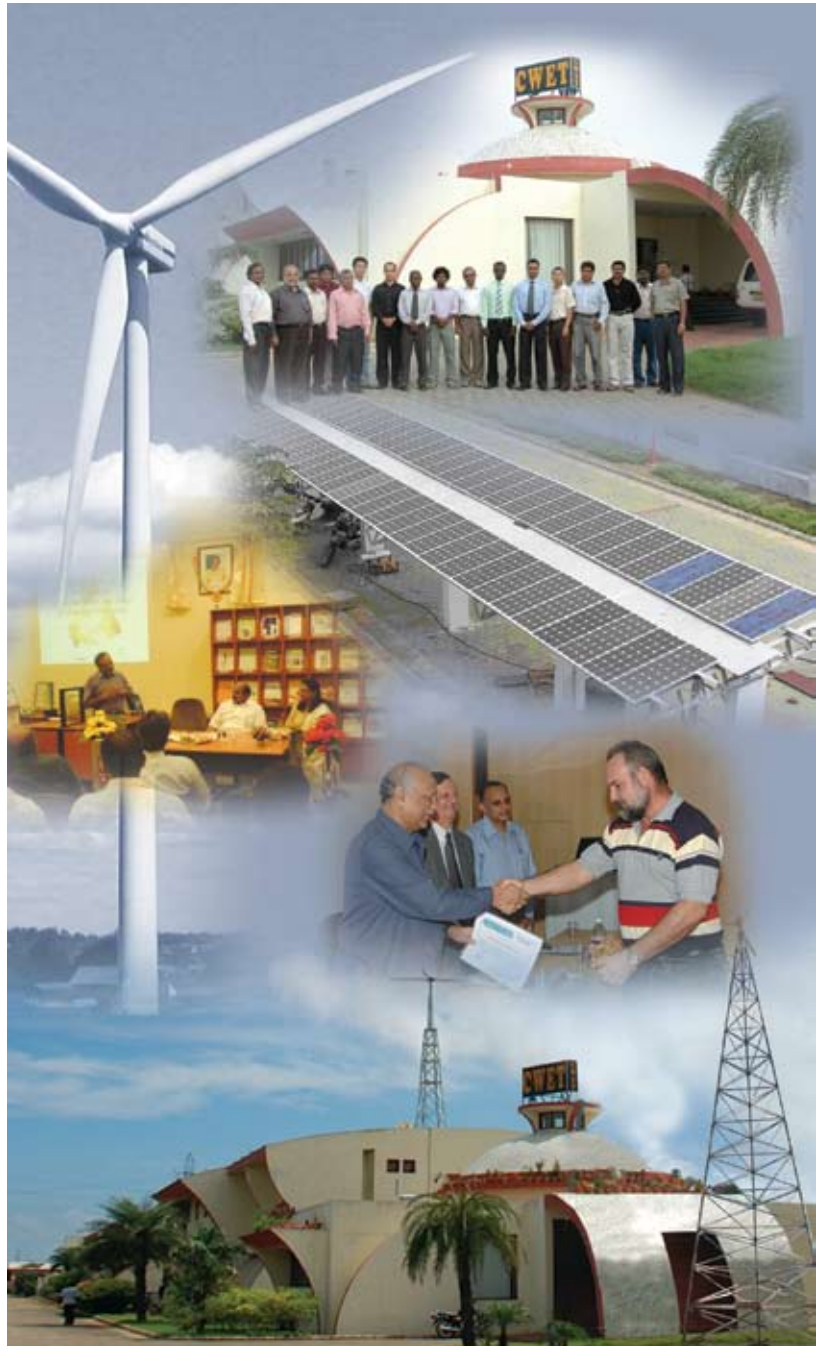
support research and development programmes to achieve and maintain reliable and cost effective technology in wind power systems.

- To analyze and assess wind resources based on the data available from various sources and prepare wind energy density maps / wind atlas / reference wind data.
- To prepare and establish Indian standards on wind turbines and to develop and implement certification system in India
- To establish world class facilities, conduct and coordinate testing of complete wind power systems and components according to Internationally accepted test procedures and criteria, whereby the total performance that includes power performance, power quality, noise

level, dynamics, operation and safety systems is tested according to agreed protocols.

- To accord type approval / type certification to wind turbines in accordance with Type Approval Provisional Scheme – TAPS 2000 (amended).
- To undertake human resource development programmes for the personnel working in the wind energy sector.
- To promote commercial exploitation of know-how, know-why results and offer various consultancy services to the customers.
- To promote the development and commercialization of any other wind energy systems including stand-alone systems.

FROM THE UNITS

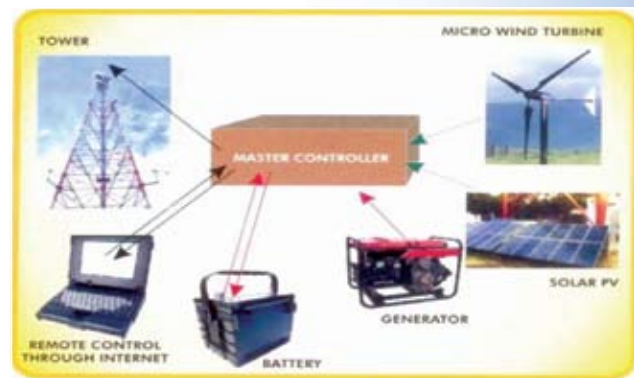


RESEARCH AND DEVELOPMENT

During the year, the unit has focused itself on a wide number of activities by and large benefiting the wind industry. A 5 kW wind-solar-diesel hybrid system has been set up in the campus as a pilot project to demonstrate the utility of renewable energy devices as a self sufficient power supply system for remote locations. Testing of small battery chargers has been taken up for the ensuing windy season of 2008-09 and preliminary activities related to the testing have been completed. Setting up of an experimental R&D facility at WTTS, Kayathar to conduct studies and real time measurements on wind turbines for research relevant activities has been initiated. Other activities include publication of a monograph on gearbox for wind industry and implementation of a database system for collecting data on wind turbines in different states.

Wind- Solar- Battery –Diesel hybrid system

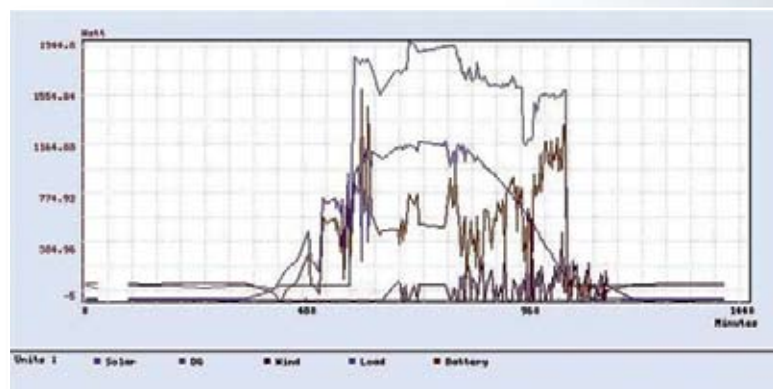
The unit has installed a 5 kW wind-solar-battery-diesel hybrid system with microprocessor control and remote monitoring through GPRS / internet at C-WET campus to serve as a pilot - cum - demonstration plant. The automated hybrid power system comprises of 1.8 kWp solar photovoltaic panels and 3.2 kW aero generator



Schematic layout of the hybrid system

optimized based on best windy / sunny months with lean periods taken care of by controlled diesel power injection. Batteries of 48 V, 1200 Ah are connected for storage. The system supplies a load of about 3 kW.

The system can supply no-break power supply at remote locations to critical installations like meteorological stations, mobile/telephone towers etc. Salient features are the master controller for unmanned control of the system and the remote monitoring system for fault diagnosis and health monitoring management of the Hybrid System particularly at remote locations.



Time series of power (watts) of the hybrid system

Establishment of R & D Windfarm

To begin with the Unit has established an experimental wind farm facility, with a 600 kW pitch regulated wind turbine for conducting of various research relevant experiments. Some of the measurement activities identified for the experimental wind turbine are:

- Power curve measurements
- Stall flag measurements
- Condition monitoring measurements
- Acoustic measurements
- Wake measurements
- Power quality measurements

Implementation, management and control of data collection system for wind turbines

The need to establish a database system on wind turbine performance scattered over several states has been felt for long. To address this issue, the Unit has embarked on a project in consultation with M/s. Telecommunication Consultants India Ltd. To begin with a survey of sample sites will be carried out in Tamilnadu in consultation with State Electricity Board based on which a system configuration will be arrived at. The system will be expanded to cover other states where wind power projects are being set up after successful demonstration and operation in Tamil Nadu state.

