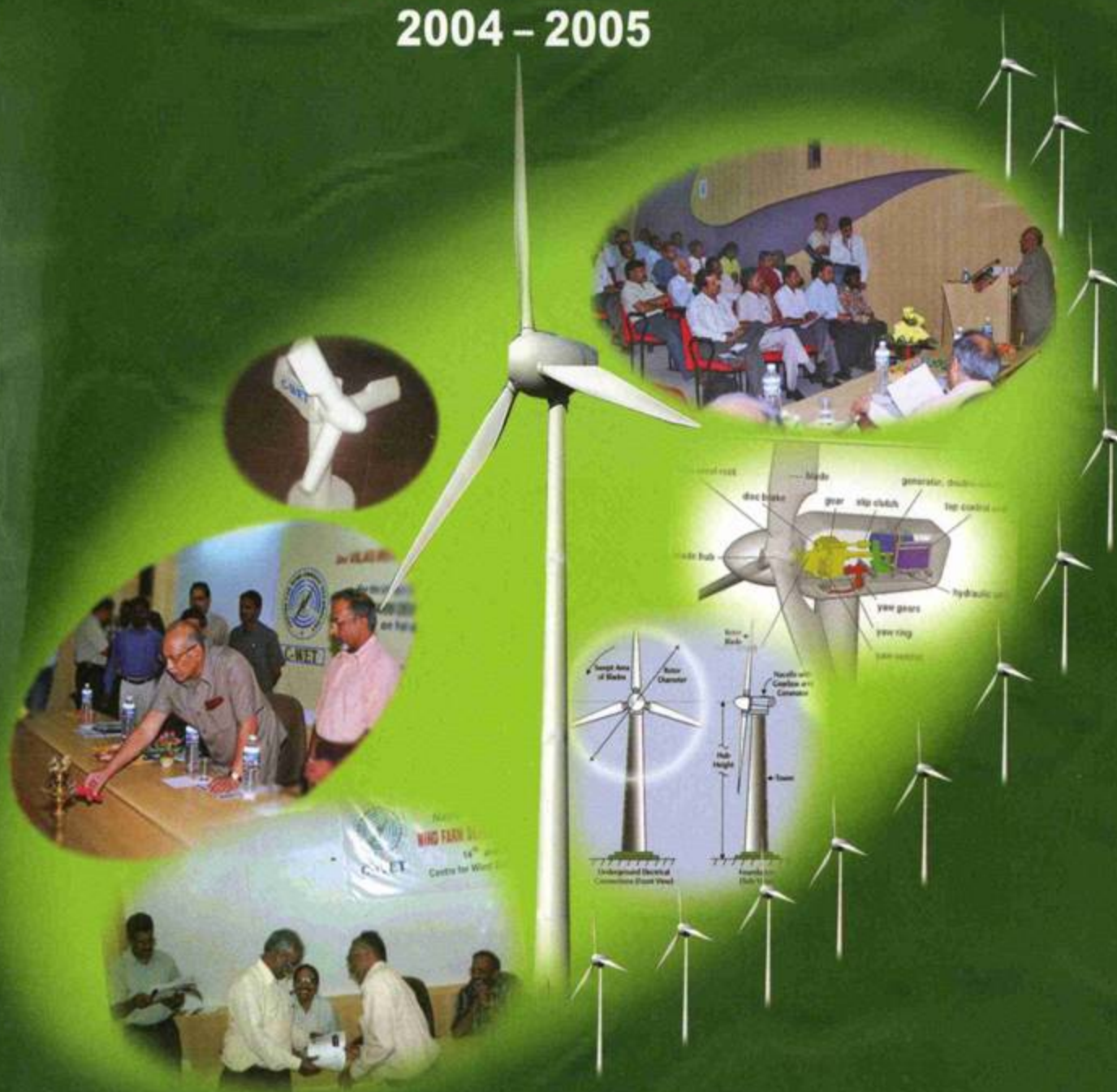


वार्षिक प्रतिवेदन ANNUAL REPORT 2004 - 2005



पवन ऊर्जा प्रौद्योगिकी केन्द्र CENTRE FOR WIND ENERGY TECHNOLOGY

(अपारंपरिक ऊर्जा स्रोत मंत्रालय, भारत सरकार के अंतर्गत एक स्वायत्त अनुसंधान एवं विकास संस्था)
(An Autonomous R & D Institution under the Ministry of
Non-Conventional Energy Sources, Government of India)



C-WET

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Centre for Wind Energy Technology, Chennai

ANNUAL REPORT 2004 - 2005



CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous R & D Institution under the Ministry of Non-Conventional Energy
Sources, Government of India)

Chennai - 601 302

Annual Report 2004-2005



Centre for Wind Energy Technology, Chennai

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
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Centre for Wind Energy Technology, Chennai

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EXECUTIVE DIRECTOR'S REPORT

The year 2004-05 is a landmark year in the brief history of Centre for Wind Energy Technology (C-WET). During the year the DANIDA sponsored project of Wind Turbine Test Station was successfully completed with most of the project goals achieved. A stock of what has been accomplished and what needs to be done was carefully assessed and an institutional development plan was prepared in consultation with RISO National Laboratory. The plan was discussed with all stakeholders and the Ministry.

During the year, ISO 9001-2000 certification was obtained for the wind resource assessment, testing and certification services. Considering the need to proceed towards international recognition, as a first step the testing services were to be accredited by National Accreditation Board for Laboratories (NABL). Application for accrediting power performance measurements was made. Based on the preliminary audit recommendations, the scope of recognition was enlarged to cover other tests and necessary action has been initiated.

Research and Development

R&D Unit has initiated a project to install a

45 kW Wind solar Pungam Integrated system in an effort to promote Renewable Energy Devices in the campus. This will serve the partial load requirements of C-WET and a demonstration of hybrid technology.

Testing of small wind turbines is another new project that will be undertaken in the near future. The necessity for this arises due to the growing demand for small wind turbines to meet basic power requirements. Such a test facility would be the first of its kind in the country.

As a part of the expansion of R&D facilities of the Centre, a need was felt to establish a R&D wind farm with turbines of latest technology. It would serve as a facility to conduct performance enhancement research studies and undertake indigenous development of wind turbine components. Also, equipments such as power analyser were procured to focus on power quality issues of wind farms. IEC 61400-11 was studied in detail to formulate test procedures to carry out acoustic emission studies of a wind turbine using the Integrated Sound Level Meter.

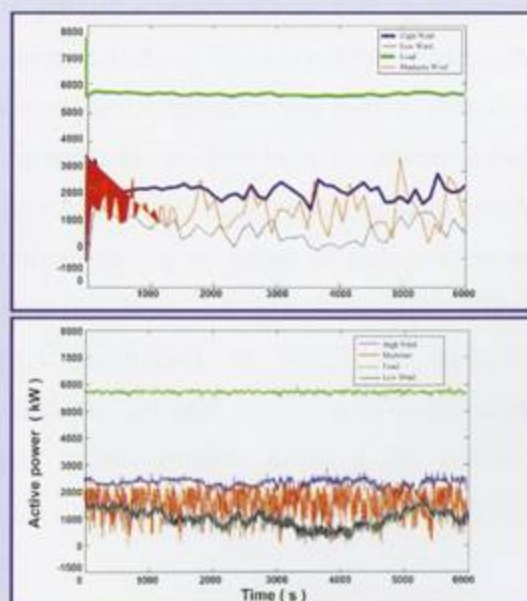
In order to quantify the flow distortions occurring around the nacelle in the flow

field, a wind tunnel model of wind turbine has been developed and fabricated. The results of the experimentation would help



identify factors for power curve correction for site effects with lower uncertainties in complex terrains.

Grid interaction studies focused on power system simulation of wind farms using individual wind turbine model and an



Comparison of results for Individual vs Aggregate wind farm model

aggregate wind farm model. The aggregate wind farm model represents the entire wind farm and is a good tool for large-scale power system studies.

A Monograph on "Recommendations on Maintenance of Gearbox of wind turbine" has been prepared for use by the Wind Turbine stakeholders. This would be released for wider dissemination.

Wind Resource Assessment Unit

The program of wind monitoring has been continued with sixty-five monitoring stations in operation. Under a project from the ministry for wind monitoring in uncovered areas, 21 stations with 50 m mast height have been established in eleven states. Apart from these stations, thirty-two stations have been in operation from the previous years in ten states. Eight stations in five states/union territories have been closed. Ten wind monitoring stations have been established in five of the northeastern states following a meeting held in Guwahati with respective state nodal agencies. Necessary training has been imparted to the concerned officers. Apart from these Government of India initiatives, several state nodal agencies and concerned departments from the Union Territories, wind-monitoring stations have also been established under bi-lateral projects.



The services of the unit have also been sought for validating data collection procedure by private initiatives. There has been a demand for carrying out a number of micro-siting exercises both from manufacturers and developers and this has been adequately addressed. A number of due-diligence assignments were undertaken and completed. A beginning has been made in obtaining wind data along the coastline. The 30 m mast installed on the Vivekananda Rock was destroyed in the Tsunami on 26th December, 2004. Fortunately one-year data had just been collected by then. The measurements have indicated that the potential is good. Two more stations have been established near Trivandrum and Kollam. These two stations use freestanding towers of thirty meters elevation and erected on wave breakers extending into sea for about one kilometer from the shoreline.

Wind Turbine Testing

Four type testing assignments and one in-situ performance measurement were undertaken during the year 2004-05. The type testing were under category-II of TAPS-2000. The unit is getting geared up to obtain NABL accreditation.

National Application Documents (NADs) on testing was prepared under guidance from experts from RISO.

Standards and Certification

Standards:

Bureau of Indian Standards has assigned the job of coordinating preparation of Indian Standards for wind turbines in line with international standards. As is the practice in most of the wind-active countries, IEC standards are accepted and together with it, country specific rules and regulations are used.

Accordingly National Application Documents (NADs) for the three most used standards IEC-WT01, IEC 61400-1 and IEC 61400-12 were prepared. These NADs considered the external conditions under which the wind turbines would have to operate in India. IEC standards, as applicable elsewhere in the world were taken in total. These were discussed in the ME-04 meeting at BIS and a decision was arrived at to combine the National Application Documents with the corresponding International Standards and discuss it with a group of experts and stakeholders before putting it up to ME-04 for a final deliberation and adoption.



Centre for Wind Energy Technology, Chennai

Certification

Currently three category-I, four category-II and one category-III certification assignments are underway. Three renewal assignments have been undertaken.

Information, Training and Commercial Services

The R&D council, Centre for Wind Energy Technology set up a committee under the Chairmanship of Prof. Sujay Basu, Director, School of Energy Studies to prepare a recommendatory syllabus for a post graduate degree course in Wind Turbine

holders in physics/meteorology. Discussions have been initiated with AICTE. Sathyabama Deemed University has expressed interest in implementing the course.



