वार्षिक प्रतिवेदन
ANNUAL REPORT
2002-2003

पवन ऊर्जा प्रौद्योगिकी केन्द्र
CENTRE FOR WIND ENERGY TECHNOLOGY
(भारत सरकार की एक स्वायत्त संस्था)
(An Autonomous Institution of Government of India)
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C-WET

गुणवत्ता नीति

पवन ऊर्जा प्रौद्योगिकी केन्द्र (सी-वैट), पवन ऊर्जा क्षेत्र में सभी अंशधारियों को अंतर्राष्ट्रीय गुणवत्ता के विश्वसनीय, त्वरित एवं संपूर्ण समाधान उपलब्ध कराकर ग्राहक संतुष्टि, निष्ठा तथा विश्वास प्राप्त करने के लिए प्रतिबद्ध है।

सी-वैट वर्तमान और भविष्य हेतु उत्कृष्टता का तकनीकी केन्द्र-विन्दु बनने के लिए प्रयत्नशील है और अपनी विशेषज्ञता में लगातार सुधारों द्वारा पवन टरबाइन प्रौद्योगिकी अनुप्रयोगों में अग्रणीय रहेगा।

पवन ऊर्जा प्रौद्योगिकी केन्द्र

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CHENNAI - 600 101.

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 and C-WET shall stay at the forefront of Wind Turbine Technology application by continously improving its expertise.

CENTRE FOR WIND ENERGY TECHNOLOGY

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Honourable Minister of State for Non-Conventional Energy Sources (Independent Charge) Mr. M. Kannappan (Second from left) presenting the Provisional Type Certificate to Suzlon Energy Limited, Pune. Mr. Ajai Vikram Singh, Secretary, MNES (extreme left) and others look on.

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EXECUTIVE DIRECTOR'S REPORT

The Centre for Wind Energy Technology is in the process of consolidating its position in the wind power sector. The Danish International Development Agency (DANIDA) aided projects have made good progress. Wind Turbine Test Station at Kayathar in Tamil Nadu has, at present, two wind turbines installed. The certification work has been making satisfactory progress. On-the-job training is being imparted both for testing and certification at both Chennai and Kayathar. Wind resource assessment using stand alone data logging stations have now been completed in 457 locations in 17 states. Work in the North East and Northern Hill States is to be taken up shortly. Detailed project reports were prepared for various agencies during the year under review. A beginning was made in the implementation of ISO 9001-2000. Apex manual, departmental quality manuals including procedures, work instructions and formats were prepared for various activities are now in use. Auditor training and related activities are planned for the near future. The aim is to use standards from the International Electrotechnical Committee (IEC Standards – 61400) along with National Application Documents (NADs), under Indian operating conditions. Matching national standards for wind turbine tests and certification are being prepared. The Centre for Wind Energy Technology is now recognised as a research facility by the Department of Scientific and Industrial Research (Scientific and Industrial Research Organisations).

Wind Turbine Testing

The two test beds at Kayathar are occupied by a 1.25 MW and a 250 kW wind turbines. As the machines were installed and commissioned in September 2002, the required tests could not be completed during the windy season of 2002. However preparations and training for load measurements (mechanical) were completed. A decision was taken to continue the tests during the windy season of 2003. One in-situ power curve measurement was carried out on a 750 kW wind turbine at Karankulam in Kanyakumari district of Tamil Nadu. Similar measurements are planned at Jaisalmer in Rajasthan and Edayarpalayam in Tamil Nadu. Work on ISO 9001-2000 has made good progress and one mock audit was conducted assisted by technical consultants. On accreditation by the National Accreditation Board for Testing and Calibration Laboratories (NABL) of the Department of Science and Technology (DST), preliminary work has been started. Introductory workshops were held during February 2003. The Electronic Test and Development Centre (ETDC), a Government of India establishment has been identified to assist C-WET obtain NABL accreditation.

Standards & Certification

One category II certificate was renewed and one agreement was signed for renewal under category I. For the first time two category III certificates were completed and certificates issued. Preparation of National Standards for wind turbine evaluation has been taken up in earnest. C-WET has been identified as the nodal agency for preparing the draft standards. The National Application Documents to be used in conjunction with relevant IEC standards are also being prepared. Expert groups have been identified to participate in the preparation of Indian standards with regard to wind turbines. A focused meeting was organised with the manufacturers on October 4, 2002 to put across the documentation requirements for certification in the correct perspective. Scientists from C-WET and RISO made presentations about the documentation required. The manufacturers

actively participated in the proceedings and demonstrated an understanding of the need to possess proper engineering documentation for their products. It also was understood that any certifying agency would insist on a minimum amount of documentation for scrutiny.

Wind Resource Assessment

At present 36 wind monitoring stations are operational in various parts of the country. Detailed project reports have been prepared for establishment of wind turbines in Car Nicobar, Madhya Pradesh, Uttaranchal, Maharashtra and Kerala. In response to the Maharashtra Energy Development Agency's request several wind monitoring stations have been established in that State. Requests have been received by the MNES and C-WET for wind monitoring from new States and in uncovered areas of several other States. As per the Ministry's directions, C-WET is seeking information from all the states and consolidating the requirements. The framework for carrying out the measurements will be finalised and necessary action initiated to establish the monitoring stations. To facilitate wind farm developers, micro-survey reports have been prepared for various areas. It is learnt that these reports are being widely used. Six reports have been prepared so far this year and 10 new stations are to be taken up for preparation of micro-survey reports.

Research & Development

The idea of using Geographical Information System (GIS) for identification of windy areas has been discussed for some time. A joint project between C-WET & National Remote Sensing Agency (NRSA) has been undertaken to check out the applicability of GIS to identify and quantify the wind power potential in a given area. Necessary inputs have been identified and the project is in progress. Gearbox failure is an area of serious concern. To get a holistic view of the problems faced in the operation & maintenance of wind turbine gearboxes, a project was sanctioned to the Centre for Energy Studies of Osmania University. The project is expected to give pointers towards efficient management of gearbox O & M in field. The Research and Development Council of C-WET has now cleared several projects in various generic areas and preparation for these studies is under way. Two projects with MNES funding were cleared for scientific and technical content. The proposals have now been sent to MNES for clearance and funding. The first project is to carry out wind tunnel based studies for the establishment of flow past wind turbine nacelles. The second is to revisit the Palghat gap in Kerala and Tamil Nadu with advanced measurement systems.

Information, Training And Commercial Services

C-WET has set up a web page with the help of National Informatics Centre, Chennai. Pending launch, a number of queries are already being made and addressed. A library has been established with the focus on renewable energy. An international training programme in association with ECN, Netherlands, is planned for November / December 2003 and preliminary work is under way. A Memorandum of Understanding has been signed between ECN and MNES in this regard.

A Syllabus Committee was constituted under the Chairmanship of renowned Professor Sujay Basu from Jadavpur University with an aim to prepare comprehensive syllabus for a Masters degree course in Wind Energy. The first meeting of the committee was held on 27th March 2003 and the broad outline of the proposed masters degree course was discussed at length. After allowing a gap of four months the committee is to reconvene again to take the matter further with concrete proposals.

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 Resources 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 all 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.
- 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 monitor the field performance of wind power systems, sub-systems and components, effectively utilize this feedback for fulfillment of

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

- 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 commercialisation of any other wind energy systems including stand-alone systems.

FROM THE UNITS

RESEARCH AND DEVELOPMENT

The Centre for Wind Energy Technology as a focal point is coordinating its Research and Development programmes with research centres/ institutions, experts and consultants working on problems and developments related to wind energy while carrying out in-house R&D in focused areas. The ultimate objective of this is to disseminate the R&D information for the overall benefit of the wind energy sector, and assist the industry in the production of cost effective, high quality wind power systems.

The Research & Development Council has classified the research activities of the centre into the following five generic areas:

- Improvement in performance of existing wind turbine installations.
- Research support for wind resource assessment
- Manpower training and HRD
- Technology support to wind power industry
- Research and advanced technology development

To realise the aims of these generic areas work has been taken up in project mode.

Improvement in existing installations:

1. **Grid related Investigations of Wind Farms:** The objective is to study the effects of grid related problems like grid outages, frequency variations, voltage variations, transients, flicker and harmonics on the WTGS, and to recommend procedures for improvement of power quality; studying the compatibility of the existing protection systems against these grid problems; and recommending methods to improve the power fed from the WTGS to the grid. The project has been completed.
2. Optimal blade angle for energy maximization: The Object is to review the optimisation of blade angle to get optimum output within the design loads through experimental verifications. This guides in fixing the pitch angle of the blades for a stall regulated WTGS according to prevailing site conditions. Increasing the pitch angle can increase the power and hence the annual energy production.

However, the loads on the WTGS also increase correspondingly. The project will review these aspects based on experimentation at the site. Analysis of the data collected during experimentation is under progress.

Strain gauging of wind turbine blade under test for optimal blade setting

one of the critical and expensive components of a wind turbine generator system. Setting right any failure in the gearbox can be a costly and time-consuming process. Failures may be due to impact loading, variable loads, non-replacement of lubricants as per schedule, design / manufacture related problems, materials problems or bad heat treatment. It is proposed to collect data and analyse failures of gearboxes. Based on the study, modifications will be recommended where design deficiencies are found. This will help in reducing the cost of repairs and replacement of gearboxes and increase availability of the system for generation. The project was started in November 2001 and three interim reports have been submitted.

4. **Operation & Maintenance practices:** A meeting of experts from NIOT, CECRI, SERC and IIT, Chennai was held to discuss protection of wind turbines from corrosion on November 13, 2002.

Experts discussing corrosion protection

Technology Support to Wind Power Industry

1. **Setting up R&D demonstration wind farm:** The "Field laboratory" is an R&D demonstration wind farm consisting of different sizes of the latest and new technology wind turbines, equipped with complete measurement systems and diagnostic tools. This will also act as a training centre for other technical, academic institutions.

   Hence, C-WET proposes to set up a 2 MW wind farm in order to develop a strong R&D base for the wind energy sector of India.

   It is proposed that C-WET prepare feasibility reports for 2-3 locations. Based on the reports, one suitable site may be selected and a detailed project report for a 2 MW R&D wind farm prepared. The proposal for preparation for DPR was presented before the Research Council during its sixth meeting on December 11, 2002.

Research and advanced development technology

1. **Pertinent Studies On Aerodynamics:** Current wind turbines in India of European designs are based on the NACA profiles of three generations.