Testing of small wind turbine

The unit has undertaken testing of a 5 kW small wind turbine manufactured by M/s Supernova Technologies Pvt. Ltd. at Wind Turbine Test Station, Kayathar. Power performance measurements, duration test and safety & function tests will be performed on the turbine. This is the first time the Centre has undertaken testing of a small wind turbine.



Aero generator under test in Kayathar

Wind - Solar – Pungham Oil Trigeneration system at C-WET campus

With a view to use renewable energy devices to the maximum extent in C-WET campus, R&D unit has set up a 45 kW Wind-Solar-Pungham oil tri-generation system to meet the load demand partially and also to undertake R&D studies on the system. Towards this end a 15 kW single

crystal photovoltaic array, 10 kW wind turbines and a 20 kW straight vegetable oil engine-generator system has been deployed. The output of these devices supplies energy to the uninterrupted power supply system at the campus. The system generates about 60 kWh per day and is used as a technological demonstrator. The system integration in association with Indian Institute of Technology Madras, Chennai is underway.

Recommendations on design and maintenance of gearboxes of wind turbines

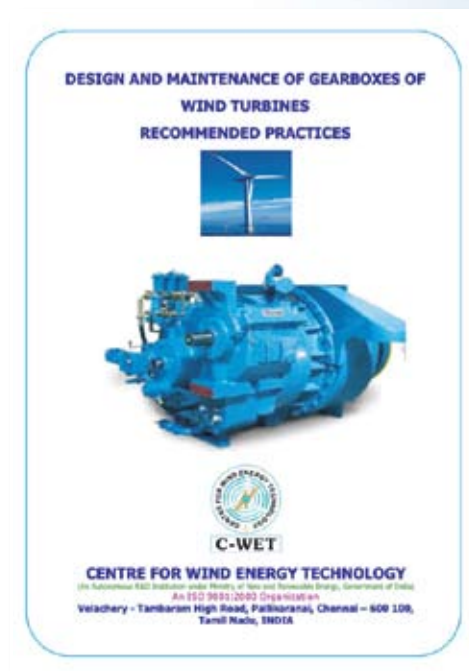
Monograph on “Recommendations on design and maintenance of gearboxes of wind turbines”, an outcome of the project was published for stakeholders of the wind industry. The manual provides information on wind turbine gearbox to Operation and Maintenance Engineers.



Solar Photovoltaic Panels



*5 kW Battery charger
Wind-Solar-Pungham oil Trigeneration System.*



Cover page of the published Monograph

WIND RESOURCE ASSESSMENT

The unit is implementing nation wide Wind Resource Assessment programme sponsored by the Government of India, in association with State Nodal Agencies. In order to extend support to the industry and developers, the unit takes up validation exercises, due diligence studies, micro siting and evaluation of production estimates of the proposed wind farms. The Ministry of New and Renewable Energy [MNRE], Government of India have been sponsoring programmes to measure, analyze and

publish wind data in our country for the last two decades. Winds have been measured at five hundred & sixty eight locations for periods ranging from one to five years since 1986. As on March 31st 2008 forty eight stations are in operation in 14 states. During 2007-08 a total number of 27 wind monitoring stations were commissioned. The over all status of the wind monitoring stations in the country is given in the table below :

Status of Wind Monitoring Stations (2007-2008)

Sl. No	State	Number of Stations				
		Established till 31.3.2008	Continued from 2006-07	Closed during 2007-08	Installed (new during 2007-2008)	In operation as on 31.03.08
1	ANDAMAN & NICOBAR ISLANDS	14	4	2	-	2
2	ANDHRA PRADESH	63	3	-	1	4
3	ARUNACHAL PRADESH	9	5	5	-	-
4	ASSAM	8	2	2	1	1
5	CHATTISGARH	3	-	-	-	-
6	GOA	1	-	-	-	-
7	GUJARAT	59	2	-	1	3
8	HARYANA	7			1	1
9	HIMACHAL PRADESH	10	-	-	1	1
10	JAMMU & KASHMIR	9	-	-	2	2
11	JHARKHAND	2	-	-		-

12	KARNATAKA	50	7	1	8	14
13	KERALA	27	-	-	2	2
14	LAKSHADWEEP	10	-	-	-	-
15	MADHYA PRADESH	35	3	-	3	6
16	MAHARASHTRA	91	2	-	2	4
17	MANIPUR	5	5	4	-	1
18	MIZORAM	5	5	5	-	-
19	ORISSA	10	-	-	-	-
20	PONDICHERRY	4	-	-	-	-
21	PUNJAB	11	-	-	-	-
22	RAJASTHAN	37	1	1	-	-
23	TAMIL NADU	64	1	-	2	3
24	TRIPURA	3	-	-	-	-
25	UTTARAKHAND	11	-	-	-	-
26	UTTAR PRADESH	7	2	1	3	4
27	WEST BENGAL	10	-	-	-	-
28	SIKKIM	3	3	-	-	-
Total		568	45	21	27	48

Of the cumulative total of 568 stations established till 31.03.2008, 216 stations have been found to have Wind Power Density (WPD) in excess of 200 W/m² at 50 m agl. Summary of these 216 stations are given in the following table :

WPD range [W/m ²]	Number of stations
200-250	82
250-300	62
300-350	31
350-400	14
>400	27

WPD Distribution at the 216 stations

WRA in the uncovered Region

State wise details of the wind monitoring stations commissioned during 2007-2008 in the country under various programmes are given in the table below. All the masts are of 50 m height. Sensors are placed at 50 m, 30m and 10 m levels above ground.

State wise installations of wind monitoring stations established during 2007-2008

Sl. No	Stations Established	State	District	Commissioned On
1.	Jogimatti II	Karnataka	Chitradurga	27.04.2007
2.	G.R.Halli I		Chitradurga	29.04.2007
3.	G.R.Halli III		Chitradurga	16.05.2007
4.	Tammanayakanahalli		Bangalore Urban	21.08.2007
5.	Topaldoddi		Raichur	22.08.2007
6.	Anadur wadi Tanda		Bidar	24.08.2007
7.	Kaudiyal		Bidar	24.08.2007
8.	Gorladaku		Chitradurga	18.10.2007
9.	R.K.Nagar	Assam	Karimganj	14.06.2007
10.	Songirpada	Maharashtra	Nandurbar	29.08.2007
11.	Kombhalane		Ahmed Nagar	24.11.2007
12.	Chowdarapalli	Andhra Pradesh	Medak	22.09.2007
13.	Uppatty	Tamilnadu	Nilgiris	19.09.2007
14.	Kalia Nagari		Ramanathapuram	31.01.2008
15.	Khalsar	Jammu & Kashmir	Leh	29.09.2007
16.	Nyoma		Leh	02.10.2007
17.	Chatayangulay	Kerala	Palakkad	16.11.2007
18.	Talapoya		Wayanad	20.11.2007
19.	Mandwa	Madhya Pradesh	Khargone	29.11.2007
20.	Kanchroota		Dhar	01.12.2007
21.	Nachanbor		Dhar	02.12.2007
22.	Patsal	Madhya Pradesh	Agra	07.12.2007
23.	Garhia Hardopatti		Budaun	10.12.2007
24.	Bahlon	Haryana	Panchkula	23.12.2007
25.	Sarkidhar	Himachal Pradesh	Mandi	18.12.2007
26.	Sukhpur	Gujarat	Amreli	25.03.2008

Consultancy Projects

In addition to the wind monitoring projects, funded by MNRE the unit has carried out 32 consultancy projects during the year 2007-08. These short-term projects were to provide micro siting services and preparation of due diligence reports. Under the direction from the Ministry, verification of data collection procedure adopted by private firms was undertaken for a number of stations. Details of projects carried out during the financial year are given in table below :

Consultancy Projects taken up during 2007-2008

Sl. No.	Name of the Project	Name of the Client	Remarks
1.	Detailed assessment of the wind energy potential at Kudankulam, Kalpakkam and Tarapur	M/s. Nuclear Power Corporation of India Limited, Mumbai	Completed
2.	Verification of procedure of wind monitoring at Chavaneshwar, Maharashtra	M/s. Enercon India Limited, Mumbai	Completed
3.	Vetting of Wind Farm at Two Locations in Gadag Dist. , Karnataka	M/s. Enercon India Limited, Mumbai	Completed
4.	Basic and Preliminary Study in Maharashtra	M/s. Southern Wind Farms Ltd., Chennai	Completed
5.	Verification of Procedure of Wind Monitoring at Revangaon, Sangli district Maharashtra	M/s. Vestas Wind Technology Pvt. Limited, Chennai	Completed
6.	Verification of procedure of wind monitoring at Soda Bandhan, Jaisalmer district , Rajasthan.	M/s. Suzlon Energy Ltd Pune	Ongoing
7.	Verification of procedure of wind monitoring at Phalodi, Jodhpur dist., Rajasthan	M/s. Suzlon Energy Ltd, Pune	Ongoing
8.	Verification of procedure of wind monitoring at Mahipatgarh (Sundi, Karve & Devarwadi)	M/s. Dahivel Energy Ltd, Mumbai	Completed
9.	Verification procedure of wind monitoring at Jakhau, Kutchh district, Gujarat	M/s. Suzlon Energy Ltd, Pune	Completed
10.	Production estimate for V-82-1.65MW at Theni, Tamilnadu	M/s. Vestas Wind Technology India (P) Ltd, Chennai	Completed
11.	Micro Survey studies at 3 locations in Kerala	ANERT, Trivandrum	Ongoing
12.	Verification of procedure of wind monitoring at Pratapgarh, Chittorgarh dist., Rajasthan	M/s. Vestas Wind Technology India (P) Ltd, Chennai	Ongoing