C-WET has started bringing out a well received quarterly news letter "PAVAN" carries articles of topical interest and information on current events of C-WET and elsewhere.



Technology. The committee with members drawn from academic institutions and wind industry prepared a four semester course that can accommodate Bachelor degree holders in engineering or Master degree



Two National Training Programmes were organised for stakeholders from manufacturing sector, wind farm developers regulatory bodies and financial institutions. The programs were well received.



Centre for Wind Energy Technology, Chennai

THE CHARTER

The Centre for Wind Energy Technology is a technical focal point for wind energy technologies established by the union Ministry of Non-Conventional Energy Sources at Chennai in 1998. A Wind Turbine Test Station has also been established at Kayathar, Tamil Nadu, with technical and financial support from DANIDA, a Government of Denmark agency.

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 analyse 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 standards including guidelines, procedures, protocols for design, testing and certification of wind power systems, sub-systems and components, taking into consideration the Indian conditions and in line with internationally recommended practices and standards and update the same based on the feedback.
- To establish world class facilities, conduct and coordinate testing of complete wind power systems, sub-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.

objective and issue of certification, establish and update the data bank on a continuous basis and serve as information centre for selective dissemination.

- ❑ To accord type approval / type certification which verifies conformity with safety related requirements as per standards, guidelines and other rules for design, operation and maintenance, as well as adequate documentation of quality issues such as power performance, noise, life expectancy and reliability.
- ❑ 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 monitor the field performance of wind power systems, sub-systems and components, effectively utilize this feedback for fulfillment of the above
- ❑ To promote the development and commercialisation of any other wind energy systems including stand-alone systems.



Centre for Wind Energy Technology, Chennai

FROM THE UNITS





RESEARCH AND DEVELOPMENT

During the year 2004-05, the R&D unit initiated three projects:

1. Testing of small wind turbines
2. 45 kW Wind- Solar Pungam oil Integrated System for C-WET campus
3. Setting up of R&D Demonstration Wind farm

Besides these, the ongoing projects of the department are:

1. Modeling of interconnection of wind turbines with the grid.
2. Parameterization of flow distortion around the wind turbine nacelle
3. Development and validation of design methodologies and design tools in respect of Wind Turbine blades for low and moderate wind regimes

About the New Projects

Testing of Small Wind Turbines: There is considerable interest in small Wind Turbines in India as stand-alone battery-charging systems or in hybrid mode in conjunction with solar photovoltaic systems to meet basic power requirements. In view of the growing market requirement of small wind turbines it was decided to undertake testing of small wind turbines.

A proposal was prepared to undertake the testing as per IEC WT01 and IEC61400-2. The proposal describes at length the

Operational tests, namely Power performance measurement, Duration Tests, and Safety & Function Tests.

The Testing can be undertaken in the forthcoming windy season subject to approval from Ministry of Non-Conventional Energy Sources.

45 kW Wind- Solar- Pungam Oil Integrated System for C-WET campus:

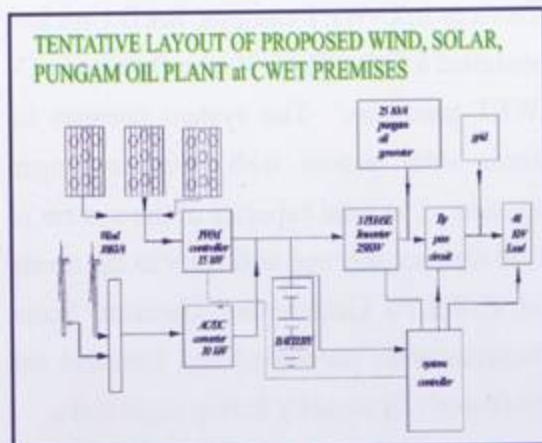
The 45 kW Wind-Solar-Pungam Oil Integrated System will be installed at C-WET premises to meet the partial load requirements of C-WET campus as a proof of concept.

The integrated system shall consist of:

- i. 10 kW Small Wind Turbine Generating System (Suitable configurations to be chosen)
- ii. 15 kW_p Solar Photovoltaic system
- iii. 20 kW Pungam oil plant.

The required capacity of the system was arrived at after evaluating the solar & wind resources prevailing at C-WET campus and the load requirements. The Pungam oil plant was proposed to complement the wind-solar system.

Procurement and installation of the system at C-WET premises is in progress. Indian Institute of Technology Madras (IITM), Chennai has been assisting C-WET in system design.



Schematic of Wind-Solar-Pungam Oil Integrated System

Setting up of R&D Demonstration Wind Farm: A proposal to set up an R&D Demonstration Wind Farm has been prepared and discussed by the R&D Council during its Ninth Meeting. The proposed wind farm will consist of two turbines of latest and new technology, fully equipped with complete measurement systems and diagnostic tools. The wind farm would be used for conduct of experiments and system improvement studies.

Ongoing Projects

Study of Interconnection of Wind Turbines with the grid: A typical wind farm connected to the grid was simulated using SimPower Systems and the results were obtained found to be reasonable. The model needs to be validated by real time measurements. Various probable sites were visited in Tirunelveli District to identify locations for carrying out the measurement programme and TNEB has agreed to

cooperate with C-WET in this project. Based on the requirements of the study, it is proposed to carry out the measurements at Sundankurichi sub-station and subsequently at Radhapuram, if required.

Parametrisation of flow distortion around the Wind Turbine nacelle: This would provide the basis for positioning the anemometer on the top of the nacelle for site calibration experiments for in situ power performance testing. This will also assist in correcting the measured power curve for site effects with lower uncertainties in complex terrains.



Wind tunnel model of Wind Turbine

A wind tunnel model of wind turbine has been developed and fabricated. The scaling factors have been determined keeping in view the wind tunnel at Structural Engineering Research Centre (SERC), Chennai. The idea is to quantify the flow distortions occurring around nacelle in the flow field.



The results of the test are expected to provide an insight into the near nacelle flow fields and give possible calibration coefficients. Their factors could then be used to correct power curve measured in complex terrain.

Development and validation of design methodologies and design tools for wind turbine blades for low and moderate wind regimes:

The objective of this initiative is to generate indigenous design databank for the development of low cost, technologically advanced wind turbine blades / rotors specifically for low / moderate wind regimes. National Aerospace Laboratories, Bangalore is implementing this project in association with C-WET.

Completed Projects

i. Recommendations on Design and Maintenance of Gearboxes of Wind Turbine:

As per the recommendations of the project, a Committee of tribology experts has been constituted to give expert opinion on the lubricants used in the present-day wind turbines and improvements that can be incorporated.

New Infrastructure

As a part of promoting Renewable Energy

Devices in C-WET campus, R&D Unit has installed a Solar Water Heater System in C-WET premises. The system consists of three solar panels with heat exchanger system. The total capacity of the system is 300 litre per day and will cater to the needs of C-WET's Guesthouse/ Canteen. Solar lanterns were purchased and installed for use mostly by security during night shifts.

Also, steps have been taken to furnish the R&D laboratory which will house the Scientific instruments / equipments.

In view of the growing importance of the interaction between wind turbine and grid, power quality issues and C-WET's involvement in such studies, it was felt necessary to procure a power analyzer that would measure all the parameters as are relevant to power quality and help in a better understanding of the system.

R&D Council Meetings

1. The Eighth Meeting of the R&D Council was held on 11th October 2004 at Conference Hall, C-WET, Chennai.
2. The Ninth Meeting of the R&D Council was held on 12th February 2005 at National Aerospace Laboratories, Bangalore.



Centre for Wind Energy Technology, Chennai

WIND RESOURCE ASSESSMENT

The Government of India has launched a National Program of wind resource assessment since 1986 and the number of wind monitoring stations established under MNES programme is 439. Apart from MNES sponsored program 31 more stations

have been established under various other projects. As on March 31st 2005 sixty-five stations are in operation in 18 states and one Union Territory. The over all status of the wind monitoring stations in the country is given in the table below:

Status of Wind Monitoring Stations (2004-05)

S.No	State	Number of Stations				
		Established till 31.3.2004	Continued from 2003-04	Closed during 2004-05	Installed (new) during 2004-2005	In operation as on 31.03.05
1	ANDAMAN & NICOBAR ISLANDS	10	-	-	4	4
2	ANDHRA PRADESH	60	2	-	-	2
3	ARUNACHAL PRADESH	4	-	-	-	-
4	ASSAM	5	-	-	1	1
5	CHATTISGARH	1	-	-	2	2
6	GOA	-	-	-	1	1
7	GUJARAT	56	3	-	-	3
8	HARYANA	5	1	1	1	1
9	HIMACHAL PRADESH	9	-	-	-	-
10	JAMMU & KASHMIR	7	2	2	-	-
11	JHARKHAND	-	-	-	2	2
12	KARNATAKA	34	3	1	3	5
13	KERALA	21	-	-	4	4
14	LAKSHADWEEP	10	1	1	-	-
15	MADHYA PRADESH	26	1	-	4	5
16	MAHARASHTRA	84	15	3	3	15
17	MANIPUR	-	-	-	3	3
18	MIZORAM	-	-	-	3	3
19	ORISSA	10	-	-	-	-
20	PONDICHERRY	4	-	-	-	-
21	PUNJAB	11	-	-	-	-
22	RAJASTHAN	35	1	-	1	2
23	TAMIL NADU	58	3	-	3	6
24	TRIPURA	-	-	-	3	3
25	UTTARANCHAL	11	-	-	-	-
26	UTTAR PRADESH	-	-	-	2	2
27	WEST BENGAL	9	-	-	1	1
Total		470	32	8	41	65

The wind resource assessment programme is being implemented in the states with the active co-operation of State Nodal Agencies. Of the cumulative total of 470 stations established till 31.03.2004, 211 stations have been found to have Wind Power Density (WPD) in excess of 200 W/m^2 at 50magl. Details of these 211 stations are given in the Table below

WPD range [W/m^2]	Number of stations
200-250	78
250-300	62
300-350	31
350-400	14
>400	26

Table W2. WPD Distribution at the 211 stations

Details of the activities carried out during 2004 - 2005 are as follows.

MNES PROGRAMMES

General

1. Data collection from twelve reference wind-monitoring stations was continued from the previous years in seven states.
2. Twenty one wind monitoring stations with 50 m tall mast with instrumentation at 3 levels were commissioned in 11 states under the programme of Wind Resource Assessment in uncovered / new areas.



50m mast under installation at Dudha, Maharashtra

3. Data collected from 26 wind-monitoring stations in six states were analyzed for the publication of Wind Energy Resource Survey in India, Volume 7.



View of 50m mast with instruments



Ten wind monitoring stations with 25 m tall masts were established in Assam (1), Manipur (3), Mizoram (3) and Tripura (3) under Ministry's programme of under a Special study of Wind Resource Assessment in the NE region.