   The theory of airfoil behaviour has seen steady improvement over the years. The flow about an airfoil can be described by a boundary layer flow near the surface of the airfoil and a potential flow outside of this boundary layer. At present CFD based solutions are available for airfoil performance comparison on various platforms and it should be feasible to get a reasonably good idea of the given airfoil behaviour for a variety of configurations.

Unlike European windy sites, wind potential sites in India are of low and average wind speeds, and complex in nature with higher turbulence and lower air density. In view of these characteristics, it is pertinent to develop a new series of aerofoil best suited for the wind regimes in India. This includes development of a modified section profile suitable for a low Reynolds number, sufficiently high lift, and low drag. Indian wind farming being located in dusty environment, the need to have airfoil sections less sensitive to surface roughness would be more suitable.

Advanced concepts such as use of adaptive blades and aerodynamic control devices are pertinent to the study and can be adopted to increase the annual energy capture for overspeed control and power modulation. The National Aerospace Laboratories, Bangalore, has submitted a revised proposal for carrying out profile studies of blades.

2. **Setting up of R&D laboratory:** The MATLAB range of software has been procured. To provide the necessary platform for carrying out simulation studies of various physical systems.

GENERIC AREAS UNDER R&D

Sl. No.	Generic Areas	Indicative title for projects / activities
1.	Improvement in performance of existing wind turbine installations	(a) Implementation of the recommendations of the project on "Failure analysis of gear boxes of wind turbines"
		(b) Operation &Maintenance (O&M) practices, including corrosion and lightning protection
		(c) Study on electromagnetic interference (EMI)
		(d) Study of yaw control system
		(e) Performance enhancement studies
		(i) Optimal blade angle for energy maximisation
		(f) Other studies
2.	Research support for wind resource assessment	(a) Validation of power law index in complex / flat terrains
		(b) Measure-correlate-predict (MCP) analysis in complex/ flat terrains
		(c) Off-shore wind resource assessment including use of synthetic aperture radar (SAR) data
		(d) Development of appropriate software tools towards preparation, comprehensive assessment of wind potential, and precise identification of sites
		(i) Geographical Information System for identifying wind potential sites.
		(ii) Study on wind flow pattern in Palghat / Arulvaimozhy gap region.
		(e) Others
3.	Manpower training and HRD	(a) Manpower training at various skill levels including design engineering, installation, Operation & Maintenance (O & M) etc.
		(b) Preparation of syllabus for courses in wind energy in universities and engineering colleges
4.	Technology support to wind power industry	(a) Setting up of technology demonstration wind farm
		i) Detailed Project Report for demonstration wind farm
		(b) Diagnostic studies and performance Evaluation of demonstration wind farm
		(c) Technology support for vendor development
5.	Research and advanced technology development	(a) Pertinent Studies on Aerodynamics
		(b) Blade design and development
		(c) Mechanical transmission systems
		(d) Studies on new concepts of generators
		(e) Design and development of controllers
		(f) Power evacuation systems
		(g) New concepts/other applications (Including wind – diesel etc.)

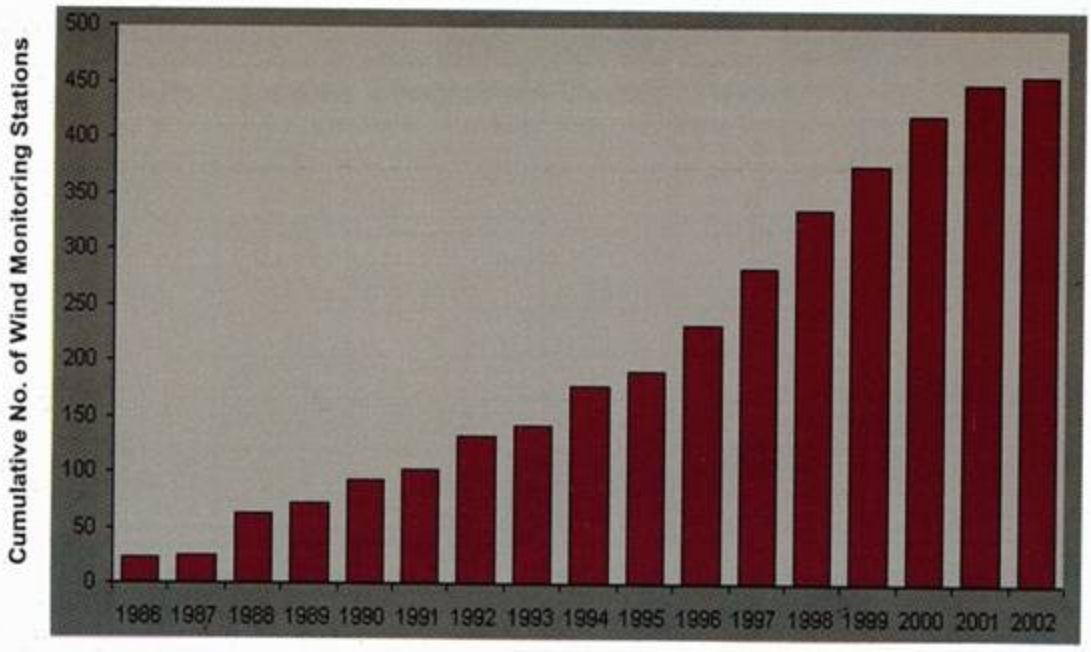
WIND RESOURCE ASSESSMENT

Resource assessment is important for an analysis of wind resources and useful primarily for obtaining a global view of the wind power potential in the country. It is a key constituent of the wind power programme aiming at large-scale commercialisation of cost effective generation of grid- quality power. Wind speed and wind direction are the basic input data to assess the resource at a site. The frequency distribution derived from these data is an important parameter to calculate the magnitude of wind energy generation. The wind resource assessment programme involves (a) Identification of candidate locations (b) Establishment of wind monitoring stations and (c) Collection and analysis of time series data on wind speed and direction at appropriate levels. The number of wind monitoring stations operating in the country as on March 31, 2002 and the stations commissioned / closed down during the period 2002-03 are shown in the accompanying table.

WIND MONITORING STATIONS IN INDIA (2002-03)

Sl. No.	State	As on 31.03.2002	No. of stations		
			Commissioned during 2002-2003	Closed down during 2002-2003	in Operation as on 31.03.2003
1	TAMIL NADU	5	-	2	3
2	GUJARAT	11	-	4	7
3	MAHARASHTRA	10	1*	6	5
4	ANDHRA PRADESH	7	-	5	2
5	RAJASTHAN	7	3	2	8
6	LAKSHADWEEP	2	-	-	2
7	KARNATAKA	7	-	5	2
8	MADHYA PRADESH	5	-	4	1
9	HIMACHAL PRADESH	5	-	5	-
10	WEST BENGAL	2	-	2	-
11	JAMMU & KASHMIR	3	-	-	3
12	HARYANA	-	3	-	3
	TOTAL	**64**	**7**	**35**	**36**

* State funded project



Cumulative total of wind monitoring stations established since 1986

The wind resource assessment programme is being implemented in coordination with the State nodal agencies. Of the 456 stations established in 17 States till date, 208 stations have been found to have wind power density (WPD) in excess of 200 W/m² at 50magl. Details are given in the Table below;

Number of monitoring stations in different WPD ranges

WPD range [W/m²]	Number of stations
<100	47
101-150	60
151-200	87
201-250	68
251-300	60
>301	70

To study the vertical variation of wind speeds in selected wind regimes, a programme of multilevel wind measurement using a 50m high mast was initiated. Three such masts were installed and operated at Vajrakarur in Andhra Pradesh, Nelganti in Karnataka and Vankusawade in Maharashtra. Accurate estimates of power law index are essential for increased hub heights of wind turbines. The power law index values for different slabs of measurements based on one-year data at Nelganti and Vankusawade are given in the table on page 12.

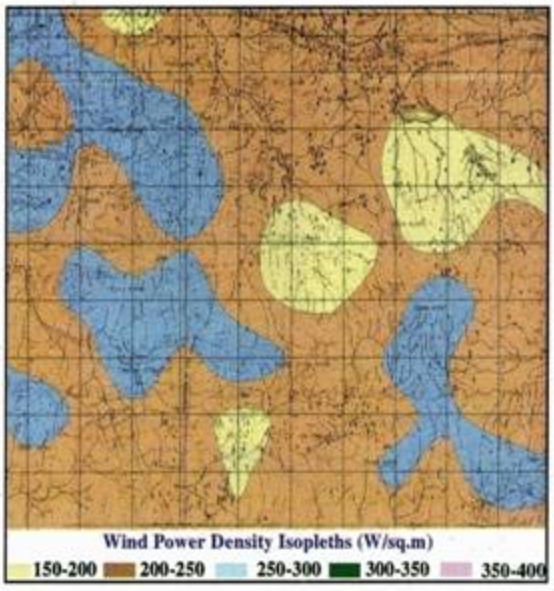
Power Law Indices in different slabs of height at Nelganti and Vankusawade

	10 –30m slab		30-50m slab		10-50m slab	
	Nelganti	Vankusawade	Nelganti	Vankusawade	Nelganti	Vankusawade
Jun-01	0.18	0.15	0.20	0.15	0.19	0.15
Jul-01	0.20	0.15	0.17	0.17	0.19	0.16
Aug-01	0.21	0.15	0.18	0.19	0.20	0.16
Sep-01	0.21	0.15	0.19	0.20	0.20	0.16
Oct-01	0.27	0.19	0.29	0.25	0.28	0.21
Nov-01	0.30	0.20	0.37	0.31	0.32	0.23
Dec-01	0.29	0.16	0.35	0.32	0.31	0.21
Jan-02	0.24	0.16	0.30	0.28	0.26	0.20
Feb-02	0.23	0.16	0.31	0.21	0.25	0.18
Mar-02	0.18	0.15	0.26	0.23	0.21	0.18
Apr-02	0.18	0.15	0.25	0.22	0.20	0.17
May-02	0.16	0.11	0.18	0.15	0.17	0.12
Annual	0.22	0.16	0.25	0.22	0.23	0.18

Micro-Survey Project

To assess the "zones of influence" and the potential available around selected wind monitoring stations for commercial exploitation, the project on micro-survey and preparation of a master plan was initiated in 1997-98. The measured data are applicable directly to the close proximity of the location where the measurements are taken.