Sl. No.	Name of the Project	Name of the Client	Remarks
13.	Evaluation of Proposed 50MW wind farm projects	M/s. SAIL, Salem	Ongoing
14.	Verification Procedure of wind monitoring at Andhra Lake & Bhose	M/s. Enercon India Limited, Mumbai	Completed
15.	Verification Procedure of wind monitoring at Bothe, Satara District, Maharashtra.	M/s. Vestas Wind Technology India (P) Ltd, Chennai	Completed
16.	Evaluation of 15MW wind farming projects in Tamilnadu	M/s.SRF Limited, Gurgaon	Completed
17.	Wind Resource Assessment Study at Jogimatti Chitradurga district in Karnataka	M/s. Poorva Powergenco Ltd, Bangalore	Ongoing
18.	Wind Resource Assessment at Panchgram & Tuli	M/s. Hindustan Paper Corporation Limited, Kolkata	Ongoing
19.	Site Validation and Generation Estimate of Proposed 50.4MW Wind Farm at Khandke Hills of Ahmadnagar district, Maharashtra	M/s. Roaring 40s Wind Farm Private Limited, Mumbai	Completed
20.	Evaluation of proposed 50 MW wind farming projects	M/s. NTPC Ltd, Noida	Ongoing
21.	Due Diligence Report on Micrositing for Proposed Wind Farm Project in Rajasthan	M/s. Bharat Petroleum Corporation Ltd, Noida	Ongoing
22.	Micrositing for wind farms in Tirumala Hills	T.T.Devasthanam, Tirupathi	Completed
23.	Verification of Procedure of Wind Monitoring at Akal site Jaisalmer dist., Rajasthan	M/s. Vestas RRB India Ltd, Chennai	Completed
24.	Technical Due Diligence for the proposed 15 MW wind farm project in Satara, Maharashtra	M/s. Theolia Wind Power Private Limited, New Delhi	Completed
25.	Wind Monitoring at a Location in the Amreli district of Gujarat state	M/s. Jyoti Limited, Vadodara	Ongoing
26.	Site Validation and Generation Estimate of Proposed 35 MW wind farm at Sadawaghapur site, Satara district in Maharashtra	M/s. Tata Power Company Limited, Mumbai	Completed
27.	Wind Recourse Assessment at Sanai Dongri	M/s. Narmada Wind Energy Private Limited, Jabalpur	Ongoing
28.	Basic & Preliminary Study for Exploring Feasibility for Wind Farms at Ottapidaram site in Tuticorin	M/s. UC World Online Limited Chennai	Ongoing
29.	Verification of Procedure of Wind Monitoring at Khanapur , Sangli District, Maharashtra.	M/s. Enercon India Limited, Mumbai	Ongoing

Preparation of Indian Wind Atlas

Ministry of New and Renewable Energy (MNRE) has sanctioned a project on "Preparation of Wind Atlas in India" in association with Riso National Laboratory, Denmark. The project duration is two years. Two Scientists and one Meteorologist of the unit have undergone a course on the background and application of Karlsruhe Atmospheric Mesoscale Model (KAMM) / WAsP methodology as a part of the project.

Objective of the course was to gain an in-depth knowledge of the KAMM/WAsP numerical wind atlas methodology. Two Scientists, one Meteorologist and one Junior Engineer of the unit have also undergone a course on the layout of the structure of the wind atlas publication.

Three pilot areas were selected covering different topography and climate types for the preparation of Wind Atlas. The wind monitoring data collected from the pilot

areas were used in validation exercise. To get an idea of offshore wind resources, parts of sea surrounding of the country is also included in the study. As per the schedule, the pilot area modeling / validation was completed in January 2008 and the result is found to be in comfortable level for further proceeding of the project. The technical committee constituted for the evaluation of the project has evaluated the progress of the project and expressed their satisfaction and suggested to continue the project for remaining areas. The project is in progress.

Installation of 120 m tall masts

Installation of three numbers of 120 m tall masts with multilevel sensors for wind shear measurement is in progress at the sites Chalkewadi (Sathara District, Maharashtra), Lamba (Jamnagar District, Gujarat) and Kethanur / Akal (Coimbatore District, Tamil Nadu / Jaisalmer District, Rajasthan).



WIND TURBINE TESTING

Development of Wind Turbine Test Station

C-WET has developed its own Wind Turbine Test Station (WTTS) near Kayathar, in Tamil Nadu, with the technical assistance of RISO National Laboratory, Denmark under DANIDA grant and with the financial assistance and guidance of Ministry of New and Renewable Energy Sources. This Test Station has two test beds to test wind turbines up to 1250 kW capacity and 400 kW capacity and the capacity is expandable.

Sensors and transducers as per the requirement of IEC standards are maintained in the workshop and Quality Management System procedures are enforced as per ISO 9001 : 2000.

9 No's of 200 kW Micon make wind turbine acquired from Tamil Nadu Electricity Board (TNEB) are now available for development of new measurements techniques.

Testing Programmes

The measurements for S52 600 kW wind turbine of M/s. Suzlon Energy Ltd., at WTTS, Kayathar were closed and the reporting is under progress.

The measurements for Provisional Type Testing (PTT) of IWPL 250 kW wind turbine and Siva 250 kW wind turbines are extended

to the next windy season of 2008 due to inadequate measurements.

The measurements of PTT of Suzlon 1500 kW wind turbine at Moti Sindhodi and Enercon 800 kW wind turbine at Jodhpur in Gujarat were closed and the reporting is under progress.

PTT of Chettinad 600 kW wind turbine at Thirumangalakurchi, Tamilnadu for M/s. Chettinad Energy Pvt. Ltd., Tamilnadu, is expected to be started in April 2008.

Blade Instrumentation for M/s. Shriram EPC's LIET WIND Model LTW77 1.35 MW was completed successfully at Oothumalai, Tamil Nadu.

Quality Management System and NABL Accreditation

- Re-certification by DNV (Det Norske Veritas) as per the requirements of ISO 9001:2000 for the unit was completed successfully.
- The surveillance audit as per the requirements of ISO/IEC 17025:2005 by NABL was completed successfully.
- The unit has applied for MEASNET (International network for Recognized and Harmonized measurements in wind energy) membership in the area of Power performance measurements. The technical audit by MEASNET is under progress.

Other Facilities

- The unit has a well-equipped laboratory at C-WET, Chennai where functional testing of data acquisition systems along with sensors and transducers is done before deployment.
- The Laboratory has also a working wind turbine model for training of engineers in deployment of instrumentation

New Initiatives

- The unit has developed an analysis code for load measurements as per the requirements of IEC TS61400-13.
- The unit has initiated the upgradation of testing and data acquisition equipment from wired technology to a wireless one..

Ongoing Test and Measurements

Year commenced	Test	Wind Turbine
2005	Provisional Type Test at Bamnasa, Gujarat	800kW 48m rotor diameter of ENERCON make
2005	Provisional Type Test at WTTS, Tamil Nadu	600kW 52m rotor diameter of SUZLON make
2006	Provisional Type Test at Bhogat, Gujarat	250kW 29m rotor diameter of IWPL make
2006	Provisional Type Test at Moti Sindhodi, Gujarat	1500kW 82m rotor diameter of SUZLON make
2006	Provisional Type Test at WTTS, Tamil Nadu	250kW 30m rotor diameter of SIVA make
2007	Provisional Type Test at Gujarat	800kW 53m rotor diameter of ENERCON make
2007	Provisional Type Test at Gujarat	350kW 30m rotor diameter of SUZLON make
2007	Provisional Type Test at Thirumangalakurchi, Tamil Nadu	600kW 46m rotor diameter of CHETTINAD make



STANDARDS & CERTIFICATION

With the surge in fossil fuel prices and uncertainties associated with its supply, wind energy has already emerged as an alternative source for India to meet its growing energy needs. Today, the investor focuses on various aspects of a wind farm project like safety and reliability, apart from financial returns, prior to the investment. Hence, there is a definite need to ensure adequate level of safety and quality of the wind turbines, which will add strength to the growth of the Indian wind industry.