SNAs & Other Institutions

1. Under a project sponsored by Maharashtra Energy Development Agency (MEDA) a report was prepared and submitted in April 2004 on wind monitoring based on the data collected in respect of wind monitoring study carried out at Kankora and Aundhewadi in Maharashtra.
2. Data collection continued from the previous year at five wind-monitoring stations commissioned in the Latur and Sangli districts of Maharashtra under a programme with MEDA, Pune.
3. Data collection continued from the previous year at six wind-monitoring

stations commissioned in the Konkan region of Maharashtra under a programme with MEDA, Pune.

4. Final report on data collected at Nargund near Gadag District in Karnataka was prepared and submitted to Karnataka Renewable Energy Development Limited (KREDL), Bangalore.
5. Two wind monitoring stations were established in Madhya Pradesh, one each in Bhopal & Hoshangabad districts under a programme with Maulana Azad Institute of Technology (MANIT), Bhopal and data is being collected.
6. Four wind-monitoring stations established in December 2004 in the Andaman & Nicobar group of islands with 30 m tall masts under a programme with the NRSE division of A/N Electricity Department.



The state wise details of the wind monitoring stations commissioned during 2004-2005 in the country under various programmes given in the below Table

State wise installations of wind monitoring stations established during 2004-2005

S.No.	Stations established	State	District	Date of commissioning	Mast height (m)
1	Badmash Pahar	A/N Islands	S.Andamans	04.12.2004	30
2	Corbin's Pahar		S. Andamans	05.12.2004	30
3	Sabari		M. Andamans	08.12.2004	30
4	Mt. Harriet		S. Andamans	11.12.2004	30
5	P. Leikul	Assam	N.Cachar	20.03.2005	25
6	Rauni	Chattisgarh	Jashpur	25.04.2004	50
7	Bailadila Hills		Dantewada	30.05.2004	50
8	Loliem	Goa	South Goa	20.01.2005	50
9	Silkhah	Haryana	Gurgaon	06.05.2004	50
10	Pithauria	Jharkhand	Ranchi	30.04.2004	50
11	Netarhat		Gumla	07.06.2004	50
12	Pasavadigumba	Kerala	Kasrgode	28.04.2004	50
13	Pushpagiri		Idukki	31.08.2004	50
14	Vizhinjam		Trivandrum	27.05.2004	25
15	Neendakara		Kollam	28.05.2004	20
16	Settigere	Karnataka	Kolar	20.05.2004	50
17	Kamalapur		Gulburga	06.06.2004	50
18	Majlatti		Belgaum	15.01.2005	50
19	Purtala	Madhya Pradesh	Chindwara	20.04.2004	50
20	Garhidadar		Anupur	02.06.2004	50
21	Bhopal		Bhopal	29.06.2004	25
22	Tawa Dam		Hoshangabad	17.08.2004	25
23	Dhanger Malegaon	Maharashtra	Aurangabad	14.04.2004	50
24	Dudha	Manipur	Buldhana	16.04.2004	50
25	Pathar		Nagpur	18.04.2004	50
26	Chawangkinging		Senapathi	04.02.2005	25
27	Phangrei		Ukhrul	08.02.2005	25
28	Kotlane	Mizoram	Senapathi	05.03.2005	25
29	Sakawrhmituai		Aizawal	15.02.2005	25
30	Reiek		Mamit	17.02.2005	25
31	Hmuifang		Aizawal	18.02.2005	25
32	Gajner	Rajasthan	Bikaner	09.05.2004	50
33	Kainankarai	Tamil Nadu	Pudukottai	20.04.2004	50
34	Agasthianpalli		Nagapattinam	11.06.2004	50
35	Kalunirkulam		Tirunelveli	30.09.2004	50
36	Phuldangsai	Tripura	N. Tripura	28.01.2005	25
37	Tlansang		N. Tripura	29.01.2005	25
38	Vanghmun		N. Tripura	30.01.2005	25
39	Drummondganj	Uttar Pradesh	Mirzapur	10.06.2004	50
40	Piparia Jagir		Lalitpur	13.06.2004	50
41	Nayachar Island	West Bengal	Midnapore	31.10.2004	50



CONSULTANCY PROJECTS

In addition to the wind monitoring projects the unit has carried out 15 consultancy projects. These short-term projects were to provide micrositing services and preparation of due diligence reports. Under direction from the Ministry, verification of data collection procedure adopted by private initiatives were undertaken for a number of stations. Details of projects carried out during the financial year are given in table below.

Micrositing projects taken up during 2004-2005

S.No.	Name of the Project	Name of the Client
1	Verification of Procedures of wind monitoring at a site near Jaisalmer, Rajasthan	M/s. Suzlon Energy Ltd, Pune
2	Verification of Procedures of Wind Monitoring at Eklingapura, Chittorgarh, Rajasthan	M/s. Enercon India Ltd, Mumbai
3	Micrositing and layout of wind farm of 19*225 kW in Radhapuram, Tamil Nadu	NEPC -India Ltd, Chennai
4	Micrositing and layout for wind farm at Ingadhal, Chitradurga, Karnataka	Hutti Gold Mines Ltd, Bangalore
5	Micrositing and layout of wind farm at Boranahalli, Chitradurga, Karnataka	M/s. Mysore Mercantile Company Ltd, Bangalore
6	Study and evaluation of existing 29.75MW wind power projects in Chitradurga Range of hills, Karnataka	M/s. MSPL Limited, Hospet
7	Micrositing and layout of wind farm at Brahmanvel region in Maharashtra	M/s. K. P. Power Private limited, Mumbai
8	Appraisal of Wind farming proposal at Sogi/Jajikkalgudda, Bellari Dt, Karnataka	M/s. MSPL limited, Hospet, Karnataka
9	Micro-Survey Studies at three locations in Tamilnadu	M/s. Tamilnadu Energy Development Agency (TEDA), Chennai
10	Wind Data Analysis and Micro siting for wind farm projects in Hospet, Karnataka	M/s. MSPL limited, Hospet, Karnataka
11	Verification of Procedures of Wind Monitoring at Phalodi, Rajasthan	M/s. Suzlon Energy Ltd, Pune
12	Micro Siting at Ramakkalmedu and Pushpakandam in Idukki District	M/s. Agency for Non Conventional Energy & Rural Technology, Thiruvananthapuram.
13	Verification of Procedures of Wind Monitoring at Pratapgarh, Rajasthan	M/s. NEG Micon Ltd, Chennai
14	Micro Siting and layout of Wind Farm at Veppilankulam Village, Tirunelveli, Tamilnadu.	M/s. Surana Industries Ltd, Chennai
15	Assessing the possible generation at Bogampatti & Pachapalayam in Coimbatore, Tamilnadu	M/s. Rasi Seeds (P) Ltd, Salem

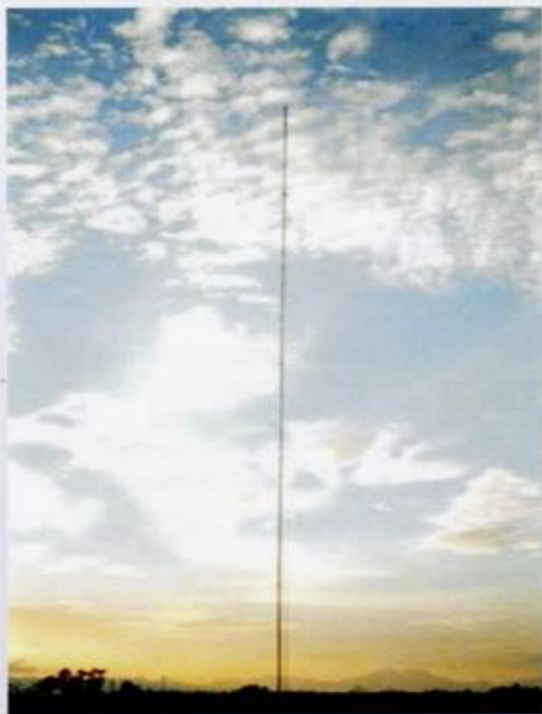
R & D PROJECTS

Power Law Verification Programme:

Vertically extrapolated wind speed based on long term-measured values of wind at two known levels is used frequently for wind

energy estimation. As the height projection of long term average is related to many influencing factors like atmospheric stability and surface characteristics, the extrapolation index has to be used very

Judiciously, and a universal value cannot be applied.



*50m mast with instruments at
Kalunirkulam*

Thus to find out the extrapolation index and its verification for a vast region having uniform roughness characteristics and weather pattern, a measurement programme was taken up in plains as well as hilly terrain. One 50 m tall mast with instrumentation at three levels was established in September 2004 at Kalunirkulam in the Tirunelveli district of Tamil Nadu and the data is being collected.

Measure - Correlate - Predict Method for Wind Resource Assessment: C-WET has started a programme of Measure - Correlate Predict (MCP) method for wind resource assessment during the year 2004-2005.

MCP is a statistical technique, used to obtain synthesized long term data at a given site where concurrent short term data is available. The idea is to obtain correlation coefficients from concurrent data sets from the site under consideration and a nearby reference station where long term data sets are available. These correlation coefficients would then be applied to the long term data sets to obtain synthesized data sets for the site under consideration. Under this programme a 50 m tall mast with three level instrumentation was commissioned at Majlatti near Chikkodi reference wind monitoring station in Karnataka in January 2005 and the data is being collected. The experiment has the aim of validating the procedures and techniques.