In order to get an idea about the resources some distance away from the monitoring station a modeling exercise has been undertaken to extrapolate the wind resource over an extended area of several tens of sq. km around the observation point. Micro-surveys around six stations at, Amberi, Kavadya Donger, Brahmanvel, TakarMouli, Vakaikulam and Mangalapuram were carried out during 2002-03. Wind data analysis, estimation of wind energy potential and a master plan for the identified areas were prepared. With this the total wind monitoring stations covered under the micro-survey project are eighty-seven. State wise wind monitoring stations taken up for micro-surveys till March 2003 and the estimated potential at 50 magl are given in the Table on Page 13.



Wind Power Density Isopleths

ESTIMATED POTENTIAL AT 50 MAGL THROUGH MICRO-SURVEY AT 87 STATIONS

Sl. No.	State	Stations covered in during 2002-03	Total Stations	Estimated Potential at 50 magl (MW)
1	Tamil Nadu	2	19	4993.1
2	Gujarat	-	15	4958.2
3	Maharashtra	4	18	1284.7
4	Andhra Pradesh	-	11	942.4
5	Karnataka	-	14	776.5
6	Kerala	-	1	285.0
7	Rajasthan	-	3	203.0
8	Madhya Pradesh	-	3	26.0
9	Orissa	-	2	35.0
10	West Bengal	-	1	-
	Total	**6**	**87**	**13503.9**

Special study in north-eastern region

Northeastern India is endowed with low levels of wind resource potential when compared with other regions of the country as per general climatology. It was therefore felt that the conventional approach of selecting sites in this region might not yield good results. Hence the Ministry of Non-Conventional Energy Sources sponsored a "Special Study on Wind Resource Assessment in Northeastern Region" at 21 sites in the region for long-term wind measurements with automated recording systems. Sites selected in various states are shown in the Table. Wind measurements at these sites with 25m masts are likely to commence by the end of this year.

Deliberation on North East project at Guwahati

Sites selected for wind monitoring in the northeastern states

Sl. No.	State	No. of sites selected
1	Arunachal Pradesh	5
2	Assam	3
3	Manipur	5
4	Mizoram	5
5	Tripura	3

GIS for identification of wind potential sites

When large areas are to be scanned for determining potential areas it is essential to use remote sensing. The development of Global Information System application will be in two parts: (1) Development of a GIS database using the data of an existing wind monitoring station and (2) Development of a GIS query shell for locating wind potential sites. Wind mapping will be based on the spatial information on natural resources such as landuse/land cover, slope, geology/geomorphology/ geotechnial and drainage using satellite data on a 1:50000 scale. The study has been initiated together with the National Remote Sensing Agency for the Muppandal area in Tamil Nadu and is expected to be completed by October this year.

Satellite imagery for estimating roughness parameters

Consultancy Projects

Detailed project report for setting up wind farms: The detailed project reports for setting up demonstration wind farms were prepared for Mahuriya and Mammatkheda in Madhya Pradesh and Bachelikhal in Uttaranchal. The wind resource of the region of interest, wind farm layout, estimated annual energy production, civil and electrical engineering works, project management and project cost analysis are contained in the reports. Three options of 250 kW, 500kW and 750 kW capacity machines were considered. The estimated wind power generation at these sites was found to be moderate. Wind Atlas Analysis and Application Program (WA^{3}P 7.0 version) are used for resource analysis and wind farm layout for the three sites.

DPR for wind-diesel hybrid project: A detailed project report for a wind-diesel hybrid system of 2 x 50 kW at Keating point, Car Nicobar, Andaman & Nicobar Islands has been prepared based on the 0-class wind-diesel concept. This concept is essentially to add wind turbines to a conventional isolated electricity grid comprising of one or more diesel power plants. The average daily wind power penetration will be 15 per cent and the maximum penetration 20.5 per cent during the day time in the windy months (June to August) with the suggested configuration of 800 kW diesel generator (already existing) and two 50 kW wind turbines. This project is to be taken up by the Andaman & Nicobar Administration to reduce dependence on fossil fuels.

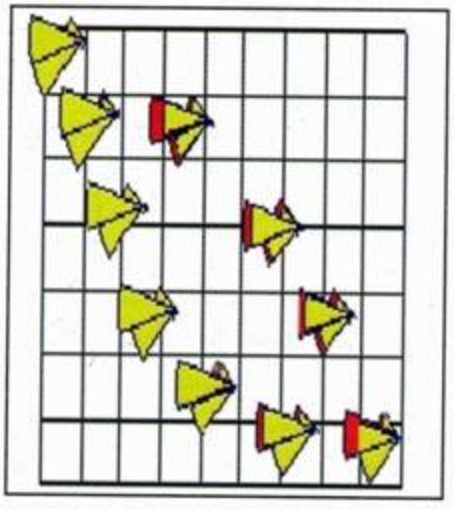
Micro-survey report for complex terrain: Micro-survey analysis and master plan for the 5 x 10 km area around the Ramakkalmedu wind-monitoring station has been carried out for the Agency for Non-conventional Energy and Rural Technology. This is one of the high wind potential sites where annual wind power density of over 500 W/m^2 is observed at 20m from ground level. Ramakkalmedu is a very

complex and highly rugged terrain site where RIX analysis was carried out to determine the accuracy of the WA^{s}P. The wind power potential at Ramakkalmedu has been estimated at 80MW with an average capacity factor of 28 – 30 per cent.

Micro siting and layout of wind farm: Micro-siting and layout of the wind farm projects with a total capacity of 14MW at Motha, Brahmanwel, Sautada and Chalkewadi / Jagamin sites for the Maharashtra Energy Development Agency have been carried out. Annual estimated energy capture has been worked out for four categories of machines with unit size 500 kW, 600 kW, 750 kW and 1000 kW for setting up wind farms at these sites with the capacity factor between 18 and 28 per cent. For the micro-survey a grid size of 25m x 25m was considered on a 2m contour interval map. The power and wake losses rose for the Brahmanwel site are shown in the figure below:

Wind Monitoring Programme: The wind-monitoring programme at twelve sites in Elephanta Island, Latur & Sangli and Konkan region of Maharashtra is under way. Five stations are to be set up with 25m mast in South and Middle Andamans and Great Nicobar. A project on wind monitoring at five locations under the IREP for the Maharashtra Energy Development Agency at Aundhewadi, Kankora, Kharumbapada, Kogda and Rajewadi has been completed during the year. Of these Aundhewadi and Kankora have been found to have wind power density above 200 W/m^2 at 50m above ground level.

Changed rotor diameter related studies: A study of the Vestas RRB wind turbine near Kathadimalai wind farm was carried out to determine the effect of changing the rotor diameter of the wind turbine in the nearby turbines. It was found that the change in rotor diameter increased the estimated generation level for the machine under consideration considerably. At the same time the outputs for the machines in surrounding area showed marginal changes in generation levels.



Power & Wake Losses Rose at Brahmanwel, Maharashtra

Wind Monitoring Station commissioned under IREP- MEDA at Aundhewadi, Maharashtra

POTENTIAL SITES FOR WIND POWER PROJECTS

(WPD > 200 W/m2 at 50m)

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m^2	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
	Tamil Nadu								
1	Achankuttam	8	57	77	28	120	18.60	270	437
2	Alagiyapandiyapuram	8	56	77	39	85	20.90	301	487
3	Andhiyur *	10	36	77	11	380	19.10	177	271
4	Andipatti	10	0	77	33	320	19.00	266	346
5	Arasampalayam	10	51	77	3	370	20.50	195	291
6	Ayikudy	9	0	77	21	182	21.40	305	536
7	Edayarpalayam	10	55	77	7	445	22.40	273	398
8	Ennore	13	16	80	19	6	19.30	139	243
9	Gangaikondan *	8	51	77	35	60	18.40	246	338
10	Kannankulam *	8	12	77	35	20	21.30	238	375
11	Kattadimalai	8	14	77	33	90	23.70	312	488
12	Kayattar - I	8	58	77	44	94	20.30	294	413
13	Kayattar - II *	8	57	77	43	105	20.50	285	356
14	Kethanur	10	54	77	13	403	21.10	259	376
15	Kumarapuram *	8	16	77	35	80	22.00	288	408
16	Mangalapuram	9	3	77	22	190	22.30	312	423
17	Meenakshipuram	9	52	77	18	290	16.40	224	334
18	Mettukadai	10	52	77	23	348	18.00	184	281
19	Muppandal	8	16	77	33	100	25.50	406	712
20	Myvadi	10	36	77	19	341	19.60	251	376
21	Naduvakkurichi	9	7	77	30	160	16.80	157	244
22	Nettur *	8	54	77	33	100	19.90	338	419
23	Onamkulam *	8	57	77	51	100	19.90	247	292
24	Ottapidaram	8	54	78	1	40	18.50	221	292
25	Ovari	8	18	77	53	39	18.20	160	378
26	Panakudi	8	19	77	33	140	22.90	366	469
27	Pongalur	10	58	77	21	388	19.10	213	309
28	Poolavadi	10	44	77	17	321	21.20	283	445

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m^2	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
29	Poosaripatti *	10	40	77	7	380	19.30	168	254
30	Puliyamkulam	8	19	77	44	40	18.90	188	343
31	Pushpathur 2 *	10	33	77	25	340	16.09	128	254
32	Rameswaram	9	17	79	20	4	23.90	290	604
33	Sankaneri *	8	12	77	40	28	22.60	258	388
34	Sembagaramanpudur	8	16	77	31	40	21.70	300	476
35	Servallar Hills	8	42	77	21	312	17.80	207	313
36	Sultanpet	10	52	77	11	380	19.00	203	206
37	Talayathu	8	48	77	40	105	20.50	324	422
38	Thannirpandal	10	57	77	19	400	18.20	216	>330
39	Tuticorin	8	50	78	8	3	17.60	148	245
40	Vakaikulam	8	45	78	0	39	16.60	167	256
	Gujarat								
1	Adesar	23	33	70	57	41	15.60	93	307
2	Amrapar (GIR)	21	11	70	25	140	19.67	147	241
3	Amrapar (SETH)	21	44	70	3	160	19.17	151	221
4	Bamanbore II	22	26	71	3	200	20.30	171	243
5	Bayath	22	56	69	11	20	17.65	118	300
6	Bhandariya	22	6	69	43	106	19.50	162	208
7	Butavadar	21	57	70	11	120	16.42	98	240
8	Dhank I	21	48	70	8	175	24.40	312	414
9	Dhank II	21	48	70	7	208	25.10	327	367
10	Gala	22	19	70	5	95	19.76	175	254
11	Godladhar	22	3	71	20	242	19.45	144	345
12	Haripar	22	16	69	38	40	20.06	160	210
13	Harshad	21	50	69	22	12	20.00	164	239
14	Jafrabad	20	54	71	24	20	17.50	137	242
15	Jamanvada	23	35	68	36	57	18.60	149	299
16	Jasapar	21	21	71	06	230	17.22	104	214
17	Kagavad	21	48	70	41	132	18.48	141	212
18	Kalyanpur	22	3	69	24	80	22.10	208	327
19	Khambada	21	22	71	8	180	17.50	126	204