Type certification for wind turbines plays an active and important role for the orderly growth of the Indian wind industry. Standards and Certification unit, as a certification body, has played an important role in creating confidence among various stakeholders such as wind turbine manufacturers, developers, State Electricity Boards, State Nodal Agencies and others .

The Indian Type Certification Scheme for wind turbines, viz., Type Approval – Provisional Scheme (TAPS-2000 (Amended) has been formulated in line with International Standards (IEC), while taking into account of the Indian conditions. TAPS – 2000 (amended) has been approved & issued by Ministry of New and Renewable Energy (MNRE). Standards and Certification unit is implementing TAPS-2000 (amended) for type certification of wind turbines in India. In addition to carrying out certification, as per the directives of MNRE, the unit issues Revised List of Models and Manufacturers of Wind Electric Generators / Wind Turbine Equipment (RLMM) periodically.

Standards and Certification unit plays a key role in preparation of Indian standards on wind energy. In this regard, the unit has active interaction with Bureau of Indian Standards (BIS) and International Electro-technical Commission (IEC).

Provisional Type Certification

Provisional Type Certificate –Issued (2007 – 2008)

Sl. No.	Manufacturer's Name	WT Model / Capacity	Status
1	M/s. Vestas RRB India Limited	Pawan Shakthi – 600 kW	Certificate issued Valid up to 04.07.08

Provisional Type Certificates – Renewed (2007 – 2008)

Sl. No.	Manufacturer's Name	WT Model/Capacity	Validity
1	M/s. Vestas RRB India Limited	V39-500 kW with 47 m Rotor / 500 kW	20.04.08
2	M/s. Southern Wind Farms Limited	GWL 225 / 225 kW	27.02.09

On-going Projects

Provisional Type Certification - Category I Projects as on 31.03.2008

Sl. No.	Manufacturer's Name	WT Model / Capacity	Status
1	M/s. Elecon Engineering Company Limited	T600-48 / 600 kW	On going
2	M/s. Vestas RRB India Limited	Vestas V27 – 225 kW	On going

Provisional Type Certification - Category II Projects as on 31.03.2008

Sl. No.	Manufacturer's Name	WT Model / Capacity	Status
1	M/s. Enercon (India) Limited	E48 / 800 kW	On going
2	M/s. Enercon (India) Limited	E53 / 800 kW	On going
3	M/s. Suzlon Energy Limited	N 3335 / 350 kW with 60 and 70 m lattice tower	On going

Provisional Type Certification - Category III Projects as on 31.03.2008

Sl. No.	Manufacturer's Name	WT Model / Capacity	Status
1	M/s. Suzlon Energy Limited	Suzlon 600 kW	On going
2	M/s. India WindPower Limited	I-29/250 / 250 kW	On going
3	M/s. Suzlon Energy Limited	S82 / 1500 kW	On going
4	M/s. Chettinad Energy Private Limited	Chettinad 600 / 600 KW	On going

Indian Standards on Wind Energy

BIS has constituted a Wind Turbine Sectional Committee (ET42). ED, C-WET has been nominated as the Chairman of ET42. Unit Chief (i/c), S&C and Testing units have been nominated as members. S&C unit is actively involved in preparation of the Indian standards on wind energy. The committee identified eight IEC publications for harmonization as Indian standards. Three draft Indian standards on wind energy corresponding to international IEC standards have been modified by taking the inputs obtained from the TC88 meeting and have been sent to the ET42 Wind Turbine Sectional Committee, BIS, New Delhi. Five draft Indian standards have been sent by BIS for wide circulation.

Revised List of Models and Manufacturers of Wind Electric Generators / Wind Turbine Equipment (RLMM)

RLMM committee has been reconstituted by MNRE. Executive Director, C-WET has been nominated as the chairman along with three other members and Unit Chief i/c, (S&C), C-WET as secretary to enlist the models and manufacturers of wind electric generators / wind turbine

equipment. The RLMM committee meetings have been held to verify the documentation provided by the manufacturers and to finalize the list. Two RLMM lists have been issued by C-WET.

Quality Management System - ISO 9001: 2000

Certification services of C-WET have already been certified for ISO 9001:2000 by DNV. The first recertification audit has been successfully carried out by DNV and issued the certificate.

Photo



Shri. M. P. Ramesh, Executive Director, C-WET presenting the Provisional Type Certificate of Pawan Shakthi – 600 kW wind turbine model to M/s. Vestas RRB India Limited



INFORMATION, TRAINING AND COMMERCIAL SERVICES

International Training Programmes

Third International Training Course

Information, Training and Commercial Services (ITCS) unit had successfully organized the third International training course on “Wind Turbine Technology and Applications” during 8th – 17th August 2007 sponsored by Ministry of New and Renewable Energy (MNRE), New Delhi, Government of India. It was designed to help the countries in the region of Asia and Africa in wind farm development. The objective of the training course was to transfer knowledge and special skills needed by the wind energy personnel working in the technical and operational fields and to share the experiences from the lessons learnt over the last two decades.

The training course was inaugurated by Shri. V. Subramanian, I.A.S., Secretary, MNRE.

The course content for the training had a carefully thought out syllabus with subject experts giving lectures and quoting specific case studies. The training addressed the following aspects :

- Introduction to Wind Resources
- Wind Energy Technologies
- Integration of Wind Energy with Grid
- Wind Energy Prediction Methodology
- Testing & Certification
- Wind Energy Measurements and Prospects
- Clean Development Mechanism
- O & M Aspects of Wind Farms
- Cost benefit analysis of wind energy projects
- HRD in Wind Power Projects



Secretary, MNRE delivering Inaugural address



Course participants in front of C-WET campus

The course provided detailed information regarding various implementation phases of a wind energy project, i.e., planning, pre-investment, implementation and operation phases.

Manufacturing facility and wind farm site visits were arranged during the course to give a complete picture of the know-how and how to go about setting up a coordinated wind energy programme at a national level.

The course was attended by nine participants from Cuba, Jordan, Mauritius, Mozambique, Sri Lanka, China and Maldives.

International training course for Cuban Scientists

ITCS unit had successfully organized a special international training course for 20 Cuban scientists on "Wind Turbine Technology and Applications" covering all aspects related to wind resource assessment, system assembly, standards, testing certification and operation & maintenance of wind energy system during 11th – 24th February 2008. Ministry of New and Renewable Energy, Government of India, New Delhi has sponsored the programme and the International travel cost of the participants was supported by Indian Technical & Economical Cooperation (ITEC) being established by TC division of Ministry of External Affairs, Government of India.

This training course was organized according to the Protocol on Cooperation in New and Renewable Energy between the Government of the Republic of India (MNRE) and the Government of the Republic of Cuba (CITMA) for the Biennium 2007 – 2009, signed at Havana, Cuba on 24th May 2007.

The training course was inaugurated by Shri. V. Subramanian, I.A.S., Secretary, MNRE and the inaugural address was delivered by Shri. K.P.Sukumaran, Advisor, MNRE and Executive Director, C-WET.



Shri. V. Subramanian, I.A.S., Secretary, MNRE delivering Key note address after inaugurating the training

Eminent speakers from the wind energy sector conducted technical sessions covering the entire gamut of wind energy technology. Apart from theoretical concepts, visits to manufacturing facilities were organized during the course to give a complete picture of the know-how and processes-to-go about for setting up a coordinated wind energy programme at a national level.

The following were the issues addressed in the training course :

1. Introduction to wind Resources Assessment & Techniques
2. Wind Measurements & Guidelines
3. Wind Monitoring Station, Operation, data collection and Analysis
4. Micro-siting Techniques & Guidelines
5. Satellite information for Wind Resources
6. Certification Schemes

7. Type Certification as per TAPS – 2000.
8. Design requirements – Electrical, Mechanical & Hydraulic systems and Tower
9. Wind Turbine Tower & Foundation
10. Testing of Wind Turbines
11. Testing Instrumentation
12. Testing Measurements techniques
13. Power performance and quality measurements
14. Erection and Commissioning of Wind Turbines
15. Wind Turbine Operation and Maintenance



Shri. Vilas Muttemwar, Honorable Minister for State, Independent Charge, MNRE distributing Course Certificate to the participants at the Valedictory function.

The course was started on 11th February and ended on 24th February 2008. The course was attended by 19 participants from Cuba. The course was appreciated by the participants. The language of the course was in English. The training course was well received and such courses are planned in future.