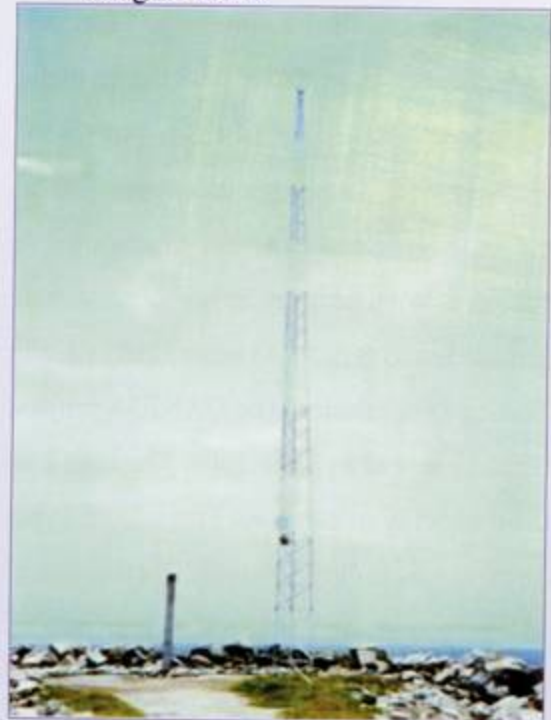
Near Off Shore Measurement Programme: A Global trend of commissioning of wind farms in the off shore region is catching up world wide mainly due to the constraint in getting suitable land and to the advantage of higher wind resource availability despite many constraints. As a prelude, to assess the off shore and near off shore wind availability in the country, a programme of wind resource assessment on coastal locations that could give an insight to the wind resources off shore to a certain extent was taken up. Under this programme

- ☐ The wind and solar radiation data collection was continued during the year at Vivekananda Rocks, Kanyakumari. The Tsunami that struck on 26th December 2004 destroyed the

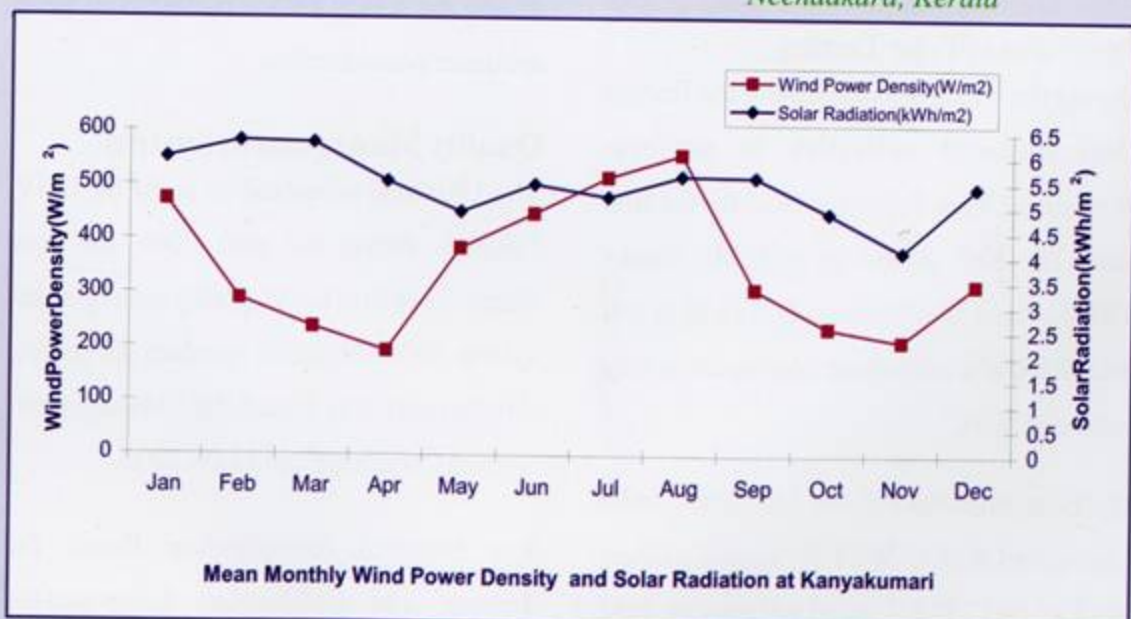
mast and sensors installed on the rocks. However sufficient data has been collected from the station. The site has exhibited sufficiently high Wind Power Density (WPD). The annual average WPD at 30 m agl at Kanyakumari is 347 W/Sq.m. A graphical representation of Monthly Mean WPD and Mean Solar Radiation is given below.

Based on data for the period December 2003 to November 2004 its seen that at Kanyakumari rock, there is good wind resources and this implies that good wind resources off-shore also in the region. It can be observed that when the wind is comparatively low during February to April, there is good amount of Solar Radiation available at the site. This is observed to a certain extent during September to November also.

- Two wind-monitoring stations were established on the coastal Kerala, one at Vizhinjam near Trivandrum and the other at Neendakara near Kollam in the month of May 2004 and the data is being collected.



Wind monitoring mast installed at Neendakara, Kerala





Centre for Wind Energy Technology, Chennai

WIND TURBINE TESTING

Establishment of the Test Station

During the five year period from 1999 to 2004, C-WET with the technical assistance from Riso National Laboratory, Denmark under DANIDA grant and with the financial assistance from the Ministry of Non-Conventional Energy Sources has gained the experience and expertise to accomplish testing of wind turbines as per International standards and at par with other International Testing Laboratories. The DANIDA project came to an end by June 2004. The Unit has the capability to carry out Provisional Type Testing including Power Performance Measurements at WTTS, Kayathar and at field independently as per the relevant International Standards.

Provisional Type Testing

During the windy season of 2004 the Testing Unit initiated activities to perform Provisional Type Testing at field for the first time. The Unit signed up with M/s Vestas RRB Ltd and M/s Enercon India Ltd to test their 600 kW wind turbines during the windy season of 2004.

M/s Enercon India Ltd and M/s NEPC India Ltd. signed with C-WET for testing of their 800 kW and 750 kW wind turbines on field



Strain gaging of Vestas Pavan Shakti 600 kW wind turbine at the Vestas RRB factory

during the windy season of 2005. The pre-feasibility study for Provisional Type Tests of Enercon 800 kW wind turbine near Bamnasa in Gujarat was undertaken by the unit during the period 23.09.2004 to 26.09.2004. The Unit has also received a few requests for Provisional Type Testing during the windy season of 2005 and these are under consideration.

Quality Management System

The Unit was subjected to audit by DNV, Chennai during the year 2004 and was found to confirm to the quality management system ISO 9000:2001 standard for testing services and was issued the "Management System Certificate" on 11.08.2004.

The National Accreditation Board for Testing and Calibration Laboratories



Instrumentation work on the mast for Provisional Type Testing on Enercon E 48 600 kW at Coimbatore

(NABL) had conducted a pre- assessment audit during January 2005 as part of the evaluation by NABL for Accreditation. The engineers of the unit have also been trained as Internal auditors as per the requirements of ISO/IEC 17025 standards by the Centre for Electronics Test Engineering, ETDC during February 2005. The Unit is aspiring to be accredited by NABL by December 2005.

TESTS CARRIED OUT

YEAR	TYPE OF TEST	SPECIFICATION OF WIND TURBINE
On-going Tests		
2005	Provisional Type Test at Bamnasa, Gujarat	Enercon 800 kW, 48 m rotor diameter
2005	Provisional Type Test in Tamilnadu	NEPC 750 kW, 47 m rotor diameter
2005	In-situ Power Performance, Chitradurga, Karnataka	NEG-MICON 950 kW, 54.5 m rotor diameter
2004	Provisional Type Test at Govindhapuram, Coimbatore	Enercon 600 kW, 48 m rotor diameter
2004	Provisional Type Test at Senjhuvadi, Coimbatore	Vestas RRB 600 kW, 47 m rotor diameter
Tests Completed		
2003	In-situ Power performance (near Jaisalmar)	SUZLON 1000 kW, 62 m rotor diameter
2003	In-situ Power performance (at Kappathagudda Hills in Karnataka state)	Enercon 230 kW, 33 m rotor diameter
2002-2003	Provisional Type Test at WTTS	SUZLON 1250 kW, 64 m rotor diameter
2002-2003	Provisional Type Test at WTTS	TTG, 250 kW, 28.5 m rotor diameter
2002	In-situ Power performance (near Muppandal)	NEG MICON, 750 kW, 48.2 m rotor diameter
2001	Provisional Type Test at WTTS	SUZLON 1000 kW, 60 m rotor diameter
2001	Provisional Type Test at WTTS	NEPC, 225 kW, 29.6 m rotor diameter
2000	Provisional Type Test at WTTS	VESTAS, 500 kW, 47 m rotor diameter
2000	Provisional Type Test at WTTS	SUZLON, 350 kW, 33.4 m rotor diameter
1999	In-situ Power performance (near Muppandal)	VESTAS, 500 kW, 39 m rotor diameter
1999	In-situ Power performance (near Coimbatore)	BHEL, 250 kW, 29.7 m rotor diameter



STANDARDS & CERTIFICATION

In the recent years, rapid wind power development is witnessed in the country. In this scenario, the certification of wind turbines would certainly help the wind industry to achieve stable growth and to the development of safe and reliable wind turbines, which would safeguard the interests of the various stakeholders.

Most of the countries with active wind energy programmes have their own certification system, based on international standards. In order to encourage the international trade, International Electrotechnical Commission (IEC) has been issuing international standards addressing various aspects with respect to wind turbines. With this development, the certification bodies have started issuing the type certificates based on international standards (IEC). At the same time, country specific rules and regulations,

addition/modifications on IEC also become applicable.

A product certification scheme for wind turbines, viz., The Type Approval Provisional Scheme (TAPS-2000), approved by MNES, is being implemented by S&C unit of C-WET.

TAPS-2000 has been prepared in line with IEC standards, covering the country specific requirements for grid, extreme wind speed and other external conditions. The Certification schemes and the type certificates issued by accredited certifying bodies elsewhere were also recognised by TAPS-2000.

S&C unit of C-WET has eight certification projects presently and is striving to serve the industry better, based on the experience gained. The status of the projects are given below.

STATUS OF S&C PROJECTS

Provisional Type Certificate issued (2004-2005)

S. No	Manufacturer's Name	WT Model/Capacity	Status
1	NEG MICON (India) Private Limited	NM 48/750kW	Certificate issued valid up to 25.08.2005

Provisional Type Certification-Status of Category I Projects as on 31.03.2005

S. No	Manufacturer's Name	WT Model/Capacity	Status
1.	Chiranjeevi Wind Energy Limited	C2920/250kW	On going
2.	Pioneer Wincon Limited	W250/29/250kW	On going
3.	NEPC India limited	NEPC-225 kW (with 50m tubular tower)	On going



Provisional Type Certification-Status of Category II Projects as on 31.03.2005

S. No	Manufacturer's Name	WT Model/Capacity	Status
1	Enercon (India) Limited	Enercon E40/6.48-600kW	On going
2	Vestas RRB India Limited	Pawan Shakthi-600kW	On going
3	NEPC India Limited	NEPC-NORWIN-ASR-46/47-600/750kW	On going
4	Enercon (India) Limited	E 48/800kW	On going

Provisional Type Certification-Status of Category III Projects as on 31.03.2005

S. No	Manufacturer's Name	WT Model/Capacity	Status
1	TTG Industries Limited	TTG-250T/250kW	On going

Renewal of Provisional Type Certification –Completed

S. No	Manufacturer's Name	WT Model/Capacity	Validity
1	Enercon (India) Limited	E30-230kW	15.04.2005
2	NEPC India Limited	NEPC-225kW	15.05.2005
3	Suzlon Energy Limited	N3330/300 kW & N3335-350kW	24.11.2005

National Application Documents

C-WET was authorized by Bureau of Indian Standards (BIS) for preparation of Standards for Wind Energy, applicable in India. International Electrotechnical Commission (IEC) has published various standards related to Wind Energy. The following National Application Documents (NADs), to be used in association with IEC standards, have been prepared by S&C unit in association with RISO, the technical

consultants and submitted to MNES. MNES forwarded the NADs to BIS.