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m^2	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
20	Kukma	23	11	69	47	205	19.20	150	239
21	Lamba	21	54	69	19	20	20.00	164	232
22	Limbara	22	32	70	59	160	19.10	166	227
23	Mahidad *	22	13	71	8	250	21.50	178	231
24	Motisindholi	23	11	68	43	4	17.50	118	311
25	Mundra	22	47	69	43	2	19.50	168	303
26	Navadra	21	57	69	16	24	20.80	183	297
27	Nani Kundal	21	55	71	28	154	20.03	163	278
28	Navibander	21	26	69	47	10	19.50	153	213
29	Okha	22	27	69	3	1	19.40	150	260
30	Okhamadhi	22	6	69	6	12	19.00	129	209
31	Poladiya	23	6	69	12	120	20.60	177	278
32	Ratabhe	22	56	71	2	70	17.50	123	212
33	Rojmal	22	1	71	28	140	18.40	129	317
34	Sanodar	21	35	72	11	80	22.46	197	373
35	Sinai	23	3	70	4	57	20.78	183	244
36	Suvarda	22	23	70	7	90	20.20	166	243
37	Surajbari	23	14	70	39	9	19.50	184	444
38	Warshamedi	22	58	70	34	03	20.41	192	499
	Orissa								
1	Chandipur	21	32	87	1	5	15.18	120	315
2	Chatrapur	19	18	84	58	9	14.40	106	264
3	Damanjodi	18	49	83	0	1325	18.63	150	250
4	Gopalpur	19	16	84	54	7	16.20	124	265
5	Paradwip	20	23	86	41	6	18.20	153	289
6	Puri	19	48	85	49	2	17.50	137	214
	Maharashtra								
1	Alamprabhu Pathar *	16	46	74	22	790	20.50	164	224
2	Amberi *	17	36	74	19	960	23.00	237	275
3	Brahmanwel *	21	10	74	11	600	23.10	278	324
4	Chakla *	21	19	74	19	380	23.70	242	323
5	Chalkewadi	17	36	73	49	1160	20.20	206	218

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m²	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
6	Dhalgaon	17	8	74	59	810	21.20	216	260
7	Dongerwadi *	16	55	74	48	820	21.40	179	284
8	Gawalwadi	20	6	73	43	740	19.00	140	278
9	Gude Panchagani	17	7	73	59	903	19.80	178	296
10	Kas *	17	44	73	49	1240	20.50	194	277
11	Kavadya Donger *	19	1	74	32	910	23.20	224	277
12	Khandke	19	8	74	53	920	19.60	146	250
13	Kolgaon *	18	50	74	43	800	20.50	177	238
14	Lonavla	18	47	73	23	560	15.50	122	285
15	Mander Deo *	18	2	73	53	1280	19.40	153	206
16	Matrewadi *	17	12	73	56	898	20.80	211	253
17	Panchpatta *	19	42	73	55	1080	20.51	201	236
18	Panchagani	17	55	73	48	1372	18.40	133	205
19	Raipur *	21	2	74	22	500	18.90	162	214
20	Palsi *	17	20	73	40	970	18.85	137	254
21	Sautada *	18	48	75	20	800	21.20	167	223
22	Takara Mouli *	21	3	73	58	600	20.80	186	224
23	Thoseghar	17	35	73	53	1140	21.70	229	489
24	Vijayadurg	16	30	73	20	100	19.60	207	253
25	Vankusawade *	17	27	73	50	1100	21.20	231	293
26	Varekarwadi	17	13	73	59	920	21.04	257	216
	Andhra Pradesh								
1	Alangarapetta *	14	48	77	47	360	20.76	244	272
2	Badhrampalli Kottala *	14	55	77	24	440	21.30	248	277
3	Bhimunipatnam	17	54	83	27	100	19.10	195	282
4	Banderlapalli *	15	1	78	4	438	20.79	240	320
5	Borampalli *	14	30	77	9	550	19.40	163	219
6	Burugula *	15	8	77	57	540	18.40	147	216
7	Chinnababaiyapalli *	13	57	77	37	750	18.50	132	206
8	Jamalamadugu I *	14	49	78	23	195	17.50	161	265
9	Jamalamadugu II *	14	46	78	22	220	18.60	165	248
10	Kadavakallu *	14	48	77	56	340	22.10	303	325

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m^2	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
11	Kakulakonda	13	43	79	21	981	23.10	332	541
12	Kondamithipalli *	15	3	78	3	440	21.22	252	349
13	Kodumuru *	15	43	77	45	410	20.83	225	270
14	Korrakodu *	14	46	77	15	460	18.67	146	220
15	Madugupalli *	14	42	77	51	440	18.70	152	266
16	M.P.R. Dam	14	54	77	25	450	19.90	228	269
17	Mustikovala	14	15	77	32	600	20.20	201	237
18	Nallakonda *	14	7	77	34	757	22.80	276	324
19	Narasimhakonda	14	30	79	52	100	20.10	186	403
20	Nazeerabad *	17	11	77	55	664	21.00	176	232
21	Pampanoor Thanda *	14	38	77	24	490	19.60	182	232
22	Payalakuntla	14	53	79	2	340	20.10	230	257
23	Ramagiri - I	14	17	77	31	667	19.50	205	308
24	Ramagiri III	14	22	77	32	550	19.40	190	246
25	Singanamala	14	46	77	44	469	23.80	366	392
26	Tallimadugula *	14	22	77	32	540	22.20	260	288
27	Talaricheruvu *	14	57	78	3	360	18.11	144	298
28	Tirumala	13	40	79	22	880	20.40	226	374
29	Tirumalayapalli	14	54	78	11	451	19.00	154	285
30	Ulindakonda *	15	38	77	59	430	17.54	130	225
31	Vajrakarur	14	58	77	19	507	19.46	173	243
	Rajasthan								
1	Devgarh *	24	3	74	39	520	19.88	151	281
2	Harshnath *	27	30	75	10	910	20.62	206	617
3	Jaisalmer	26	54	70	55	231	17.80	159	274
4	Jaisalmer 2 *	26	53	70	55	231	19.79	182	311
5	Khodal	26	22	71	13	200	17.00	135	229
6	Mohangarh	27	17	71	13	155	15.50	117	243
7	Phalodi	27	7	72	20	260	17.40	142	261
	Lakshadweep								
1	Agathi	10	51	72	11	1	18.40	179	253
2	Aminia	11	7	72	44	4	17.40	140	>150

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m^2	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
3	Bitra	11	35	72	12	4	16.50	173	>258
4	Chetlat	11	43	72	43	4	19.00	170	267
5	Kadmat	11	13	72	47	1	18.00	169	282
6	Kalpeni	10	5	73	39	1	16.20	125	302
7	Kavarathi	10	32	72	38	1	18.00	161	283
8	Minicoy	8	17	73	4	1	17.40	162	>162
	Karnataka								
1	B.B. Hills	13	26	75	45	1768	26.80	498	581
2	Chalamatti	15	18	75	3	710	21.40	189	268
3	Channavadayanapura *	11	57	76	36	940	20.39	154	243
4	Chikodi *	16	25	74	35	769	23.20	264	298
5	Gokak	16	7	74	47	775	19.20	168	336
6	Hanamsagar	15	54	76	2	719	20.60	173	270
7	Hanumanahatti	15	55	74	43	902	20.30	165	294
8	Horti *	17	7	75	44	620	19.80	173	294
9	Haradenahalli	12	51	76	13	1030	18.50	127	294
10	Jogimatti	14	10	76	24	1120	30.30	498	632
11	Kappataguda *	15	15	75	42	979	24.92	311	423
12	Khamkarhatti *	15	45	74	35	863	20.30	159	217
13	Malgatti	15	49	75	54	680	19.60	156	335
14	Mannikere	15	58	74	28	925	24.30	252	315
15	Mavinhunda *	16	25	74	48	787	22.13	212	>212
16	Ramgad *	15	8	76	27	960	18.24	134	263
17	Sangundi	16	15	75	44	625	18.70	153	259
18	Arasinagundi	14	29	76	50		-	-	>392
19	Bullenahalli 1	13	25	76	41		-	-	>168
20	Bullenahalli 2	13	24	76	41		-	-	>195
21	Gujanur	14	58	75	54		-	-	>240
22	Jogimatti	14	11	76	25		-	-	632
23	Madikaripura	14	13	76	27		-	-	>365
24	Sogi A	14	55	75	59		-	-	>415
25	Sogi B *	14	54	75	59	890	23.80	246	284

SL. No.	Station	Latitude °N		Longitude °E		Elevation m.a.s.l.	Annual Mean Wind Speed (KMPH)	Annual Mean Wind Power Density W/m^2	
		Deg.	Min.	Deg.	Min.		Meas-ured at 20/25m	Meas-ured at 20/25m	Extra-polated at 50m
26	Subramanya Halli *	15	0	76	34	1020	21.13	214	409
	Kerala								
1	Kanjicode	10	47	76	49	130	22.60	218	296
2	Kailasammedu	9	51	77	10	1160	23.20	251	375
3	Kolahalamedu	9	40	76	56	1000	16.90	146	222
4	Kotamala	10	40	76	36	150	19.20	154	239
5	Kottathara	11	7	76	39	750	19.70	207	297
6	Kulathummedu	9	44	77	13	1040	20.20	181	349
7	Kuttikanam	9	35	76	59	1000	16.50	140	243
8	Nallasingam	11	6	76	44	840	22.90	324	456
9	Panchalimedu	9	32	76	57	950	20.20	258	327
10	Parampukettimedu	9	54	77	12	1160	27.30	470	721
11	Ponmudi	8	46	77	8	1074	18.50	216	226
12	Pullikanam	9	44	76	52	1100	18.20	178	200
13	Ramakalmedu	9	49	77	14	920	29.70	532	535
14	Senapathi	9	57	77	11	1240	19.40	189	339
15	Sakkulathumedu	9	52	77	13	1040	28.55	531	561
16	Tolanur	10	42	76	30	100	15.70	115	231
	Madhya Pradesh								
1	Jamgodrani	22	59	76	10	560	18.20	130	222
2	Kukru	21	30	77	28	1118	19.00	157	255
3	Mahuria *	23	50	76	6	504	19.00	171	217
4	Mamatkheda	23	45	75	3	560	20.04	169	255
5	Nagda *	22	53	76	3	700	22.50	219	371
6	Sendhva	21	38	75	3	540	18.10	163	215
7	Valiyarpani	21	39	74	57	505	18.90	191	287
	West Bengal								
1	Ganga Sagar *	21	37	88	4	3	17.40	155	225
Andaman & Nicobar Islands									
1	Keating Point	9	15	92	46	2	16.06	114	>175
	Uttaranchal								
1	Bachelikhal	30	4	78	37	945	18.06	144	244