National Training Programmes

Fifth National Training Course

ITCS unit had successfully organized the fifth National training course on “Wind Farm Development and Related Issues” on 6th & 7th December 2007 to address all aspects of Wind Power starting from Wind Resource Assessment to project implementation and operations & maintenance in a focused manner. The course was attended by 72 participants as against the targeted participants of 30. The participants were from Academic Institutes, Industry, State Nodal Agencies, Developers and Consultants from various part of the country.



The Secretary, MNRE delivering Inaugural address



The training course was inaugurated by Shri. V. Subramanian, IAS, Secretary, MNRE.

The course content for the training was designed in such a way so as to cover all the areas of wind power development and the following topics were addressed in the training course :

- Wind Resources Assessment
- Design and layout of wind farms

- Wind turbine technology
- Grid Integration of wind turbines
- Certification of wind turbines
- Testing of wind turbines
- O&M aspects of wind farms



Advisor, MNRE & ED, C-WET distributing course certificate

Newsletter "PAVAN"

C-WET is continuously bringing out its well received quarterly newsletter "PAVAN" to create awareness, disseminate information on wind energy developments and on the role & activities of the Centre.

The "PAVAN" highlights the happenings / accomplishments / endeavors of C-WET and carries technical articles, success stories, expert's interviews, new rules and policies of Government and the latest news & views from the industry.



The Fifteenth issue of Newsletter "PAVAN"

Prof. Anna Mani Information Centre

C-WET library has been named as "Professor Anna Mani Information Centre" on 21st May 2007. The inauguration function was attended by various personnel from State Nodal Agencies, Industries and Association of wind energy sector.

C-WET Library is being continuously enlarged by the constant addition of Indian, Foreign books and periodicals related to wind energy and renewable energy. To maintain the Library resources and offer the best services effectively, the C-WET Library has been computerized by using Library Automation Software.



Inauguration function of Prof. Anna Mani Information Centre

Bilingual Website

ITCS unit is maintaining a well received bilingual website in Hindi and English to create awareness and disseminate information about C-WET activities and wind energy sector. The website is being updated regularly with the latest information and the website can be viewed at www.cwet.tn.nic.in.

Networking Facility

To speed up the information retrieval, dissemination and also to enable a suitable platform to perform the research, project and day-to-day activities, a 2 Mbps leased line internet connectivity has been established. Firewall with E-Security features has been installed to strengthen the e-security of C-WET.

Visit to C-WET facilities

- Physics students along with their faculties of Sri Meenakshi Women College, Chennai visited C-WET facility on 17th September 2007 as part of their curriculum requirements and learned about the wind turbine technology.
- Engineering students along with their faculties of Madras Institute of Technology, Chennai visited C-WET facility on 19th March 2008 as part of their curriculum requirements and learned about the wind turbine technology.



Executive Director, C-WET explaining wind turbine technology

Visits Abroad

- E. Sreevalsan, S. S. Das, R. Sasi Kumar visited Denmark from 2nd June to 11th June 2007 in Connection with the "Preparation of Indian Wind Atlas Project".
- E. Sreevalsan, S.S. Das, R. Sasi Kumar & G. Arivukkodi visited Denmark from Nov. 17th to Nov. 29th 2007 in connection with the "Preparation of Indian Wind Atlas Project".

Publications

- M.P. Ramesh : (2007), Wind Resource Assessment in India : a program with a difference, 64,6.
- A paper published on "Digital Simulation of Standalone Wind Energy System using SIMULINK" by Rajesh Katyal, as Co-Author in March 2008 in POWERCOIN-2008, an International Conference conducted by Sona College of Technology, Salem, Tamil Nadu.
- E. Sreevalsan, S. S. Das, R. Sasikumar and M. P. Ramesh: (2007), Wind Farm Site Assessment Using Measure-Correlate-Predict (MCP) Analysis, Wind Engineering, Vol.31, No.2, pp.111-116.
- S. S. Das., A. K. Patra and D. N. Rao : (2008), VHF radar echoes in the vicinity of tropopause during the passage of tropical cyclone: First observations from the Gadanki MST radar, Journal of Geophysical Research, Vol.113, doi:10.1029/2007JD009014.

Selected Lectures in Conferences and Seminars

Research & Development

Rajesh Katyal

- Lecture on "Tower and Foundation Concepts" at the Third International training course on "Wind Turbine technology and Applications" during 8th -17th August 2007.
- Lecture on "Wind Turbine Technology and Applications" at an awareness course conducted for PG students from MGIIREPD, Bakoli, Delhi during January 2008.
- Lecture on "Tower and Foundation Concepts" during Special Training course for Cuban Scientists during 11th to 24th February 2008.
- Lecture on "Wind Turbine Technology and Applications" at S.A. Engineering College, Chennai.

K. Boopathi

- Lecture on "Wind Turbine Components" at the Third International training course on "Wind Turbine technology and Applications" during 8th -17th August 2007.
- Lecture on "Wind Turbine Technology and Applications" at Technical Teachers' Training, Taramani during September 2007.
- Lecture on "Wind Turbine Technology" at Kalasalingam College of Engineering, Srivilliputtur, during National Seminar-Wind-08 during February 2008.

- Lecture on "Wind Turbine Technology" at ONGC, Chennai, during Oil and Gas Conservation Fortnight-2008 during January 2008.
- Lecture on "Case Study of Wind Turbine Components (Gearbox)" during State level GENCO Meet in Tamil Nadu during February 2008.
- Lecture on "Wind Turbine Technology" at Dhanalakshmi College of Engineering, Chennai, during March 2008.

Deepa Kurup

- Lecture on "Grid Integration of Wind Turbines" at the Third International training course on "Wind Turbine Technology and Applications" during 8th - 17th August 2007.

Wind Resource Assessment

E. Sreevalsan

- A lecture on "Wind Structure and Statistics" on 08.08.2007 during 3rd International Training course on "Wind Turbine Technology and Applications".
- A lecture on "Wind Resource Assessment Techniques" on 06.12.2007 during 5th National Training course on "Wind power development and related issues".
- A lecture on "Winds in the Atmospheric Boundary Layer" & "Wind Resource Assessment Techniques – An Introduction" on 11.02.2008 during "Special Training Course conducted for the Cuban Scientists on Wind Turbine Technology and Applications

covering all aspects of Wind Resource Assessment, System Assembly, Standards, Testing and Certification, and Operation & Maintenance of Wind Energy System".

Sidharth Shankar Das

- "Measurement Techniques & Modeling for Wind Resource Assessment" at International Training course conducted for the Cuban Scientists held on 13th February 2008 at C-WET, Chennai.
- "Wind farm site assessment using measure - correlate - predict (MCP) analysis", at the International Training course conducted for the Cuban Scientists held on 13th Feb. 2008 at C-WET, Chennai.
- S. S. Das, E. Sreevalsan, R. Sasikumar and K. P. Sukumaran "An overview of wind power potential in India" at National Space Science Symposium held on 26-29 February 2008 in Ooty.
- S. S. Das, S. K. Das, K. N. Uma, K. Kishore Kumar and A. R. Jain "Characteristics of Kelvin-Helmholtz instability observed using UHF/VHF radars" at National Space Science Symposium held on 26-29 February 2008 in Ooty.

R. Sasi Kumar

- A lecture on "Siting guidelines for Wind Measurements", "Monitoring Station Instrumentation and Installation" & "Site Operation and Data collection" on 12.02.2008 during the Special Training course conducted for the Cuban Scientists on Wind Turbine Technology and Applications.

G. Arivukkodi

- A lecture on "Measurement Parameters & data Analysis" on 12.02.2008 during the Special Training course conducted for the Cuban Scientists on Wind Turbine Technology and Applications.

Wind Turbine Testing

S. A. Mathew

- A lecture about "Power Curve Measurement" at the Third International Training course on "Wind Turbine Technology and Applications" held at C-WET campus.
- A lecture about "Testing of Wind Turbines and Power Curve Measurement" at the Fifth National Training course on "Wind Farm Development and related issues" held at C-WET Campus.
- A lecture on "Measurement Techniques" was delivered during the special training course organized for the Cuban Scientists from 11-24 February 2008 at C-WET.
- A lecture on "IEC-61400-12-1 and Danish Recommendation" was delivered during the special training course organized for the Cuban Scientists from 11-24 Feb 2008 at C-WET.
- A lecture on "Power Performance Measurements and Yaw Efficiency Measurements" was delivered during the special training course organized for the Cuban Scientists from 11-24 Feb 2008 at C-WET.

M. Anvar Ali

- A lecture on "Instrumentation for Testing" was delivered during the special training course organized for the Cuban Scientists from 11-24 Feb 2008 at C-WET.