C-WET Scientists along with Executive Director have participated in Non-conventional Energy Sources Sectional Committee ME04 meeting on 28.01.2005 at BIS, New Delhi. In the meeting, methodology to be adopted for preparation of Indian Standards on wind energy was discussed.

S. No.	IEC Standards	NADs
1	IEC WT 01: IEC System for Conformity Testing and Certification of wind Turbines	NAD (IN) IEC WT 01
2	IEC 61400-1 Wind Turbines-Part 1: Safety Requirements	NAD (IN) IEC 61400-1
3	IEC 61400-12: Wind Turbines-Part 12: Wind Turbine Power Performance Testing	NAD (IN) IEC 61400-12



List of Wind Turbine Manufacturers / Wind Electric Equipment

The Committee meeting on the List of Manufacturers of Wind Electric Generators / Wind Turbine Equipment have been held periodically to verify the documentation provided by the manufacturers and to recommend the list of Wind Turbine Manufacturers / Wind Electric Equipment for the issue. Two quarterly lists of Wind Turbine Manufacturers/Wind Electric Equipment have been issued on 9th June 2004 and 18th October 2004.

TYPE APPROVAL SYSTEM (TAS)

The draft Type Approval System (TAS), prepared in association with RISO, has been submitted to MNES for approval.

QMS : ISO 9001-2000

The Quality Manual, Common System Procedures and unit level QMS documentation have been implemented as per ISO 9001:2000. Internal Audits have been conducted periodically as per the audit plan, to verify the implementation of the

Quality System, by certified Internal Auditors.

Management Review meeting has been conducted. The preliminary audit was completed by DNV on 23.06.2004. The final audit as per ISO 9001:2000 has been conducted on 29.07.2004. C-WET has been certified as per ISO 9001:2000 by DNV and certificate was issued on 11.08.2004.

The Quality Manual has been revised to meet the requirements of ISO/IEC 17025 and revised manual was issued.

Steering Committee

Eighth meeting of steering committee was conducted on 16th April 2004 at C-WET to review the implementation of WTTS projects. A presentation on the implementation of the project was made by Unit Chief, S&C.

Mission of Technical Consultant

Mr. Erik Jorgensen, Technical consultant, DANIDA, provided training from 19th April 2004 to 05th May 2004. During the period, FEM concepts using ANSYS software and stress calculations using flex 5 results were discussed.

INFORMATION, TRAINING AND COMMERCIAL SERVICES

The Information, Training and Commercial Services (ITCS) unit executed the following activities during the year 2004-2005.

Academic

In view of the growing need of qualified manpower in the Wind Energy sector both in national/international level there is a need to start a masters level course in wind energy in the universities/colleges. This would help in getting trained manpower for the wind industry - universities - research institutions. As per the directives of the R&D Council of Centre for Wind Energy Technology a syllabus committee was constituted under the chairmanship of Prof. Sujay Basu, Director, School of Energy Studies, Jadavpur University, Kolkata to prepare a suitable syllabus, which in-turn be recommended to universities / colleges for implementation. The committee met thrice and finalized a syllabus including all of the subjects and electives for a two year Master's Degree course. The Syllabus has been forwarded to the MNES, New Delhi for consideration and approval and also forwarded to the All India Council for Technical Education (AICTE), New Delhi for implementation in some of the Universities. The Sathyabama Deemed University, Chennai is in the process of implementing the Syllabus for a M. Tech. Wind Energy Course.

Mini conference

As a part of Project DANIDA's Phasing out Plan, C-WET organized a mini-conference, "Focus on long-term sustainability and development" along with RISO with the objective of exploring long term sustainability of the C-WET as well as wind energy sector as a whole, on 15th April 2004 at C-WET, Chennai. The participants were manufacturers, end-users, consultants, O&M agencies and State Nodal Agencies. Shri. A.M. Gokhale, Secretary, MNES inaugurated the conference. Dr. Per Lundsager, Dr. Peter Hague Madsen, Technical Consultants from RISO made presentations on project accomplishments and perspectives of future. The recommendations of the mini-conference were presented in the 8th meeting of the steering committee.



*Shri. A.M. Gokhale, Secretary,
MNES inaugurating the conference*



Centre for Wind Energy Technology, Chennai

Newsletter

C-WET has been bringing out its well received quarterly newsletter "PAVAN" to create awareness and disseminate information on the activities and role of the centre besides local and global developments in the wind energy sector. The newsletter highlights the activities of C-WET and feature focused articles, success stories, interviews with experts in wind energy sector, Government's new rules/policies, and the latest news/ views/ trends.



The first issue of C-WET Newsletter PAVAN

Four issues of PAVAN carrying the information and latest articles for the period from April 2004 to March 2005 has been published and circulated.

Release of "PAVAN" Inaugural Issue:

Shri. Vilas Muttemwar, Honorable Minister of State, (Independent Charge) released the inaugural issue of the C-WET Newsletter "PAVAN" on 28th July 2004.



Hon. Minister releasing the inaugural issue of "PAVAN"

National Training

First National Training: Successfully organized the first National Training Programme on "WIND FARM DEVELOPMENT AND RELATED ISSUES" on 14th and 15th October 2004 to address all aspects of Wind Power deployment starting from Wind Resource Assessment to project implementation and operations in a focused manner. The idea was to share basic and advanced training and knowledge with industry, utilities, technical institutions and various Central and State governmental implementing agencies. In addition, the course provided an invaluable platform for dialogue and open exchange of views and experiences.



Shri. K. P. Sukumaran, Advisor, MNES distributing the course certificate

Second National Training: The second National training programme on “Fundamentals of Wind Turbine Technologies” was organized successfully on 10th and 11th March 2005 to address all aspects of Fundamentals of Wind Turbine Technologies starting from wind resource to aerodynamics, wind turbines and wind electric generator in a focused manner.

The following topics were covered in the training, Blade theory and Power Regulation, Types of Generators in Wind Turbine, Wind Resources & Assessment Techniques, Grid Integration of Wind Turbines, Analysis of Lattice Tower and Foundation Concepts, Overview of Wind Turbine Design, Control and Protection System Requirements, Certification of wind Turbines, Power Curve Measurements, Mechanical Loads and Operation & Maintenance of Wind Turbine. 27 participants got benefited in the training course. All the lectures were delivered by the



Training participants in front of C-WET Office

C-WET scientists/engineers. The participants were also taken to the 55 kW Wind turbine nacelle facility at C-WET and explained to have a practical knowledge.



Participants getting their first look at Wind Turbine Nacelle

International Training Programme

Under a government sponsored initiative, asked C-WET to coordinate the initial part of the two-weeks programme to host about 20 participants from BIMSTEC and ASEAN Member countries. C-WET welcomed the participants and organised a

well-received full-day workshop. The next day the participants were taken to Pondicherry to Auroville and blade manufacturing facilities set up by a private wind turbine manufacturer. In order to give field exposure, the team was then taken to wind farms around Jogimatti near Chitradurga in Karnataka.

Hindi day celebrations

“Hindi Diwas” was celebrated on 21.09.04 at Conference Hall of Centre For Wind



Field visit at Chitradurga, Karnataka

Energy Technology. Shri M. P. Ramesh, Executive Director and Chairman of Hindi Promotion Committee, C-WET extended warm welcome and invited the Chief Guest & employees of C-WET and delivered a introductory note. Shri. Rajesh Katyal, Unit Chief, R & D and Member-Secretary of Hindi Promotion Committee, C-WET presented a detailed report on implementation of Hindi in C-WET. A Hindi speaking competition was held for the

employees of C-WET and most of them delivered speech in Hindi on the topic “Water problems in Chennai”. Essay writing competition was also conducted. There after a keynote address was delivered by the Chief Guest, Shri. Tikaram Kashyap, Deputy Director, Hindi Teaching Scheme (Ministry of Home Affairs), Shastri Bhavan, Chennai explaining the importance of promotion of Hindi, National Language. He reiterated the need of Hindi training for C-WET officials. The Chief Guest



Hindi Diwas Celebrations

distributed the prizes to the successful participants. The meeting concluded with a Vote of Thanks by Shri. N. S. Prasad, Unit Chief, S&C, C-WET.

Training for State Nodal Agencies

One day training programme on “Memory Storage Device collection and Operation & Maintenance of the Wind Monitoring Stations” was successfully organised for the benefit of the State Nodal Agencies (SNAs)



Centre for Wind Energy Technology, Chennai

officials in June and August 2004. A total of 16 participants from 9 States participated in the program.



Training for State Nodal Agencies in progress

Internal Auditor Training

As a part of accreditation activities of Test unit, a training programme on “Internal Auditor as per ISO/IEC 17025” was organised for C-WET Scientists / Engineers, during 21st - 23rd February 2005. This training was conducted by Dr. Veena S. Kamth, Scientist from Centre for Electronics Test Engineering (CETE), Bangalore.



Internal Auditor training in progress

Special Lecture

C-WET organised a special lecture on “Some observed wind profiles in the atmospheric boundary layer over coastal and inland stations” delivered by Dr. S. Sivaramakrishnan, Scientist, Indian Institute of Tropical Meteorology, Pune at C-WET Lecture Hall on 25th August 2004.

Networking Facility

Local Area Network (LAN) facility for C-WET new campus at Pallikaranai has been established to have the Internet connectivity to speed up the Information Dissemination. Internet Radio link connectivity of 128Kbps has been established and is in the process of upgradation to higher bandwidth. The process of hosting the center's website at C-WET server is initiated.

Library Automation

C-WET has established a well-equipped Library in its campus with reference materials, books and periodicals (Magazines and Journals). Every effort is being made to procure literature regarding wind energy sector in particular and renewable energy in general. The work related to the automation of the library is in progress to maintain the library resources and offer the services effectively.

Apprentice Training Programme

Three apprentices Shri. S. Natarajan and Shri. G. Govind in Wind Resource



Assessment unit and Shri. Rajkumar in R&D unit have been engaged as apprentice for a period of one year to provide an opportunity to learn and gain experience about wind energy technology.

E-MAIL facility

Domain name www.cwet.res.in has been registered and our own office E-mail facility has been extended to the staff for speedy communication.

Visit to Abroad

1. Shri. Rajesh Katyal, Unit Chief, R&D, has attended training on "Foundation concepts" conducted by Mr. Erik Jorgensen and Mr. Jasper Schaarup, Technical Consultants at Risoe National Laboratory, Denmark during 07th-15th June 2004.
2. Shri. David Salomon, Scientist, Testing has attended training on "Inter-Laboratory Comparison of Cup-anemometer & Active Power Transducer" conducted by Mr. Uwe Schmidt Paulsen, Technical Consultants at Risoe National Laboratory, Denmark during 07th-15th June 2004.
3. Shri. M. P. Ramesh, Executive Director and Shri. N. S. Prasad, Unit Chief, S&C participated in the International conference conducted by World Renewable Energy Congress-VIII held

at Denver, Colorado, US, during 29th August to 3rd September, 2004.