Note : * 25m Mast

Note: Sl. No 18 to 24 in Karnataka with 30m Mast (KPCL & NAL Mast)

WIND TURBINE TESTING

Provisional Type Testing

During 2002-03, C-WET received offers from four manufacturers for provisional type testing of their wind turbines of which two wind turbines, one of 1250 kW of Suzlon Energy Ltd., and the other of 250 kW of TTG Industries, were selected taking into consideration the availability of two test beds at the Wind Turbine Test Station (WTTS), Kayathar.

For testing the 1250 kW wind turbine, the existing infrastructure facilities were upgraded. The heights of reference-meteorological masts readily available in front of each test bed were suitably modified to match the hub heights of the wind turbines under test. Due to delayed installation, both wind turbines could be commissioned and taken up for measurement during the first week of September 2002.

However, tests on both wind turbines, relating to safety and function, could not be completed due to the waning wind season. A decision was taken to continue the tests during the windy season of the current year.

1250 kW wind turbine under test at WTTS, Kayathar

250 kW wind turbine under test at WTTS, Kayathar

In-situ power performance measurements

One in-situ power performance measurement was completed on a 750 kW wind turbine of NEG Micon at Karunkulam in Tirunelveli district of Tamil Nadu and the measurement report was presented to the client.

A pre-feasibility study was completed by the Testing Unit of C-WET to decide the feasibility of undertaking power performance measurement on a 1000 kW wind turbine of Suzlon Energy Ltd., operating near Jaisalmer in Rajasthan. A decision was taken in consultation with the client to commence the power performance measurement on the wind turbine during the wind season of the current year.

1000 kW Wind Turbine near Jaisalmer

Development of infrastructure at WTTS

Over a period of three years, the Wind Turbine Test Station of C-WET has been developed with the following facilities for testing wind turbines.

- Sophisticated PC based data logging systems at the control rooms of each test bed
- Readily available grid connection for each test bed
- Facilities at Test Beds A and B to test wind turbines up to 1250 kW and 400 kW respectively and the capacity is expandable based on future offers
- Two reference met masts located in front of each test bed with facility to modify the height in both masts.

Status of tests carried out by C-WET

S. No.	YEAR	TEST	WIND TURBINE
Tests completed			
1	1999	In-situ power performance (near Muppandal)	500 kW, 39 m rotor diameter of VESTAS make
2	1999	In-situ power performance (near Coimbatore)	250 kW, 29.7 m rotor diameter of BHEL make
3	2000	Provisional Type Test at WTTS	500 kW, 47 m rotor diameter of VESTAS make
4	2000	Provisional Type Test at WTTS	350 kW, 33.4 m rotor diameter of SUZLON make
5	2001	Provisional Type Test at WTTS	1000 kW, 60 m rotor diameter of SUZLON make
6	2001	Provisional Type Test at WTTS	225 kW, 29.6 m rotor diameter of NEPC make
7	2002	In-situ power performance (near Muppandal)	750 kW, 48 m rotor diameter of NEG MICON make
On-going tests			
1	2002-2003	Provisional Type Test at WTTS	1250 kW, 64 m rotor diameter of SUZLON make
2	2002-2003	Provisional Type Test at WTTS	250 kW, 29.6 m rotor diameter of TTG make

Visit of Danida review team

The second review of the DANIDA assisted project "Wind Turbine Test Station" was made by a review team during the first and second weeks of December 2002, both at C-WET, Chennai, and at the Wind Turbine Test Station, Kayathar.

The objective of the second review was to assess the implementation of the project since the first review in March / April 2000, the present status of the project, and to give recommendations for the remaining part of the implementation period in order to ensure the sustainability of C-WET.

DANIDA review team at WTTS, Kayathar

National and international accreditation

Work on ISO 9001-2000 has made good progress with the preparation of procedures for "Testing". One mock audit was conducted with the assistance of RISO Technical Consultants.

Preliminary works have been started in the Testing Unit towards accreditation of the Wind Turbine Test Station by the National Accreditation Board for Testing and Calibration Laboratories (NABL) under the Department of Science & Technology. Introductory workshops were held during February and March 2003. The Electronic Test and Development Centre (ETDC), a Government of India establishment, has been identified to help C-WET obtain NABL accreditation.

New building at WTTS

Construction of the office-cum-workshop building, commenced during March 2002 by the Central Public Works Department, was completed during August 2002.

The total value of the construction is Rs. 20.83 lakhs. The building has the following facilities:

- One laboratory room for analysis and verification of functionality of the sensors/instruments
- One conference room
- One workshop cum store room, with adequate space to accommodate one nacelle for instrumentation purpose.
- One office room with an attached document room.

New building of WTTS

STANDARDS AND CERTIFICATION

The importance of third party certification of high and products such as a Wind Turbine cannot be over emphasized. The certification process ensures adherence of many quality related aspects ensuring long and safe operation of wind turbines in field.

An industry friendly, need based, market oriented product certification system, TAPS-2000, approved by the MNES with three categories of certification, has been in implementation by C-WET certification over the last three years. The certification, with value addition in terms of identifying improvements as the prime factor, assesses the design class and the quality of the Wind Turbine focusing mainly on safety and structural integrity.

Agreement signing between Pioneer Wincon and C-WET

While the core of TAPS-2000 has been drawn from the international wind turbine approval system it has also captured the good aspects of other country specific systems. More importantly, Indian environmental requirements of grid, wind and site conditions have been incorporated. TAPS-2000 recognises the type approval systems of Denmark, The Netherlands, Germany and other countries.

The Indian wind turbine industry, typical of its character and nature, has come forward and availed the first ever certification system of wind turbines in India. C-WET certification has served four wind turbine manufactures of India with five certificates covering all the three categories.

ISO 9000 – 2000 Internal Audit Team

Status of S&C projects

1. ***Provisional Type Certification - Completed:***

   - Provisional type certification under Category-III for Suzlon –1 MW wind turbine was issued by the Hon'ble Minister of State – Independent Charge for Ministry of Non-Conventional Energy Sources.
   - Provisional type certification under Category-III for NEPC 225 kW wind turbine was issued.

2. *Provisional Type Certification - New Project:*

- Provisional type certification under Category-III for Suzlon –1.25 MW wind turbine is under way.
- Provisional type certification under Category-III for TTG 250 kW wind turbine is in progress.
- Provisional type certification under Category-I for Pioneer Wincon W250/29 250 kW wind turbine is under way.

RISO - C-WET, Certification Co-operation for Assessment of GI Wind Farm Project at Satara, Maharashtra

STATUS OF S&C PROJECTS

Provisional Type Certification – New Projects

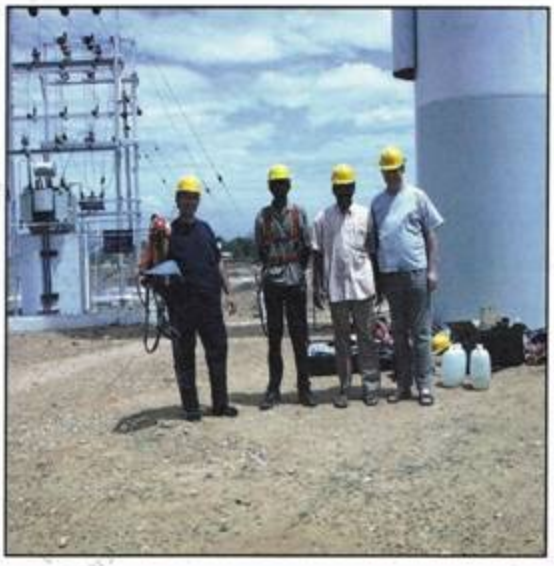
Sl. No	Project Name	Project Number	Manufacturer's Name	WT Model / Capacity	Status of Certification
1.	SUZLON-1MW	PTC III – 003	Suzlon Energy Limited	Suzlon S 60 / 1000 kW	Project completed. Issued on 21.02.2003, valid up to 31.06.2003
2.	NEPC-225 kW	PTC III – 004	NEPC India Limited	NEPC-225 kW / 225 kW	Project completed. Issued on 13.03.2003, valid up to 30.09.2003
3.	SUZLON-1.25 MW	PTC III – 006	Suzlon Energy Limited	Suzlon S 64/66 / 1250 kW	Agreement signed and project initiated
4.	TTG – 250 kW	PTC III – 007	TTG Industries Limited	TTG 250 T /250 kW	Agreement signed and project initiated
5.	PIONEER WINCON W250/29	PTC I - 008	Pioneer Wincon Ltd.	W 250/29 /250 kW	Agreement signed and project initiated

Provisional Type Certification – Renewal

Sl. No	Project Name	Project Number	Manufacturer's Name	WT Model / Capacity	Status of Certification
1.	Renewal of V39 / 500 kW with 47m rotor diameter	PTC II – 001- R1	Vestas RRB India Limited	V-39-500 kW with 47m rotor diameter / 500 kW	Project completed. Renewed on 18.11.2002, valid up to 17.11.2003
2.	Renewal of ENERCON – 230 kW	PTC I – 005	Enercon (India) Limited	E-30 / 230 kW	Renewal is in progress (First issued on 14.03.2002)
3.	Renewal of SUZLON 300/350 kW	PTC II – 002 – R1	Suzlon Energy Limited	N3330/300 kW & N 3335 / 350 kW	Renewal is in progress (First issued on 21.03.2002.)