J. C. David Solomon

- A introduction lecture on Safety and Function Test at the Third International Training Programme on "Wind Turbine Technology and Applications" held at C-WET Campus.
- A lecture on "Load Measurement's Instrumentation" was delivered during the special training course organized for the Cuban Scientists from 11-24 Feb 2008 at C-WET.
- A lecture on "Safety and Function Testing" was delivered during the special training course organized for the Cuban Scientists from 11-24 Feb 2008 at C-WET.

R. Kumaravel

- A lecture on "Wind Energy and its Application" at the National level workshop on Energy source conducted at St. Joseph college of Engineering, Chennai.
- A lecture about "Load Measurement" at the Third International Training course on "Wind Turbine Technology and Applications" held at C-WET Campus.
- Presided over the National level Technical Symposium at S.A. Engg. College, Chennai
- A lecture on "Instrumentation used in Wind Energy" at the National

level seminar on "Energy Crisis" at S.A. Engineering college, Chennai.

- A lecture on "Introduction to IEC-61400-1 and 61400-13" was delivered during the special training course organized for the Cuban Scientists from 11-24 February 2008 at C-WET.
- A lecture on "Load Measurements" was delivered during the special training course organized for the Cuban Scientists from 11-24 February 2008 at C-WET.
- A lecture on "Power Quality" was delivered during the special training course organized for the Cuban Scientists from 11-24 February 2008 at C-WET.

Standard and Certification

A. Senthil Kumar

- A lecture on "Type certification of wind turbines as per TAPS – 2000" has been delivered during the third International Training course on "Wind Turbine Technology and Applications", organized by C-WET.
- A lecture on "Certification of wind turbines" has been delivered during the fifth National Training course on "Wind Farm Development and Related Issues", organized by C-WET.
- A lecture on "Introduction to Wind turbine Certification Schemes and overview of International Standard IEC WT 01" has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.

- A lecture on “Type Certification as per TAPS – 2000” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Overview of Indian Standard IS 875 Part III” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Overview of Manufacturing System Evaluation, as per International Standard IEC WT 01” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.

V. R. Gireesh Kumar

- Lecture on “Basic Aerodynamics” has been delivered during the third International Training course on “Wind Turbine Technology and Applications”, organized by C-WET.
- Lecture on “Overview of wind turbine design” has been delivered by covering the requirements for certified wind turbines during the third International Training course on “Wind Turbine Technology and Applications”, organized by C-WET.
- Lecture on “Basic Aerodynamics of Wind Turbines” has been delivered during the fifth National Training course on “Wind Farm Development and Related Issues”, organized by C-WET.
- A lecture on “Basic Aerodynamics” has been delivered during Special Training

course conducted for Cuban delegates, organized by C-WET.

- A lecture on “Overview of IEC 61400–1 standard” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Overview of Load and Load cases as per IEC 61400–1 standard” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Design requirements of mechanical components” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Design requirements of structural component – Tower and overview of foundation design requirements” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.

S. Arulselvan

- Lecture on “Wind turbine control and protection system requirements” has been delivered during the third International Training course on “Wind Turbine Technology and Applications”, organized by C-WET.
- Lecture on “Types of wind turbine generators” has been delivered during the third International Training course on “Wind Turbine Technology and Applications”, organized by C-WET.

- Lecture on “Wind turbine control and protection system requirements” has been delivered during the fifth National Training course on “Wind Farm Development and Related Issues”, organized by C-WET.
- A lecture on “Design requirements of Electrical system” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Design requirements of Control and Protection System” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Overview of Operation and maintenance requirements” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.
- A lecture on “Overview of Verification of safety and function test and spot inspection” has been delivered during the Special Training course conducted for the Cuban delegates, organized by C-WET.

Conferences, Meetings & Trainings attended by the C-WET Staff

Research and Development

- K. Boopathi attended a training course for “Geographical Information System (GIS)” during January 2008
- K. Boopathi attended “KISSOFT” software training course on Gearbox during June 2007.

- K. Boopathi attended an “ISO Audit” training course during May 2007.

Wind Turbine Testing

- S. A. Mathew, M. Anvar Ali and R. Kumaravel have attended the training course on Communication and Networking held at C-WET campus on 15th March 2007.
- S. A. Mathew, M. Anvar Ali and R. Kumaravel and Testing Unit Project Assistants have attended a training course about Load measurement software combined with rain flow counting techniques concluded by Col. V. T. Venkatesh at C-WET campus on 23rd July 2007.
- S.A. Mathew, M. Anvar Ali, J.C. David Solomon, R. Kumaravel, and testing unit Project Assistants have attended a training about Load Measurement Analysis Software by Col. V. T. Venkatesh at C-WET campus on 6th, 7th & 8th of September 2007.
- The project Assistants have attended a seminar on “Automated Testing” conducted by NI (National Instruments) at Park Hotel Chennai on 23rd August 2007.
- S. A. Mathew, M. Anvar Ali, R. Kumaravel, and testing unit Project Assistants have attended the training on Wireless Data Acquisition System and Data Communication System by M/s. Pyramid Precession at C-WET campus on 23rd and 28th of March 2008.

Standard and Certification

- (Late) S. Sivakumar has attended one day Seminar on "Fatigue Analysis and durability Assessment" conducted by IITM, Chennai.
- A. Senthil Kumar, V. R. Gireesh kumar, (Late) S. Sivakumar and Project Assistant have attended two days seminar on "Wind Turbine Gearbox Technology" conducted by KISS SOFT AG, Switzerland.
- A. Senthil Kumar, V.R. Gireesh kumar, (Late) S. Sivakumar and Project Assistant have attended "KISS SOFT" software training conducted for two days by KISS SOFT AG, Switzerland.

Information, Training and Commercial Services

- M.R. Gunasekaran had attended a 5 days training programme on "MS-Access for Data Base Management" from 19.11.2007 to 23.11.2007 organised by Anna Institute of Management, Chennai and Sponsored by the Govt. of Tamil Nadu.

Administration

- K. Tamilselvi had attended a one-day work shop on Service Tax on 07.09.2007 organised by Management Study Centre, Chennai.
- B. Muthulakshmi had attended a 5 days training programme on "MS-Access for Data Base Management" from 19.11.2007 to 23.11.2007 organised by Anna Institute of Management, Chennai (Sponsored by the Govt. of Tamil Nadu).

One day Awareness Programme on Renewable Energy Devices

- The R&D Unit conducted a one-day Awareness Programme for Renewable Energy Agency of Pondicherry on wind and solar energy programmes implemented at C-WET. The visit was planned to facilitate implementation of Renewable Energy programme in Pondicherry.
- The R&D Unit conducted a one-day Awareness Programme for students of Madras Institute of Technology on Wind turbine technology and wind & solar programmes implemented at C-WET



GENERAL INFORMATION

Governing Council

The following are the members of the Governing Council & Annual General Body (To administer and guide the affairs of the Centre)

1.	Shri V. Subramanian, IAS, Secretary, MNRE, New Delhi	Chairman
2.	Dr. V. Siddhartha, Chairman, R&D Council, C-WET, Ministry of External Affairs, (Formerly Outstanding Scientist, DRDO, Ministry of Defence, New Delhi)	Member
3.	Shri. A. K. Rath, Financial Adviser, MNRE, New Delhi	Member
4.	Shri. R. Satapathy, Special Commissioner & Secretary to Govt., Energy Department, Govt. of Tamil Nadu, Secretariat, Chennai,	Member
5.	Shri Alka Sirohi Director General, Bureau of Indian Standards, New Delhi.	Member
6.	Shri V .S. Verma, Member (Planning), Central Electricity Authority, New Delhi.	Member
7.	Shri. Debashish Majumdar, Managing Director, IREDA, New Delhi.	Member
8.	Dr. A. R. Upadhya, Director, National Aerospace Laboratories, Bangalore	Member
9.	Dr.Kota Hari Narayana, Raja Ramanna Fellow, National Aerospace Laboratories, Bangalore,	Member
10.	Shri. K. P. Sukumaran, Scientist 'G' & Head, Wind Energy Group, MNRE, New Delhi	Member
11.	Shri. D.V. Giri Chairman, IWTMA, Chennai,	Member
12.	Shri. M. P. Ramesh Executive Director, C-WET, Chennai	Member Secretary

Management Committee

The following are the members of the Management Committee
(To take decisions as and when required and to inform GC from time to time)

- | | |
|----|------------------------------------|
| 1. | Chairman, Governing Council, C-WET |
| 2. | Financial Adviser, MNRE |
| 3. | Executive Director, C-WET |

Finance Committee

The following are the members of the Finance Committee
(To review the financial performance of the Centre)