Publications

1. Shri. M. P. Ramesh, Executive Director, "A technical note on Micro-siting of Wind Turbines", Directory Indian Wind Power 2004, 4th Ed., P. 18-30.
2. Shri. M. P. Ramesh, Executive Director, Smt. Deepa Kurup, Junior Engineer, R&D and Shri. S. Sureshbabu, Technician, R&D jointly with IIT, Bombay, paper on "Modelling of Interconnection of Wind Turbines with the Grid" accepted for presentation at IEEE Conference on Power Systems held at Kathmandu, Nepal during November 2004.
3. Dr. E Sreevalsan, Unit Chief in-charge, WRA/ITCS "Pareto Analysis on various problems of grid connected wind energy conversion system", WINPRO, March 2005.
4. Dr. E Sreevalsan, Unit Chief in-charge, WRA/ITCS "Reliability, Availability and Maintainability Analysis of Wind Turbine Generators using Markov model for sustainable development", Proceedings of the National Conference on Recent Advances in Mechanical Engineering, NI College of Engineering, Tamilnadu, 2004.
5. Dr. E Sreevalsan, Unit Chief in-charge, WRA/ITCS "Wind Speed and Power



- Prediction using Artificial Neural Networks", Poster Presentation. European Wind Energy Conference, 2004.
6. Dr. E Sreevalsan, Unit Chief in-charge, WRA/ITCS "Estimation of Weibull Parameters of Wind Regimes A Comparison of Different Methods", Proceedings of International Conference of Renewable Energy, Central Board of Irrigation & Power, 6th - 8th October 2004, New Delhi.
 7. Shri. R. Sasi Kumar, "Wind Measurement and instrumentation", WINDPRO, December 2004.
 - Report" at TERI on 24th August 2004.
 4. Shri. M. P. Ramesh, Executive Director & Shri. N. S. Prasad, Shri. Carsten Skamris, RISOE, "Experiences of Indian Certification System" in the World Renewable Energy Congress VIII on 29th August 3rd September 2004 at Denver, USA.
 5. Shri. M. P. Ramesh, Executive Director, "Micrositing and Layout of Wind Farm" first national training course on "Wind Farm Development and Related Issues" organized by C-WET, on 14-15 October 2004.
 6. Shri. M. P. Ramesh, Executive Director, "Efficacy of Site Selection and factors affecting Micro Siting" in the one day Business meet on Wind Energy and Energy Efficiency on 26th November 2004 at Coimbatore.

Selected Lectures in Conference and Seminars

Research & Development

1. Shri. M. P. Ramesh, Executive Director, "Wind Energy/The Indian Scenario" on 26th May 2004 in the International workshop on wind Engineering & Sciences 2004 at IIT, Roorkee.
2. Shri. M. P. Ramesh, Executive Director, an Expert Lecture on "Recent Trends in Wind Energy Technology" on 10th August 2004 in the inaugural function of the Association of Student Members in the department of Electrical & Electronics Engineering of Jerusalem college of engineering, Chennai.
3. Shri. M. P. Ramesh, Executive Director, "Workshop on Technology Assessment
7. Shri. M. P. Ramesh, Executive Director, "An overview of Indian Forays in Wind Energy Technology" on 3rd December 2004 in the business meet on Wind energy and energy conservation at Hyderabad organised by NEDCAP.
8. Shri. M. P. Ramesh, Executive Director, "Modern Wind turbine & Off-shore applications" on 21st December 2004 in the AICTE-ISTE Short term course on Advanced Energy Technologies at IIT Madras, Chennai.
9. Shri. M. P. Ramesh, Executive Director, Chair for the Wind Energy (TS1-A)



- session in the International Congress on Renewable Energy (ICORE), 20th-22th, January 2005, Pune.
10. Shri. M. P. Ramesh, Executive Director, "Inaugural Address in the National Conference on Emerging Trends in Energy and Environment" on 18th & 19th February 2005.
 11. Shri. M. P. Ramesh, Executive Director "Introduction to Wind Turbine Technologies" in the, second national training course on "Wind Power Development in India: An overview" organized by C-WET on 10th - 11th March 2005.
 12. Shri. K. Boopathy, Scientist, "Wind Energy Technology & Applications" at Technical Teachers' Training Institute (TTTI), Chennai on 31st August 2004.
 13. Smt. Deepa Kurup, Junior Engineer, presentation on R&D activities and 'Modelling of Interconnection of Wind Turbines with the grid' in the training on 'Renewable Energy options for BIMSTEC and ASEAN Member Countries' at C-WET on 6th November 2004.
 14. Shri. Rajesh Katyal, Unit Chief, 'Analysis of Lattice Tower and foundation concepts' in the second National Training course on "Wind Power Development in India: An overview" organized by C-WET on 10th - 11th March 2005.
 15. Shri. S. Suresh Babu, Technician, 'Grid Interconnection of Wind Turbines' in the second National Training course on "Wind Power Development in India: An overview" organized by C-WET on 10th - 11th March 2005.
 16. Shri. S. Suresh Babu, Technician, 'Operation & Maintenance of Wind Turbines' in the second National Training course on "Wind Power Development in India: An overview" organized by C-WET on 10th - 11th March 2005.
- ### Wind Resource Assessment
17. Dr. E. Sreevalsan, Unit Chief in-charge, "Wind Power Statistics and Energy Calculation" first national training course on "Wind Farm Development and Related Issues" organized by C-WET on 14th - 15th October 2004.
 18. Dr. E. Sreevalsan, Unit Chief in-charge, "Wind Resources & Assessment Techniques", second national training course on "Wind Power Development in India: An overview" organized by C-WET on 10th - 11th March 2005.
- ### Wind Turbine Testing
19. Shri. S. A. Mathew, Unit Chief in-charge, "Testing of wind turbines-An Overview" International Training programme on renewable Energy



- options for BIMSTEC and ASEAN member countries on 06 December 2004.
20. Shri. S. A. Mathew, Unit Chief in-charge, "Power Curve Measurements", second national training course on "Wind Power Development in India: An overview" organized by C-WET, 10th - 11th March 2005.
 21. Shri. David Solomon, Scientist, "Blade theory and Power Regulation", second National Training course on "Wind Power Development in India: An overview" organized by C-WET, 10th - 11th March 2005.
 22. Shri. R. Kumaravel, Junior Engineer, "An overview Testing of Wind Turbine" first national training course on "Wind Farm Development and Related Issues" organized by C-WET, on 14th - 15th October 2004.
 23. Shri. R. Kumaravel, Junior Engineer, "Mechanical Loads", second National Training course on "Wind Power Development in India: An overview" organized by C-WET, 10th - 11th March 2005.
 24. Shri. N. S. Prasad, Unit Chief, "Assessment of Wind Turbine for a site Other than Power" first national training course on "Wind Farm Development and Related Issues" organized by C-WET, on 14th - 15th October 2004.
 25. Shri. N. S. Prasad, Unit Chief, "Natures gift to Environment Wind Turbines" at IITM, Chennai as part of their QIP short term course on "Recent Trend in environmental Physics" during 22th - 27th November 2004.
 26. Shri. N. S. Prasad, Unit Chief, "Experiences of Indian Certification Systems" International Conferences, World Renewable Energy Congress-VIII, Denver, Colorado, US.
 27. Shri. A. Senthil Kumar, Unit Chief in-charge, "Certification of wind Turbines", second National Training course on "Wind Power Development in India: An overview" organized by C-WET, 10th - 11th March 2005.
 28. Shri. V. R. Gireesh Kumar, Scientist, "Wind Turbine Technology Application and Opportunities" at technical symposium conducted by NES Engineering College, Valanchery, Kerala.
 29. Shri. S. Siva Kumar, Junior Engineer, "Type Approval Provisional Scheme" International Training programme on renewable Energy options for BIMSTEC and ASEAN member countries on 6th December 2004.
 30. Shri. S. Siva Kumar, Junior Engineer, "Overview of Wind Turbine Design", second National Training course on "Wind Power Development in India: An

Standard and Certification



overview" organized by C-WET, 10th-11th March 2005.

31. Shri. S. Arulselvan, Technician, "Types of Generators in Wind Turbine", second National Training course on "Wind Power Development in India: An overview" organized by C-WET, 10th-11th March 2005.

32. Shri. S. Arulselvan, Technician, "Control and Protection System Requirements", second National Training course on "Wind Power Development in India: An overview" organized by C-WET, 10th-11th March 2005.

Conferences, Meetings and Training attended by the C-WET Staff

Research & Development

1. Shri. V. Asaithambi, Scientist, Shri. K. Boopathi, Scientist, Smt. Deepa Kurup, Junior Engineer and Shri. S. Suresh Babu, Technician, training on 'Automotive NVH Testing' on 27th September 2004.
2. Shri Rajesh Katyal, Unit Chief and Shri. K. Boopathi, Scientist, training on "Recent Trends on High Performance FRP Composites" at IIT, Chennai on 29th October 2004.
3. Shri Rajesh Katyal, Unit Chief, Shri. K. Boopathi, Scientist, Smt. Deepa Kurup,

Junior Engineer and Shri. S. Suresh Babu, Technician, intensive two-day training programme on use of 'Bladed Software on Windows' on 3rd-4th November 2004.

4. Shri Rajesh Katyal, Unit Chief, Shri. K. Boopathi, Scientist, Smt. Deepa Kurup, Junior Engineer and Shri. S. Suresh Babu, Technician, training on the Iotech Data Acquisition System on 13th-17th December 2004.
5. Shri. S. Suresh Babu, Technician, workshop on 'Real-time Simulation of Power Systems' at Central Power Research Institute, Bangalore on 24th January 2005.
6. Shri. Rajesh Katyal, Unit Chief, Smt. Deepa Kurup, Junior Engineer and Shri. S. Sureshbabu, Technician, training programme on 'Certified Internal Auditor as per ISO/IEC-17025 Standard' conducted by Centre for Electronics test Engineering, Bangalore on 21st-23rd February 2005 at C-WET, Chennai.

Wind Resource Assessment

7. Dr. E. Sreevalsan, Unit Chief in-charge, Shri. R. Sasikumar, Meteorologist and Smt. T. Arivukkodi, Technician, training programme on 'Certified Internal Auditor as per ISO/IEC-17025 Standard' conducted by Centre for Electronics test Engineering, Bangalore on 21st-23rd February 2005 at C-WET, Chennai.



Wind Turbine Testing

8. Shri. David Solomon, Scientist and Shri. R. Kumaravel, Junior Engineer, training on strain gage technology and applications at Dynalog Bangalore during 20th - 23rd November 2004.
9. Shri. David Solomon, Scientist and Shri. R. Kumaravel, Junior Engineer, training programme on 'Certified Internal Auditor as per ISO/IEC- 17025 Standard' conducted by Centre for Electronics test Engineering, Bangalore on 21st-23rd February 2005 at C-WET, Chennai.