Other Projects - Spot Inspection of GI Wind Farm

Sl. No	Project Name	Project Number	Manufacturer's Name	WT Model / Capacity	Status of Certification
1.	Spot check of GI wind farm	—	RISO	E 40 / 600 kW	Project completed



Verification of safety of E-30/230 kW WT of Enercon India Ltd. on a field installation as a part of category – I certification

Spot check and yaw efficiency test on 39/500kW with 47m wind turbine of Vestas RRB India Ltd.

INFORMATION, TRAINING AND COMMERCIAL SERVICES

Academic

In view of the growing demand for qualified manpower in the wind energy sector, both at the national and international levels, there is a need to start a masters level course in wind energy in the universities/ colleges. This may ensure supply of suitable manpower to the wind industry/ universities/research institutions. Hence a committee has been formed under the chairmanship of Prof. Sujay Basu, Director, School of Energy Studies, Jadavpur University, Kolkata to prepare a suitable syllabus, that will be recommended to universities / colleges for implementation.

First meeting of Syllabus Committee held on March 27, 2003 at C-WET, Chennai

International Training

A proposal for organising a international training for wind energy industries / institutions / State nodal agencies in collaboration with the Energy Research Centre in the Netherlands (ECN), is planned for December 2003 and preliminary work is under way. An MOU has been signed between ECN and the MNES for the same.

Website

To create awareness and disseminate information about its activities to various stakeholders around the globe, C-WET recently developed and hosted its website to offer integrated solutions in the wind energy domain. It can be accessed at http:// www.cwet.tn.nic.in.

Home page of C-WET website

Interaction with Academia

One student each from the National Institute of Technology, Kozhikod and Tezpur University, Tezpur carried out their final year projects in wind resource assessment at C-WET under the guidance of Dr. E Sreevalsan, on the following topics:

- Markov Matrix Approach for wind speed simulation, 2002.
- Estimation of Weibull parameters by different methods and wind power related studies, 2002.

Newsletter

Work is in progress to bring out a half yearly 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 will highlight 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. There will also be special highlights from various other organisations on matters of global concern.


PAVAN

A Newsletter of Centre for Wind Energy Technology

C-WET

Editorial.....

Inside.....

Proposed newsletter

Apprentice Programme

To provide an opportunity to young and fresh graduates/diploma holders to learn and gain experience about wind energy technologies five apprentices (2 graduates and 3 diploma holders) have been engaged in different units for a period of one year.

1. Mr. R. Machlin Allen
2. Mr. R. Uthra Pandian
3. Mr. M. A. Balaji
4. Mr. M. Arun
5. Mr. K. Vinoth Kumar

Wind Turbine Industry Meet

To bring awareness on documentation requirements for provisional type certification according to TAPS-2000 among wind turbine manufacturers, a C-WET- Wind Turbine Industry Meet was held on October 4, 2002.

Wind Turbine Industry Meet held on October 4, 2002

Training Organised

- Mr. Rene Moeller, Technical Consultant from RISO National Laboratory, visited C-WET and WTTS for imparting training on instrumentation of DAQWin systems during September 2002.
- Mr. Uwe Schmidt Paulsen, Technical Consultant from RISO National Laboratory, visited C-WET and WTTS during November 2002 and February 2003 for imparting training on WTGS load calculation and QMS programme for ISO accreditation.

- An awareness course on ISO / IEC 17025: 2000 - General requirements for the competence of Testing and Calibration laboratories was arranged on February 7, 2003. Mr. P. Mathialagan, Additional Director, Electronics Test & Development Centre, delivered a lecture.
- A two-day training programme on wind resource assessment for the project officers of MEDA, Pune was organised on February 24 and 25, 2003. About 15 participants including C-WET officials were enlightened on operation & maintenance of wind monitoring stations, data collection & analysis, site selection & familiarisation with the instruments/software used in wind resource data analysis.
- A training programme for trainers was conducted during the first two quarters of the year. The knowledge gained by the staff from their training in Denmark was shared by other staff of C-WET during this programme. Training sessions were arranged at C-WET, Chennai, and WTTS, Kayathar.
- Training sessions on ISO 9000 - 2000 were conducted by DNV, Chennai, as a part of Phase II activities of the Wind Turbine Test Station Project.
- Training sessions on NABL accreditation were conducted by ETDC during February and March 2003.
- Dr. R. M. Srinivasan, Assistant Director, Official Language Department, Ministry of Home Affairs, Hindi Teaching Team, Rajaji Bhawan, Chennai gave a lecture on September 26, 2002 as part of implementing and promoting Hindi as the official Language. A committee to implement and promote Hindi as official language has been constituted.

Conferences and training attended by C-WET staff

Administration

1. Mr. A. Jayaraman General Manager (F&A) attended a 5-day management development programme on "Accounting for Non-Profit Organizations" from April 15 to 19, 2002 organised by the National Institute of Financial Management, Faridabad, Haryana.
2. Ms. R. Vijayalakshmi, Office Assistant, attended a day's business orientation workshop on tally on July 6, 2002 organised by JL Infomatrix Ltd., Chennai.
3. Mr. K. V. Uma Maheswara Rao, Admn. & Accts. Officer, attended a 3-day technical workshop on "Purchase Policy & Procedure in Government Departments, Autonomous Bodies & PSUs" from August 7 to 9, 2002 organised by Centre for Training and Social Research, New Delhi.
4. Mr. A. Jayaraman, General Manager (F&A), attended the 28th Regional Conference of the Southern India Regional Council of the Institute of Company Secretaries of India at Chennai on July 19 and 20, 2002.
5. Mr. A. Jayaraman, General Manager (F&A), attended the 44th National Cost Convention on Globalizing Management Accounting – Paradigms for new economic order, organised by Southern India Regional Council, Institute of Cost and Woks Accountants of India, Chennai, from January 4 to 6, 2003.

Research & Development

1. Ms. Deepa Kurup participated in a One-day Technology Appreciation Programme on "Digital Signal Processing: Theory and Application" conducted by the Centre for Industrial Consultancy and Sponsored Research, IIT Madras, on November 7, 2002.
2. Mr. S. Suresh Babu attended a 2-day wind resource assessment training programme on February 24 and 25, 2003 organised by the Wind Resource Assessment unit of C-WET.
3. Mr. S. Suresh Babu participated in a seminar on Signal Integrity challenges & Solutions conducted by Textronix India on February 26, 2003.

Wind Turbine Testing

1. Training on C language and Training on MS office was arranged for the staff of WTTS.
2. On-the-job training on in-situ power performance on the 750 kW wind turbine at the Dalmia Wind Farm, Karankulam Village, was imparted to new recruits of WTTS.
3. A Technical Consultant (TC) from RISO National Laboratory, Denmark, (Mr. Rene) imparted training on handling of DAQWIN software during the first and second weeks of September 2002.
4. A training programme for trainers was conducted during the first two quarters of the year. The knowledge gained by the staff, who had training in Denmark, was shared by other staff of C-WET during this programme. Training sessions were arranged at C-WET, Chennai, and WTTS, Kayathar.
5. The Technical Consultant from RISO (Mr. Uwe Schmidt Paulsen) imparted training on (a) TOTS on λ^3 Cp (λ) power curves and (b) data analysis with the upgraded measurement system during his mission in November 2002.
6. The Technical Consultant from RISO (Mr. Uwe Schmidt Paulsen) visited C-WET, Chennai, and WTTS, Kayathar, in February 2003 and imparted training on analysis using new software and on QMS and on in-house calibration of anemometers.
7. Training sessions on ISO 9000 - 2000 were conducted by DNV, Chennai, as a part of Phase II activities of the Wind Turbine Test Station Project.
8. Training sessions on NABL accreditation were conducted by ETDC during February and March 2003.

Standards and Certification

1. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar and Mr. S. Siva Kumar attended a 2-day Internal Quality Auditing training programme organised on February 28 and March 20, 2003 by DNV, Chennai.
2. Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended a 2-day wind resource assessment training programme on February 24 and 25, 2003 organised by the Wind Resource Assessment unit of C-WET.
3. Mr. N. S. Prasad, Mr. V. R. Gireesh Kumar and Mr. S. Siva Kumar attended a 3-day meet on 'Fatigue and Fracture Behaviour of Components and Structures' from February 12 to 14, 2003 organised by Structural Engineering Research Centre, Chennai.

4. Mr. A. Senthil Kumar attended a 2-day 'Welding Technology and Inspection' training programme organised on January 31 and February 1, 2003 by Indian Institute of Technology, Chennai.

5. Mr. N. S. Prasad, and Mr. V. R. Gireesh Kumar attended a one-day 'Orientation towards Mathematical Treatment of Metal Forming' technology appreciation programme organized on January 30, 2003 by Indian Institute of Technology, Chennai.

6. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, on the job training by Technical Consultant (TC), Mr. Carsten Skamris, from January 30 to February 14, 2003.

7. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, on the job training by TC, Mr. Erik Joergensen, from November 18 to 30, 2002.

8. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, on the job training by TC, Mr. Carsten Skamris, from November 14 to December 06, 2002.

9. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, on the job training by TC, Mr. Carsten Skamris, from September 23 to October 04, 2002.

10. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, the mission of Resident Expert (RE), Mr. Lars Jorgensen, from February to September 2002 has been completed.

11. All engineers/scientists of S&C unit attended the Training of Trainers Programme organized by RISØ for C-WET staff, the following topics were discussed: Measurement methods/ techniques, Introduction to DAQ/DAU, Control & Protection Systems, Overview of IEC WT 01 Vs. TAPS 2000, Strain gauge technique, External conditions (IEC 61400-1), IEC 61400-1 Overview and IEC 61400–13, Fatigue Load Analysis, Calibration, Aero elastic load calculations.

12. Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended a Two-day training on 'Windows based Data Acquisition System' by TC, Mr. Rene Moeller, in September 2002.

13. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, on the job training by TC, Mr. Carsten Skamris, from May 16 to 29 2002.

14. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended, on the job training by TC, Mr. Erik Joergensen, from August 19 to 30, 2002.

15. Mr. N. S. Prasad, Mr. A. Senthil Kumar, Mr. V. R. Gireesh Kumar, Mr. S. Siva Kumar and Mr. S. Arul Selvan attended ISO 9001:2000 Introductory Programme organised by DNV, Chennai.