- | | | |
|----|---|------------------|
| 1. | Shri. A. K. Rath, Financial Adviser, MNRE | Chairman |
| 2. | Shri. R. Satapathy,
Special Commissioner & Secretary to Govt.,
Energy Department, Tamil Nadu Government | Member |
| 3. | Shri. K. P. Sukumaran, Adviser & Head,
Wind Energy Group, MNRE | Member |
| 4. | The Director (WE),
MNRE, New Delhi | Member |
| 5. | The Director (Finance), MNRE, New Delhi | Member |
| 6. | Shri. M. P. Ramesh
Executive Director, C-WET, Chennai | Member |
| 7. | Shri. D. Lakshmanan
General Manager (F&A), C-WET | Member Secretary |

Research and Development Council

The following are the members of the Research and Development Council (To guide C-WET on laying down Research direction to serve the Indian Wind Energy Sector)

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|----|--|----------|
| 1. | Dr. Kota Hari Narayana, Rajaramanna Fellow,
National Aerospace Laboratory, Bangalore, | Chairman |
| 2. | Shri. K. P. Sukumaran,
Scientist 'G', Advisor, Wind Power, MNRE, New Delhi | Member |
| 3. | Shri. K. P. Sukumaran, Executive Director, C-WET, Chennai. | Member |

4.	Prof. Sujay Basu, Professor (Retd), Jadavpur University, Kolkata	Member
5.	Ms. K. A. Fathima, Senior Director & Head, Power Electronic Group, C-DAC (Formerly ER & DCI), Trivandrum	Member
6.	Dr. A. Rama Mohan Rao, Scientist Gr. IV(4), Structural Engineering Research Centre, Chennai.	Member
7.	Dr. Vidyadhar Mudkavi, Scientist, Computational & Theoretical Fluid Dynamics Divn., National Aerospace Laboratories, Bangalore.	Member
8.	Dr. G. B. Pant, Ex-Director, Indian Institute of Tropical Meteorology, Pune.	Member
9.	Shri. J. P. L. N. Sastry Ex. G. M. & Head, R & D, BHEL & Ex. OSD of C-WET, Hyderabad	Member
10.	Shri. Rajesh Katyal, Unit Chief, C-WET, Chennai.	Member-Secretary

Revised List of Models and Manufactures (RLMM) Committee

The following are the members of the Revised List of Models and Manufacturers of Wind Electric Generators/ Wind Turbine Equipment Committee (RLMM)

1.	Executive Director, C-WET	Chairman
2.	Advisor , MNRE	Member
3.	Chairman, IWTMA, Chennai	Member
4.	Hon'y. Vice Chairman, IWPA, Chennai	Member
5.	Unit Chief, S&C, C-WET , Chennai	Secretary

Hindi Promotion Committee

The following are the members of the Hindi Promotion Committee (It constituted for the purpose of promotion of Hindi Official Language in C-WET):

1.	Executive Director	Chairman
2.	Shri. Rajesh Katyal, Unit Chief	Member Secretary
3.	Shri. D.Lakshmanan, General Manager (F&A)	Member
4.	Admin. And Accounts Officer	Member
5.	Shri.P.Kanagavel, Scientist	Member
6.	Shri. R. Kumaravel, Junior Engineer	Member

Vigilance Awareness Week / Sadbhavana Diwas

- Vigilance awareness week for the year 2007 was observed in C-WET from 12.11.2007 to 16.11.2007 and all the employees had taken a pledge as instructed by the Central Vigilance Commission.
- Sadbhavana Diwas for the year 2007 was observed in C-WET on 20.08.2007 and all employees have taken a pledge to promote National Integration and maintain Communal Harmony among peoples of all regions, languages and regions.

Announcement

- Recruitment Rules and Staff Rules of C-WET notified on 22.02.2008

Hindi Teaching Scheme

- M. Anvar Ali, Scientist, Testing attended and passed the Praveen Hindi Examination.
- M.R. Gunasekaran, Steno, ITCS attended and passed the Praveen Hindi Examination.
- A. Senthil Kumar, Unit Chief Incharge, S&C attended and passed the Praboth Hindi Examination.
- Late S. Sivakumar, Scientist, S&C, attended and passed the Praboth Hindi Examination.
- S. Arulselvan, Junior Engineer, S&C attended and passed the Praboth Hindi Examination.
- P. Kanagavel, Scientist, ITCS attended and passed the Praboth Hindi Examination.

- R. Girirajan, Assistant, Admin attended and passed the Praboth Hindi Examination.
- G. Arivukodi, Junior Engineer, WRA attended and passed the Praboth Hindi Examination.
- K. Boopathi, R&D Scientist attended and passed the Praboth Hindi Examination.
- B. Muthulakshmi, Steno, ED office attended and passed the Praboth Hindi Examination.

Committee for prevention of sexual harassment of women at work place

- In pursuance of Government institutions, a Complaints Committee for woman for redressal of complaints concerning sexual harassment in work place has been constituted in C-WET and the Committee conducted its meetings on 10.09.2007 and 17.03.2008. No complaints were received during the year 2007-2008.

Important Events



Parliamentary Standing Committee on Energy conducted a study tour to C-WET from 25.07.2007 to 27.07.2007

Staff Promotion

S.No	Name	Previous Cadre and Scale of Pay	Promoted Cadre and Scale of Pay	Date of Promotion
1	Shri. V.R. Gireesh Kumar	Scientist – B 8000-275-13500	Scientist – C 10000-325-15200	01.01.2008
2	Shri. J. C. David Solomon	Scientist – B 8000-275-13500	Scientist – C 10000-325-15200	01.01.2008

Farewell

Shri. M.P. Ramesh was given a warm farewell on 12.10.2007. His work tenure spanned from 15.04.2002 to 12.10.2007 as the Executive Director of C-WET. His dedicated contributions and remarkable services towards making this organization a 'Centre of Excellence' will always be remembered.



Shri. M. P. Ramesh and his family during his farewell function

Obituary



*Shri. S. Sivakumar,
Scientist
expired on 24.06.2007*



HUMAN RESOURCE

K. P. Sukumaran
Executive Director

Research & Development

- Rajesh Katyal, Scientist & Unit Chief
- K. Boopathi Scientist
- Deepa Kurup Scientist

Wind Resource Assessment

- E. Sreevalsan Scientist & Unit Chief
- Siddarth Shankar Das Scientist
- R. Sasikumar Meteorologist
- G. Arivukkodi Jr. Engineer
- K. A. Haji Abdul Ibrahim Attendant

Wind Turbine Testing

- S. A. Mathew Scientist & Unit Chief I/c
- M. Anvar Ali Scientist
- J. C. David Solomon Scientist
- R. Kumaravel Scientist
- M. Karuppuchamy Jr. Engineer
- A. R. Hasan Ali Jr. Engineer
- Y. Packiyaraj Jr. Engineer

Standards and Certification

- A. Senthil Kumar Scientist & Unit Chief i/c
- V. R. Gireesh Kumar Scientist
- S. Arulselvan Jr. Engineer

Information, Training and Commercial Services

- P. Kanagavel Scientist
- M. R. Gunasekaran Steno

Administration

- D. Lakshmanan Gen. Manager (F & A)
- G. Rajan Admn. & Accts. Officer
- R. Girirajan Assistant
- K. Tamilselvi Assistant
- B. Muthulakshmi Steno
- M. Malaravan Driver
- M. Selvakumar Attendant



C-WET OFFICIALS ON EXTERNAL COMMITTEES / MEMBERSHIP OF ASSOCIATIONS / BODIES

D. Lakshmanan

- National Institute of Personnel Management, Kolkata, Corporate Member

Rajesh Katyal

- Institution of Engineers (India), Member

E. Sreevalsan

- Indian Meteorological Society, Member
- Doctoral Committee (Academic Research), Sathyabama Deemed University, Chennai, Member
- Evaluation RFQ & RFP Bid Committee (Wind farms in Kerala) Committee Member
- Tender Evaluation Committee (Technical) of NTPC, BPCL and SAIL Member

A. Senthil Kumar

- Wind Turbines Sectional Committee, ET 42 of BIS, Member

V. R. Gireesh Kumar

- Institution of Engineers (India) Associated member
- Indian Institute of Metals Associated member

R. Kumaravel

- Institution of Engineers (India) Associate member.

P. Kanagavel

- Society for the Advancement of Library and Information Science (SALIS) Member



AUDITOR'S REPORT

Auditor's Report to the Members of the Governing Body of Centre for Wind Energy Technology, Chennai - 600 100.

We have audited the attached Balance sheet of Centre For Wind Energy Technology (C-WET) Velachery - Tambaram Main Road, Pallikaranai, Chennai – 600 100 as at March 31,2008 and also the Income and Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the management of Centre For Wind Energy Technology (C-WET). Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with auditing standards generally accepted in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatements. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management as well as evaluating the overall financial statements presentation. We believe that our audit provides reasonable basis for our opinion.