Standard and Certification

10. Shri. N. S. Prasad, Unit Chief, Shri. V. R. Gireesh Kumar, Scientist, "Recent Trends on High Performance FRP Composites" at IITM, Chennai on 29th October 2004.
11. Shri. N. S. Prasad, Unit Chief, Shri. A. Senthil Kumar, Scientist, Shri. V. R. Gireesh Kumar, Scientist, Shri. S. Sivakumar, Junior Engineer and Shri. S. Arulselvan, Technician, attended two-day training programme on use of "Bladed Software on Windows" on 3rd-4th November 2004.
12. Shri. N. S. Prasad, Unit Chief, has attended ISO/BIS Regional Workshop on Certification and Conformity Assessment-Building Confidence for

Developing Countries on 6th-7th December 2004, New Delhi.

Information, Training and Commercial Services

13. Shri. P. Kanagavel, Scientist, visited the Wind Diesel hybridization plant at Ganga - Sagar Island in Kolkata and also the Installation of 50m wind monitoring mast at Haldia, Nayachar Island, West Bengal during the period 11th - 18th June 2004.
14. Shri. P. Kanagavel, Scientist, training programme on "Terminology & official language implementation" on 14th - 16th February 2005 at Munnar, Kerala organized by Centre for Training and Development, Bangalore.

Administration

15. Shri. D. Lakshmanan, GM (F&A), 3 days training Programme on Service Rules of Central Government - Supreme Court Judgments on appointments from 16.02.2005 to 18.02.2005 organized by Parsam Institute of Statutory Rules, Bangalore.
16. Shri. K. V. Uma Maheswara Rao, AAO, 3 days special Programme on Reservation Policy on 14th - 16th February 2005 at Munnar, Kerala organized by Centre for Training and Development, Bangalore.



GENERAL INFORMATION

Committees

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. A.M. Gokhale, Secretary, MNES, 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, Additional Secretary & Financial Adviser, MNES, New Delhi, Member |
| 4 | Dr. K. P. Sukumaran, Scientist 'G' & Head, Wind Energy Group, MNES, New Delhi, Member |
| 5 | Shri. R. Satapathy, Special Commissioner & Secretary to Govt., Energy Department, Govt. of Tamil Nadu, Secretariat, Chennai, Member |
| 6 | Shri. Debashish Majumdar, Managing Director, IREDA, New Delhi, Member |
| 7 | Ms. Satwant Reddy, Director General, Bureau of Indian Standards, New Delhi, Member |
| 8 | Shri. H. L. Bajaj, Chairman, Central Electricity Authority, New Delhi, Member |
| 9 | Dr. A. R. Upadhyaya, Director, National Aerospace Laboratories, Bangalore, Member |
| 10 | Shri. Rajan T Joseph, Executive Director, Centre for Development of Advanced Computing (Formerly ER&DCI), Thiruvananthapuram, Member |
| 11 | Shri. Sarvesh Kumar, 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, MNES |
| 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, Additional Secretary & Financial Adviser, MNES, Chairman |
| 2 | Shri. R. Satapathy, Special Commissioner & Secretary to Govt., Energy Department,
Tamil Nadu Government |
| 3 | Shri. K. P. Sukumaran, Adviser & Head, Wind Energy Group, MNES |
| 4 | Shri. B. M. L. Garg, Director, Wind Power, MNES |
| 5 | Shri. D. Lakshmanan, General Manager (F&A), C-WET, Member Secretary |
-

Steering Committee

The following are the members of the Steering Committee (To formulate broad policies, plans and approve the budget for the functioning of the Wind Turbine Test Station within the overall framework of the Centre for Wind Energy Technology):

-
- | | |
|----|---|
| 1 | Secretary, MNES |
| 2 | Chairman & Managing Director, TEDA |
| 3 | Representative of DANIDA |
| 4 | Danish Technical Consultant for the Project |
| 5 | Danish Project Monitoring Consultant for the project |
| 6 | Managing Director, IREDA |
| 7 | Deputy Director General, Bureau of Indian Standards |
| 8 | Chairman, Indian Wind Turbine Manufacturers Association |
| 9 | Prof. Sujay Basu, Jadavpur University, Calcutta |
| 10 | Hon. Secretary, WINDPRO, Chennai |
| 11 | Financial Adviser, MNES |
| 12 | Adviser & Head, Power Group, MNES |
| 13 | Project / Executive Director, C-WET |
-

Standards Advisory Committee

The following are the members of the Standards Advisory Committee (To guide C-WET in evolving strategies and planning in preparation of Indian Standards for wind turbines):

-
- | | |
|---|---|
| 1 | Deputy Director General, BIS, Southern Regional Office, Chennai |
| 2 | Representative of IWTMA |
| 3 | Representative of WINDPRO |
| 4 | Mr. T. B. Chikkoba, Consultant |
-



- 5 Representative of SEB (TNEB)
- 6 Mr. P. T. Kumar, Joint Director BIS, Southern Regional Office, Chennai
- 7 Mr. J. P. L. N. Sastry
- 8 Mr. A Senthil Kumar, Engineer, C-WET
- 9 Mr. N. S. Prasad, Unit Chief, S & C, C-WET

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):

- 1 Dr. V. Siddhartha, Ministry of External Affairs (Formerly Outstanding Scientist, DRDO, Ministry of Defence, New Delhi, Chairman
- 2 Shri. K. P. Sukumaran, Scientist 'G', Advisor, Wind Power, MNES, New Delhi, Member
- 3 Prof. Sujay Basu, Professor (Retd) Jadavpur University, Kolkata, Member
- 4 Ms. K. A. Fathima, Additional Director & Head, Power Electronic Group, C-DAC (Formerly ER & DCI), Trivandrum, Member
- 5 Dr. A. Rama Mohan Rao, Scientist Gr. IV(4), Structural Engineering Research Centre, Chennai, Member
- 6 Dr. Vidyadhar Mudkavi, Scientist, Computational and Theoretical Fluid Dynamics Division, National Aerospace Laboratories, Bangalore, Member
- 7 Dr. G. B. Pant, Director, Indian Institute of Tropical Meteorology, Pune, Member
- 8 Shri. J. P. L. N. Sastry, Ex. G. M. & Head, R&D, BHEL & Ex. OSD of C-WET, Hyderabad, Member
- 9 Shri L. E. D'Cruz, Advisor, Enercon (India) Limited, Andheri (West), Mumbai, Member
- 10 Shri. M. P. Ramesh, Executive Director, C-WET, Chennai, Member-Secretary

Syllabus Committee

The following are the members of the syllabus committee (To prepare syllabus and design courses on wind energy for master's degree):

- 1 Prof. Sujay Basu, Director, School of Energy Studies, Jadavpur University, Kolkata
- 2 Mr. M. P. Ramesh, Executive Director, Centre for Wind Energy Technology, Chennai
- 3 Dr. N. Siva Prasad, Professor, Machine Design Section, Dept. of Mech. Engineering IIT, Chennai
- 4 Dr. Bh. Nagabhushana Rao, Professor, Structural Engineering Division, Anna University, Chennai



- 5 Dr. C. Chellamuthu, Professor & HOD, Electronics & Communication Engineering and Dean, R & D and Consultancy, Jeruselam College of Engineering, Chennai
 - 6 Dr. R. Rudramoorthy, Professor, Mechanical Sciences, PSG College of Technology, Coimbatore
 - 7 Mr. Sarvesh Kumar, Chairman, IWTMA, Chennai
 - 8 Dr. K. K. Sasi, Reader, Department of Energy, Tezpur University, Tezpur, Sonitpur, Assam
 - 9 Mr. K. C. Dhimole, Principal Engineer & Head, WRA & ITCS, C-WET, Chennai
-

Implementation of Reservation

Policy for SC, ST & OBC

C-WET strictly follows Govt. of India Rules prescribed for Recruitment and appointment for various posts. All the posts are filled as per Post Based Reservation Roster of Govt. of India. Grouping of various posts in direct recruitment for maintaining rosters with pay scales is being done as per Govt. of India Rules. Liaison Officers are appointed for OBC, SC & ST Separately. Reservation Roster is being singed by them every year. No de-reservation has been made till date.

No grievances or complaints of harassment form OBC, SC & ST candidates have been reported so far.

Out of the sanctioned strength of 40, C-WET has staff strength of 31 as on date. Out of which 2 are filled by SC candidates as per the cadre strength of respective category. As per Reservation Roster for Direct Recruitment, the Roster Point for ST Starts once the number of sanctioned posts touches 14. Since the sanctioned strength in each cadre is below 7 or less (as on now) no ST candidate has been appointed.



Centre for Wind Energy Technology, Chennai

HUMAN RESOURCE

M. P. Ramesh, Executive Director

Research & Development

Rajesh Katyal, Unit Chief
K. Boopathi, Scientist
Deepa Kurup, Junior Engineer
S. Suresh Babu, Technician
M. R. Gunasekaran, Steno

Wind Resource Assessment

E. Sreevalsan, Unit Chief In-Charge
R. Sasikumar, Meteorologist
T. Arivukkodi, Technician
K. A. Haji Abdul Ibrahim, Attendant

Wind Turbine Testing

S. A. Mathew, Unit Chief In-Charge
M. Anvar Ali, Scientist
J. C. David Solomon, Scientist
R. Kumaravel, Junior Engineer
M. Karuppuchamy, Technician
A. R. Hasan Ali, Technician
Y. Packiyaraj, Technician

Standards and Certification

N. S. Prasad, Unit Chief
A. Senthil Kumar, Unit Chief In-Charge
V. R. Gireesh Kumar, Scientist
S. Sivakumar, Junior Engineer
S. Arulselvan, Technician

Information, Training and Commercial Services

P. Kanagavel, Scientist

Administration

D. Lakshmanan, General Manager (F&A)
K. V. Uma Maheswara Rao, Admin &
Accounts Officer
R. Girirajan, Assistant
R. Vijayalakshmi, Assistant
K. Tamilselvi, Assistant
B. Muthulakshmi, Steno
M. Malaravan, Driver
M. Selvakumar, Attendant



C-WET officials on external Committees / Membership of Associations / Bodies

M. P. Ramesh

1. Governing Body of ANERT, Member.
2. BIS, New Delhi - Non Conventional Energy Sources Sectional Committee (ME-04), Member & Wind Energy Sub Committee (WG3), Convener
3. CSIR NMITLY project Monitoring Committee, Member
4. Consultative Group on Wind Power, constituted by the Ministry to review and consolidate the Guidelines for wind power projects, Member.
5. Group of Experts (GE) on Engineering and Communication, constituted by the National Centre for Antarctic and Ocean Research (Department of Ocean Development), Goa, Chairman.
6. Technical Committee constituted by Central Board of Irrigation and Power, New Delhi to scrutinize the papers of the First International Conference on "Renewable Energy", Member.
7. Wind Energy Sector A Committee constituted by Indian Renewable Energy Development Agency Limited, New Delhi to review the cost of projects for various renewable energy sector projects, Member.
8. Aeronautical Society of India, Member.
9. International Solar Energy of Education [affiliated to ISES], Member.
2. Non-Conventional Energy Sources Sectional Committee ME04 of Bureau of India Standards (BIS), Member.
3. Wind Energy Sub-Committee ME04:4 of BIS, Member.
4. Lead Author of the TAR (WG III) of "Inter Government Panel on Climate Change (IPCC).