Wind Resource Assessment

1. Shri. R. Sasi Kumar, Meteorologist, WRA attended an International Trainer Certification Workshop in New Delhi, on October 22 and 23, 2002, organised by IT power India, Pondicherry, in association with RET Screen International, Canada.

Selected Lectures in Workshops and Seminars

1. Mr. M. P. Ramesh, Executive Director, on "Wind mapping and preparation of wind atlas", Training Programme on "Renewable Energy Technologies and their application for representatives of BIMST-EC" organised by Tata Energy Research Institute, New Delhi, on May 9, 2002.

2. Mr. M. P. Ramesh, Executive Director, on "Use of Renewable Energy in the Context of Developing Countries", International Seminar on Utilizing Technology for Enhanced Energy Efficiency and Profitability on October 3, 2002 organised by the Federation of Indian Chambers of Commerce and Industry.

3. Mr. M. P. Ramesh, Executive Director, on "Wind Resource Assessment and data availability in India", one day Intensive Workshop on Wind Pumping conducted by Solar Energy Society of India, Pondicherry on November 29, 2002.

4. Mr. M. P. Ramesh, Executive Director, gave Miss Anna Mani Memorial Lecture at 26th National Renewable Energy Convention at PSG College of Technology, Coimbatore, on January 17, 2003.

5. Mr. K. C. Dhimole, Dr. E. Sreevalsan and Mr. R. Sasi Kumar, on 'Wind Resource Assessment over India' at International Seminar on Decentralized Energy Systems: Options and Management organised by the Institution of Engineers (India), Kolkata on February 23, 2002.

6. Dr. E. Sreevalsan presented a paper on 'Wind Energy Potential of Kerala' at the Business Meet organised by the Agency for Non Conventional Energy & Rural Technology (ANERT) at Kochi on October 21, 2002.

7. Dr. E. Sreevalsan delivered a lecture on 'Wind Power Technology at the 4-week Training Programme on Rural Energy Entrepreneur Development' organised by Kumaraguru College of Technology at Coimbatore on August 31, 2002.

Foreign Deputation

Mr. M. P. Ramesh, Executive Director and Mr. K.C. Dhimole, Principal Engineer and Head, WRA / ITCS were deputed to RISO National Laboratory, Denmark from October 7 to 22, 2002 to discuss various issues under the framework of technical cooperation between India and Danish Government and visit their facilities. Besides Mr. Dhimole, underwent expert training on wind turbine monitoring.

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 Secretary, MNES
2 Financial Adviser, MNES
3 Adviser & Head, Power Group, MNES
4 Secretary (Energy), Tamil Nadu Government
5 Director General, Bureau of Indian Standards
6 Chairman, Central Electricity Authority
7 Managing Director, IREDA
8 Dr. B. Ramchandra Pai, Director, NAL, Bangalore
9 Dr. V. Siddhartha, Outstanding Scientist, Scientist 'H', Secretariat of SA to RM, New Delhi
10 Mr. V.K. Neelakandhan, Director, ER&DCI, Thiruvananthapuram
11 Chairman, Indian Wind Turbine Manufacturers Association, Chennai
12 Executive Director, C-WET

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 Joint Secretary & 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 Financial Adviser, MNES
2 Secretary (Energy), Tamil Nadu Government
3 Adviser & Head, Power Group, MNES
4 Director, Wind Power, MNES
5 General Manager (F&A), C-WET

Building and Infrastructure Development Committee

The following are the members of the Building and Infrastructure Development Committee (To consider, finalize and recommend master plan for new campus of Centre at Pallikaranai):

1 Mr. K. S. Narayanan, Chief Engineer (Retd.), CPWD

2 Mr. Anant Raje, Consultant Architect

3 Mr. K. Veeraraghavan, Chief Engineer (Retd.) State PWD

4 Mr. M. Santhanam, Chief Architect (Retd.), State PWD

5 Mr. N. Rajagopalan, Professor (Retd.), IIT, Chennai

6 Mr. S. Gopal, Superintending Engineer (Retd.), CPWD

7 Executive Director, HUDCO - South Zone, Chennai

8 Director, Solar Energy, MNES

9 Director, Wind Power, MNES

10 Executive Director, C-WET

11 Principal Engineer, WRA, C-WET

12 General Manager (F&A), C-WET

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 Dy. 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

List of Manufacturers Committee

The following are the members of the List of Manufacturers Committee (To prepare and finalize the list of manufacturers):

1 Mr. V.V. Shantaraman, Secretary, IWTMA

2 Mr. P.T. Kumar, Joint Director BIS, Southern Regional Office, Chennai

3 Mr. N.S. Prasad, Unit Chief, S&C, C-WET

Research and Development Council (RC)

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

1 Dr. V. Siddhartha, Adviser, DRDO & OSD (Chairman, RC), Secretariat of SA to RM, New Delhi

2 Mr. Ajit K. Gupta, Adviser (Power), MNES, New Delhi

3 Dr. R. V. Krishnan, Head, Materials Science Dn.& Adviser (Mgt. & Admn.), NAL, Bangalore

4	Prof. Sujay Basu, Director, School of Energy Studies, Kolkata
5	Ms. K. A. Fathima, Additional Director & Head, Power Electronic Groups, ER & DCI, Trivandrum
6	Dr. S. Rangarajan, Wind Energy Expert, A-41, Industrial Estate II stage, Peenya, Bangalore
7	Mr. L. E. D'Cruz, Wind Energy Consultant, Enercon (India) Limited, Andheri (West), Mumbai
8	Dr. R. P. Gupta, Wind Energy Expert, Osmania University, Hyderabad
9	Executive Director, Centre for Wind Energy Technology, Chennai
10	Shri.N.S.Prasad, Unit Chief, (Secretary, RC), Centre for Wind Energy Technology, Chennai

Syllabus Committee

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

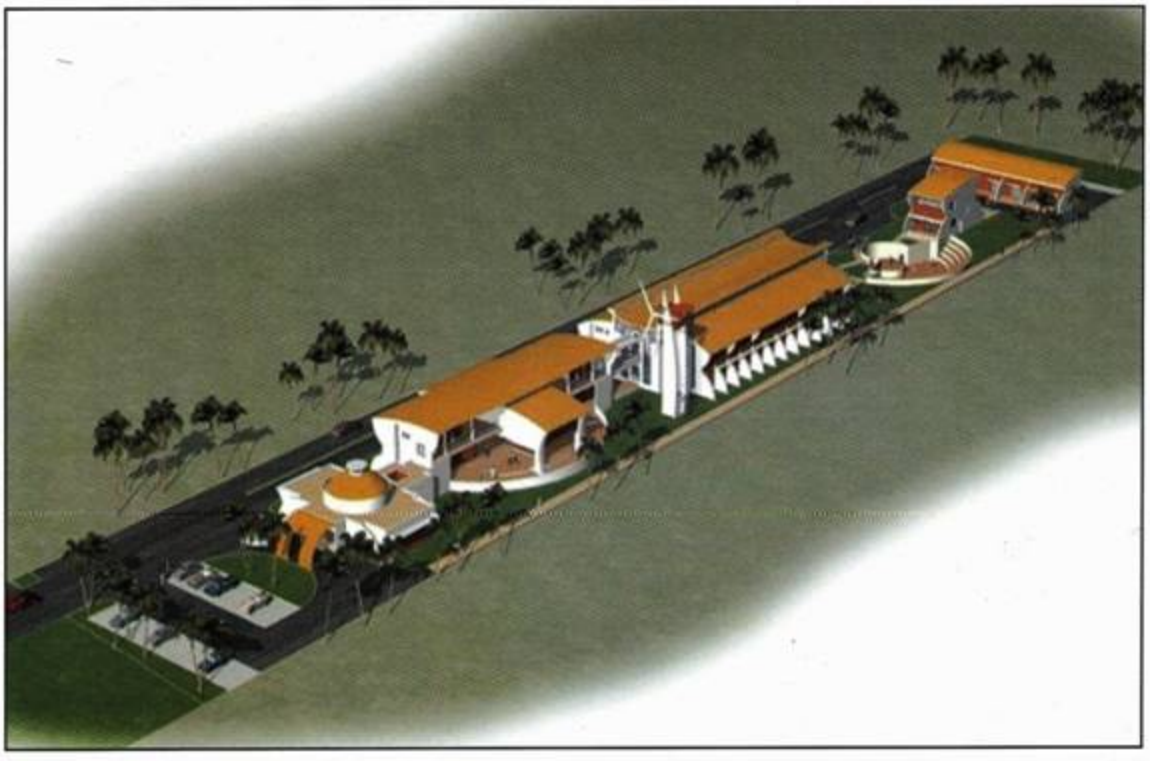
1	Prof. Sujay Basu, Director, School of Energy Studies, Jadavpur University, Kolkata
2	Mr. M. P. Ramesh, Executive Director, Centre for Wind Energy Technology, Chennai
3	Dr. N. Siva Prasad, Professor, Machine Design Section, Dept. of Mech. Engineering IIT, Chennai
4	Dr. Bh. Nagabhushana Rao, Professor & Head, 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, Faculty of Mechanical Sciences, PSG College of Technology, Peelamedu, Coimbatore
7	Mr. Sarvesh Kumar, Chairman, Indian Wind Turbine Manufacturers Association (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, Centre for Wind Energy Technology, Chennai

Visitors to the Centre

- A team of USAID (United States Agency for International Development) visited C-WET office on September 13, 2002.
- A Danida Review Team visited C-WET during the second week of December 2002 with the objective of reviewing the implementation of the DANIDA assisted project since the first review in March/April 2000. The team members visited the Wind Turbine Test Station, Kayathar and held discussions with the testing unit staff.
- Prof. Chem V. Nayar, Director, Centre for Renewable Energy and Sustainable Technologies Australia, School of Electrical & Computer Engineering, Curtin University of Technology, Perth, Western Australia visited C-WET on December 24, 2002 and delivered a lecture on Small scale hybrid systems using wind and solar energy.
- Mr. P. Mathialagan, Additional Director, ETDC, visited WTTS, Kayathar, on January 22, 2003 for assessing the status as well as for familiarisation and understanding of laboratory processes at WTTS in connection with NABL Accreditation.

New Facilities / Infrastructure

A new complex for the Centre is under construction at Pallikkaranai, Chennai, and the building is expected to be ready by December 2003. Land measuring 4.41 acres has been allotted by the Government of Tamil Nadu.