We report that :

- a) We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit.
- b) In our opinion proper books of accounts as required by law have been kept by Centre For Wind Energy Technology (C-WET) so far as it appears from our examination of those books.
- c) The Balance Sheet and Income and Expenditure Account dealt with by this report are in agreement with the books of account.
- d) The Balance Sheet and Income and Expenditure Account dealt with by this report are prepared in accordance with the applicable Accounting Standards issued by the Institute of Chartered Accounts of India.
- e) In our opinion and to the best of our information and according to the explanations given to us, the said accounts together with schedules and notes there-on give the information required under section 10(21) of the Income Tax Act, 1961 in case of Scientific & Research Institution in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India.
 - i) In the case of the Balance Sheet, of the state of affairs of the Centre For Wind Energy Technology (C-WET) as at March 31,2008; and
 - ii) In the case of the Income and Expenditure Account, of the excess of income over expenditure for the year ended on that date.

Date :

for V. SOUNDARARAJAN & Co.,
Chartered Accountants

Place : Chennai

Sd/-
V.S. RAVIKUMAR
Partner
(Membership No. 18030)

CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous R & D Institution under MNRE, Government of India)

Chennai - 600 100

BALANCE SHEET AS AT 31st MARCH, 2008

	(Amount in Rs.)		
	Schedule	31 st March 2008	31 st March 2007
CAPITAL FUND AND LIABILITIES			
CAPITAL FUND	1	113,376,558	56,186,291
EARMARKED - PROJECTS	1A	24,981,378	30,516,574
UNSPENT BALANCE OF GRANTS-IN-AID	1B	Nil	216,127
RESERVES AND SURPLUS	2	95,699,981	68,835,196
CURRENT LIABILITIES AND PROVISIONS	3	70,970,531	45,074,386
TOTAL		305,028,448	200,828,574
ASSETS			
FIXED ASSETS			
(a) Created out of Central Governments Grants	4	117,815,595	65,457,262
(b) Created out of Own Resources - Projects Funds		533,943	641,165
CURRENT ASSETS, LOANS AND ADVANCES	5	186,678,910	134,730,147
TOTAL		305,028,448	200,828,574
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached for V. Soundararajan & Co., Chartered Accountants

Sd/-
D. Lakshmanan
General Manager (F&A)

Sd/-
K.P. Sukumaran
Executive Director

Sd/-
President/Chairman

Sd/-
V.S. Ravikumar
Partner

CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous R & D Institution under MNRE, Government of India)

Chennai - 600 100

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH, 2008

	(Amount in Rs.)		
INCOME	Schedule	31 st March 2008	31 st March 2007
Income from Scientific & Technical Consultancy Services	6	24,157,723	17,999,965
Income from publication	7	1,538,925	1,274,510
Interest Earned	8	11,831,541	6,360,156
Other Income	9	920,818	1,230,670
Grants from Government of India allocated for Revenue expenditure during the year		(1,409,054)	20,086,624
Grants from Government of India allocated for Inhouse project expenditure during the year		8,580,471	23,951,860
Deferred Income transferred from Capital Fund (Vide note No.4)	4	25,854,443	13,116,073
TOTAL (A)		71,474,867	84,019,858
EXPENDITURE			
Establishment Expenses	10	9,404,951	8,516,892
Other Administrative Expenses	11	17,061,553	20,503,967
In house project expenditure		8,580,471	23,951,860
Depreciation	4	25,965,607	13,116,073
TOTAL (B)		61,012,582	66,088,792
Balance being excess of income over Expenditure (A-B)		10,462,285	17,931,066
Prior period adjustment	12	(16,402,500)	3,232
BALANCE BEING SURPLUS TRANSFERRED TO GENERAL RESERVE ACCOUNT		26,864,785	17,927,834
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached for V. Soundararajan & Co., Chartered Accountants

Sd/-
D. Lakshmanan
General Manager (F&A)Sd/-
K.P. Sukumaran
Executive DirectorSd/-
President/ChairmanSd/-
V.S. Ravikumar
Partner

CENTRE FOR WIND

(An Autonomous R&D Institution under Ministry of

Chennai -

RECEIPTS AND PAYMENTS ACCOUNT

	(Amount in Rs.)	
RECEIPTS	31 st March 2008	31 st March 2007
I. Opening Balances		
(a) Cheques in hand	13,256	6,084
(b) Bank balances		
i) In Current Account	22,466,413	11,634,170
ii) In Deposit Accounts	99,922,247	126,797,906
(c) Stamps on hand	7,119	8,076
II. Grants Received		
(a) From Government of India	90,000,000	
(b) From interest earned on Grants-in-aid		910,000
(c) From GOI for execution of various projects	10,000,000	20,434,217
(d) From GOI for organising Cuban International training programme	1,078,656	
III. Income on Investments		
IV. Interest Received		
(a) On Bank deposits	11,831,541	6,360,156
V. Other Income		
(a) Fees for services	10,628,998	16,765,154
(b) Sale of Books and Time Series Data	1,579,669	1,274,510
(c) Energy receipts	13,528,725	3,954,296
(d) Sale of Asset	82,202	
(e) Misc. income	838,616	974,402
VI. Amount borrowed		
VII. Any other receipts		
(a) Fees received in advance on Consultancy projects	23,876,181	11,106,198
(b) Other advance recovered		1,050
(c) Security deposit received	2,458,000	873,300
(d) Earnest money deposit received	2,485,000	1,670,000
(e) Service Tax realised	6,038,465	4,629,822
(f) TDS to be remitted	54,162	14,207
TOTAL	296,889,250	207,413,548

For Centre for Wind Energy Technology

Sd/-
D. Lakshmanan
General Manager (F&A)

Sd/-
K.P. Sukumaran
Executive Director

Sd/-
President / Chairman

ENERGY TECHNOLOGY

New & Renewable Energy, Government of India)

600 100

FOR THE YEAR ENDED 31st MARCH, 2008

	(Amount in Rs.)	
PAYMENTS	31 st March 2008	31 st March 2007
I. Expenses		
(a) Employee related Expenses	9,139,863	8,503,523
(b) Administrative Expenses - (Operational & TA/DA)	15,386,564	12,294,116
II. Payments made against funds for various projects		
Out of CFA		
(a) In house R&D project expenses	8,340,539	6,063,707
(b) Research support to WRA		116,000
(c) HRD and manpower training		57,994
(d) Seminar & Information dissemination	256,700	405,150
(e) Accreditation fee	123,673	103,942
(f) Enhancement of test facilities	(16,402,500)	16,402,500
Out of Grants for projects		
(a) International training programme	541,065	
(b) Cuban Training Programme	1,159,050	
(c) Parameterisation of WT		
(d) Scanning of wind profile in Palghat gap		293,248
(e) Wind Shear Assessment expenses	740,805	460,264
(f) North-Eastern Project	13,474	239,300
(g) North-Eastern Project 2006-07	2,544,674	
(h) Study on Uncovered / New areas (2003-04 to 2006-07)	12,947,827	10,453,306
III. Investment and Deposits made		
IV. Expenditure on Fixed assets & Capital Work-in-Progress		
(a) Purchase of Fixed assets	74,705,700	4,752,416
(b) Expenditure on Capital Work-in-progress	(3,500)	3,500
(c) Advance on capital account (including imports)	2,689,159	(2,123,093)
V. Refund of Surplus Money		
(a) Balance of Grants-in-aid to GOI		12,697,000
VI. Other Payments		
(a) Refund of Security deposits	200,000	10,000
(b) Refund of Earnest Money Deposits	2,580,000	1,145,000
(c) Expenditure on Consultancy Projects	2,167,393	8,135,758
(d) Advance & Deposits	2,937,887	321,022
(e) Payment of TDS	14,207	36,806
(f) Prior period expenses		3,232
(g) Service tax remittances	6,038,465	4,629,822
(h) Receivable from Debtors	(5,009)	
(i) Festival advance paid	1,200	
VII. Closing Balances		
(a) Cheques in hand	2,775,739	13,256
(b) Bank Balances		
i) In Current Account	23,991,956	22,466,413
ii) In Deposit Accounts	144,000,000	99,922,247
(c) Stamps on hand	4,319	7,119
TOTAL	296,889,250	207,413,548

As per our Report attached
for V. Soundararajan & Co.,
Chartered Accountants

Sd/-
V.S. Ravikumar,
Partner







पवन ऊर्जा प्रौद्योगिकी केन्द्र

(भारत सरकार के नवीन एवं नवीकरणीय ऊर्जा मंत्रालय के अंतर्गत एक स्वायत्त अनुसंधान एवं विकास संस्था)

CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous R & D Institution under the Ministry of New and Renewable Energy, Government of India)

वेलचेरी-ताम्बरम मेन रोड, पल्लिकरणै, चेन्नई-600 100, तमिलनाडु, भारत
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