D. Lakshmanan

1. National Institute of Personnel Management, Kolkata, Corporate Member.

Rajesh Katyal

1. Institution of Engineers (India), Member.

E. Sreevalsan

2. Indian Meteorological Society, Member
3. Doctoral Committee (Academic Research), Sathyabama Deemed University, Chennai, Member.

V. Asaithambi

1. Institution of Engineers (India), Member

A. Senthil Kumar

1. Wind Energy Sub-Committee ME04: 4 of BIS, Member.

V. R. Gireesh Kumar

1. Institution of Engineers (India), Associated member.
2. Indian Institute of Metals, Associated member.

R. Kumaravel

1. Institution of Engineers (India), Associated member.

N. S. Prasad

1. Solar Energy Society of India, Member.



Centre for Wind Energy Technology, Chennai

AUDITORS REPORT

R.JANAKIRAMAN & CO.

Chartered Accountants

Partners

R.Janakiraman, B.Com., F.C.A.,

J. Chandrasekaran., B.Sc., F.C.A.,

C. Geetha, B.Com., A.I.C.W.A., F.C.A. D.L.S.A.,

C. Shanmukham, B.Com., F.C.A.,

B. Chandran, B.Com., F.C.A.,

K. Chandramouli, B.Sc., F.C.A., M.S., MBIM (UK), D.L.S.A.,

AUDITOR'S REPORT TO THE MEMBERS OF THE GOVERNING BODY OF CENTRE FOR WIND ENERGY TECHNOLOGY, CHENNAI-601 302

We have audited the attached Balance sheet of Centre For Wind Energy Technology (C-WET) Velachery - Tambaram Main Road, Pallikaranai, Chennai - 601 302 as at March 31, 2005 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 over all financial statements presentation. We believe that our audit provides reasonable basis for our opinion.

We report that:

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.

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.

Conti.....



Centre for Wind Energy Technology, Chennai

- 2 -

The Balance Sheet and Income and Expenditure Account dealt with by this report are in agreement with the books of account.

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.

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.

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, 2005; and

In the case of the Income and Expenditure Account, of the excess of income over expenditure for the year ended on that date.

FOR R. JANAKIRAMAN & COMPANY
Chartered Accountants

R. JANAKIRAMAN
PARTNER
(Membership No.5129)

Date : 19.08.2005

Place : Chennai

New no.6, Old no.43, Maharaja Surya Rao Road, Alwarpet, Chennai 600 018. Phone :2435 2596

E-mail: rjco@md5.vsnl.net.in



Centre for Wind Energy Technology, Chennai

BALANCE SHEET

BALANCE SHEET AS AT 31ST MARCH 2005

(Amount in Rs.)

CAPITAL FUND AND LIABILITIES	Schedule	31st March 2005	31st March 2004
CORPUS AND CAPITAL FUND	1	74,739,487	76,226,173
EARMARKED AND ENDOWMENT FUNDS	1A	7,351,976	2,201,669
RESERVES AND SURPLUS	2	23,448,182	20,623,166
UNSPENT BALANCE OF GRANTS IN HAND		44,160,025	4,174,574
SECURED LOANS AND BORROWINGS	-	-	-
UNSECURED LOANS AND BORROWINGS	-	-	-
DEFERRED CREDIT LIABILITIES	-	-	-
CURRENT LIABILITIES AND PROVISIONS	3	22,588,228	10,873,692
TOTAL	-	172,287,898	114,099,274
ASSETS			
FIXED ASSETS	4	74,096,067	62,461,334
INVESTMENT - FROM EARMARKED AND ENDOWMENT FUNDS	-	-	-
INVESTMENT - OTHERS	-	-	-
CURRENT ASSETS, LOANS AND ADVANCES	5	98,191,831	51,637,940
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)	-	-	0
TOTAL	-	172,287,898	114,099,274
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached
for R. Janakiraman & Co.,
Chartered Accountants

Sd/-

D. Lakshmanan
General Manager (F&A)

Sd/-

M. P. Ramesh
Executive Director

Sd/-

A. M. Gokhale
President/ Chairman

Sd/-

R. JANAKIRAMAN
Partner



Centre for Wind Energy Technology, Chennai

INCOME AND EXPENDITURE ACCOUNT

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2005

(Amount in Rs.)

INCOME	Schedule	Current Year	Previous Year
Income from Scientific & Technical Consultancy Services	6	7,586,181	10,476,984
Income from publication	7	579,910	491,800
Interest Earned	8	1,433,751	1,267,899
Other Income	9	354,182	44,431
Grants from Government of India allocated for Revenue expenditure during the year		8,885,805	5,287,736
Deferred Income transferred from Capital Fund (vide note no.4)		11,586,821	4,304,956
TOTAL (A)		30,426,650	21,873,806
EXPENDITURE			
Establishment Expenses	10	7,956,998	6,934,663
Other Administrative Expenses	11	9,169,006	6,635,713
Depreciation	4	11,586,821	3,913,416
TOTAL (B)		28,712,825	17,483,792
Balance being excess of income over Expenditure (A-B)		1,713,825	4,390,014
Prior period adjustment	12	25,626	3,058
BALANCE BEING SURPLUS TRANSFERRED TO GENERAL RESERVE ACCOUNT		1,688,199	4,386,956
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached
for R. Janakiraman & Co.,
Chartered Accountants

Sd/-

D. Lakshmanan
General Manager (F&A)

Sd/-

M. P. Ramesh
Executive Director

Sd/-

A. M. Gokhale
President/ Chairman

Sd/-

R. JANAKIRAMAN
Partner



Centre for Wind Energy Technology, Chennai

RECEIPTS AND PAYMENTS ACCOUNT

(Amount in Rs.)

RECEIPTS	31st March 2005	31st March 2004
I. Opening Balances		
(a) Cash in hand		
(b) Bank balances		
i) In Current Account	14,065,257	7,289,264
ii) In Deposit Accounts	9,093,416	6,910,950
(c) Stamps on hand	3,459	11,665
II. Grants Received		
(a) From Government of India	60,000,000	41,000,000
(b) From Government of India for execution various projects	9,200,000	8,300,000
(c) From Government of India for organising an international training programme	450,000	604,000
III. Income on Investments		
IV. Interest Received		
(a) On Bank deposits	1,433,751	1,267,899
V. Other Income		
(a) Fees for services	7,363,124	4,867,825
(b) Income from publications	579,910	491,800
(c) Energy receipts		6,225,449
(d) Misc. income	354,182	79,631
VI. Amount borrowed		
VII. Any other receipts		
(a) Fees received in advance (Consultancy)	10,948,689	3,198,876
(b) Other advance recovered (festival advance)	12,300	
(c) Amt received in excess from DANIDA & repayable	1,310	
(d) Security deposit	118,006	90,000
(e) Service Tax	744,156	479,975
(f) Amount reimbursed by DANIDA towards assets purchased out of previous year's Capital grant	77,990	
TOTAL	114,445,550	80,817,334



Centre for Wind Energy Technology, Chennai

FOR THE YEAR ENDED 31ST MARCH, 2005

(Amount in Rs.)

PAYMENTS	31st March 2005	31st March 2004
I. Expenses		
(a) Establishment Expenses	7,868,367	6,499,351
(b) Administrative Expenses - (Operational & TA/DA)	8,730,203	5,281,165
II. Payments made against funds for various projects		
Out of CFA		
(a) Execution of R&D project expenses	440,204	125,000
(b) Research support to WRA	161,816	599,435
(c) HRD and manpower training	84,805	212,851
(d) Seminar & Information dissemination	198,099	26,661
(e) Accreditation fee	82,610	
(g) Advance for execution of projects	49,000	1,663,000
Out of Grants for projects		
(f) International training programme	355,123	673,423
(g) Wind Energy Resource Survey Project	506,965	975,641
(h) North-Eastern Project	261,574	2,345,551
(i) Micro-survey & preparation of Master Plan		1,458,000
(j) Study on Uncovered / New areas	2,959,526	3,611,196
III. Investment and Deposits made		
IV. Expenditure on Fixed assets & Capital Work-in-Progress		
(a) Purchase of Fixed assets	10,126,830	4,154,983
(b) Expenditure on Capital Work-in-progress -Campus & furniture		22,077,521
(c) Advance on capital account	5,314,335	6,181,987
V. Refund of Surplus Money		
(a) Balance of Grants-in-aid to Government of India	94,877	
VI. Other Payments		
(a) Refund of Security deposits	45,000	
(b) Expenditure on Consultancy Projects	306,566	1,561,887
(c) Advance on Consultancy projects	1,670,836	
(c) Advance & Deposits	350,946	-324,662
(d) Due from DANIDA	11,989	-
(e) Prior period expenses	25,626	3,058
(f) Service tax remittances	797,001	529,154
(g) Festival advance paid	6,000	
VII. Closing Balances		
(a) Cash in hand		
(b) Bank Balances		
i) In Current Account	11,316,180	14,065,257
ii) In Deposit Accounts	62,680,372	9,093,416
(c) Stamps on hand	700	3,459
TOTAL	114,445,550	80,817,334

For Centre for Wind Energy Technology

As per our Report attached
for R. Janakiraman & Co.,
Chartered Accountants

Sd/-

Sd/-

Sd/-

Sd/-

D. Lakshmanan
General Manager (F&A)

M. P. Ramesh
Executive Director

A. M. Gokhale
President/ Chairman

R. JANAKIRAMAN
Partner



Centre for Wind Energy Technology, Chennai

AUDITORS:

R. JANAKIRAMAN & CO.,
Chartered Accountants,
New no.6, Old no.43, Maharaja Surya Rao Road,
Alwarpet,
Chennai - 600 018

BANKERS:

Canara Bank
NIOT Extension counter,
Pallikaranai
Chennai - 601 302

Canara Bank
Annanagar west Extension
Chennai - 600 101

Vijaya Bank
Annanagar.
Chennai - 600 040

REGISTERED OFFICE

Centre for Wind Energy Technology
Survey No. 657/1A2
Velachery Tambaram High Road
Pallikaranai
Chennai 601 302