Plan view of proposed C-WET-building at Pallikaranai, Chennai

HUMAN RESOURCE

M. P. Ramesh, Executive Director

Research & Development

K. Boopathi, Scientist B (T)

Deepa Kurup, Junior Engineer

S. Suresh Babu, Technician

M. R. Gunasekaran, Steno

Wind Resource Assessment

K. C. Dhimole, Scientist D

E. Sreevalsan, Senior Scientist

R. Sasikumar, Meteorologist

T. Arivukkodi, Technician

Wind Turbine Testing

K. J. Sundararajamoorthy, Officer on Special Duty

V. Asaithambi, Scientist C

M. Anvar Ali, Scientist B

S. A. Mathew, Scientist B

J. C. David Solomon, Scientist B

R. Kumaravel, Junior Engineer

M. Karuppuchamy, Technician

A. R. Hasan Ali, Technician

Y. Packiyaraj, Technician

Standards and Certification

N. S. Prasad, Scientist F

A. Senthil Kumar, Scientist B

V. R. Gireesh Kumar, Scientist B

S. Sivakumar, Junior Engineer

S. Arulselvan, Technician

Information, Training and Commercial Services

P. Kanagavel, Scientist B (T)

Administration

T. Nagesha Rao, General Manager (F&A)

K. V. Uma Maheswara Rao, Admin & Accounts Officer

M. Sundaramoorthy, Officer (Stores & Purchase)

R. Girirajan, Office Assistant

R. Vijayalakshmi, Office Assistant

K. Tamilselvi, Office Assistant

B. Muthulakshmi, Steno

M. Selvakumar, Attendant

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

M. P. Ramesh

1. Non-Conventional Energy Sources Sectional Committee ME04 of Bureau of India Standards (BIS), Member.
2. Advisory Committee, KREDL (Karnataka), Member.
3. Indian Antarctic Science Expedition planning group, Expert Member.
4. Aeronautical Society of Indian Association, Member.
5. International Solar Energy of Education [affiliated to ISES], Founder Member.

K. C. Dhimole

1. Indian Society of Agricultural Engineers (ISAE), Member.
2. Indian Society for Technical Education, Member.
3. Indian Association of Soil and Water Conservationist, Member.
4. Institution of Engineers (India), Fellow.
5. Solar Energy Society of India, Member.
6. Council of Food & Agriculture Division, Bureau of Indian Standards, Member.
7. Asian Association for Agricultural Engineering (Thailand), Member.
8. Indian Water Resources Society, Member.
9. Governing Board of Editors (American Biographical Institute, USA), Member.
10. Indian Meteorological Society, Member.
11. Expert Committee on Wind Power Development Programme (Govt. of Kerala), Member.

N. S. Prasad

1. Solar Energy Society of India, 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.

E. Sreevalsan

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

V. Asaithambi

1. Institution of Engineers, Associated member.

A. Senthil Kumar

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

V. R. Gireesh Kumar

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

R. Kumaravel

1. Institution of Engineers, Associated member.

Founder (Late)
K. GNANANANDULU, G.D.A.F.C.A

Managing Partner
K. NARASIMHAM, B.A., F.C.A.

Managers:
K. RAMAKRISHNA, B.Sc.,
K. RAVISHANKAR, B.Sc., I.C.A.,

K. Gnananandulu & Co.,
CHARTERED ACCOUNTANTS
280 / 682, MOUNT ROAD,
Chennai – 600 006.

Phone 2852 5067
Res 2434 2523
2434 1957
Residence:
50/21, Madley Road,
T.Nagar,
Chennai – 600 017.

AUDITOR'S REPORT

To

The Governing Council,
Centre for Wind Energy Technology,
R-8, North Main Road,
Anna Nagar West Extension,
Chennai - 600 101.

We have audited the attached Balance Sheet of Centre for Wind Energy Technology as at 31st March 2003, Receipts and Payments Account and Income and Expenditure Account for the year ended as on that date along with Schedules, Significant Accounting Policies and Notes forming part of accounts annexed there to. These financial statements are the responsibility of the Centre for Wind Energy Technology (An Autonomous Institution of Government of India). 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 misstatement. 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 statement presentation. We believe that our audit provides a reasonable basis for our opinion.

As required by the Tamil Nadu Societies Registration Act, 1975 and Tamil Nadu Societies Registration Rules, 1978, we report that:

1. We have obtained all the information and explanation, which to the best of our knowledge and belief were necessary for the purpose of audit.
2. In our opinion, proper books of account as required by law have been kept by the Centre for Wind Energy Technology so far as it appears from our examination of those books.
3. The Balance Sheet, Receipts and Payments Account and Income and Expenditure Account dealt with by this report are in agreement with the books of account. The accounts are prepared based on the Uniform Format of Accounts for Central Autonomous Bodies.

4. In our opinion and to the best of our information and according to the explanations given to us, the said accounts read together with the schedules, accounting policies and notes thereon give a true and fair view in conformity with the accounting principles and standards generally accepted in India:

   (i) In the case of the Balance Sheet, of the state of affairs of the Centre for Wind Energy Technology as at 31st March 2003.

   and

   (ii) In the case of the Income and Expenditure Account of the excess of Expenditure over Income of the Centre for Wind Energy Technology for the year ended on that date.

For **K.Gnananandulu & Co.,**
Chartered Accountants

Place : Chennai.
Date : 29.08.2003

(K. NARASIMHAM)
Partner.

Founder (Late)
K. GNANANANDULU, G.D.A.F.C.A

Managing Partner
K. NARASIMHAM, B.A., F.C.A.

Managers:
K. RAMAKRISHNA, B.Sc.,
K. RAVISHANKAR, B.Sc., I.C.A.,

K. Gnananandulu & Co.,
CHARTERED ACCOUNTANTS
280 / 682, MOUNT ROAD,
Chennai – 600 006.

Phone 2852 5067
Res 2434 2523
2434 1957
Residence:
50/21, Madley Road,
T.Nagar,
Chennai – 600 017.

ANNEXURE TO THE AUDITORS REPORT

1. The Centre for Wind Energy Technology had maintained proper records showing full particulars including quantitative details and situation of fixed assets. The said fixed assets have been verified by the management at reasonable intervals having regard to the size of the organisation and nature of its assets. No material discrepancies have been noticed on such physical verification. None of the assets have been revalued during the year.
2. As per the information furnished, the Centre for Wind Energy Technology has not taken any loans, secured or unsecured from companies, firms or other parties. No Mortgage or Charge has been created on the Assets of Centre for Wind Energy Technology.
3. As per the information furnished, the Centre for Wind Energy Technology has not given any loans, secured or unsecured to companies, firms or other parties. No loan / advance in the nature of loans other than advances to staff have been given by the Centre for Wind Energy Technology. The said advances are free from interest.
4. In our opinion and according to the information and explanations given to us, there are adequate internal control procedures commensurate with the size and the nature of its operation with respect to purchase of instruments, equipment and other assets.
5. A firm of Chartered Accountants has conducted the Internal Audit of the Centre for Wind Energy Technology and taking into consideration the size and nature of its business; the scope and coverage are considered adequate. We suggest that the Internal Auditors may make an in depth study of the policies systems, project management and financial management of the society.
6. The Centre for Wind Energy Technology has been generally regular in depositing statutory dues with the appropriate authorities.
7. As per the records of the Centre for Wind Energy Technology and the information and explanations given to us, no personal expenses have been charged to Revenue Account other than those payable under contractual obligation or in accordance with generally accepted practice.
8. During the year 90% of the Provsional Type Testing fee advance has been taken to revenue account on completion of first phase of the work and total work pending completion and this is included in the note.
9. Capital work in progress is determined on the basis of utilization certificates issued as upto 31.3.2003.

For **K.Gnananandulu & Co.,**
Chartered Accountants

Place : Chennai.
Date : 29.08.2003

(K. NARASIMHAM)
Partner.

BALANCE SHEET AS AT 31ST MARCH 2003

(Amount in Rs.)

CAPITAL FUND AND LIABILITIES	Schedule	Current Year	Previous Year
CORPUS AND CAPITAL FUND	1	52,292,650	20,224,726
RESERVES AND SURPLUS	2	14,902,585	8,843,872
EARMARKED AND ENDOWMENT FUNDS	-	-	-
SECURED LOANS AND BORROWINGS	-	-	-
UNSECURED LOANS AND BORROWINGS	-	-	-
DEFERRED CREDIT LIABILITIES	-	-	-
CURRENT LIABILITIES AND PROVISIONS	3	7,330,976	3,277,377
TOTAL		**74,526,211**	**32,345,975**
ASSETS			
FIXED ASSETS	4	40,987,682	20,564,873
INVESTMENT - FROM EARMARKED AND ENDOWMENT FUNDS	-	-	-
INVESTMENT - OTHERS	-	-	-
CURRENT ASSETS, LOANS AND ADVANCES	5	33,538,529	11,781,102
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)	-	-	-
TOTAL	-	**74,526,211**	**32,345,975**
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached
For K. Gnanandandulu & Co.,
Chartered Accountant

T. NAGESHA RAO
General Manager(F&A)

M.P. RAMESH
Executive Director

AJAI VIKRAM SINGH
President / Chairman

K. NARASIMHAM
Partner

Place : Chennai
Date : 29.08.2003

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2003

(Amount in Rs.)

INCOME	Schedule	Current Year	Previous Year
Income from Sales and Services	6	8,531,416	4,438,210
Income from publication	7	327,590	394,400
Interest Earned	8	532,059	708,254
Other Income	9	29,393	40,978
TOTAL (A)		**9,420,458**	**5,581,842**
EXPENDITURE			
Establishment Expenses	10	6,122,860	4,661,091
Other Administrative Expenses	11	6,433,743	5,121,965
Depreciation	4	3,928,106	3,739,009
TOTAL (B)		**16,484,709**	**13,522,065**
Balance being excess of Expenditure Over Income (A-B)		7,064,251	7,940,223
Prior period adjustment	12	755	38,376
Transfer to General Reserve		2,182,466	920,751
Transfer to Corpus Fund			
BALANCE BEING DEFICIT CARRIED TO CAPITAL FUND		**9,247,472**	**8,899,350**
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached
For K. Gnanandandulu & Co.,
Chartered Accountant

T. NAGESHA RAO	M.P. RAMESH	AJAI VIKRAM SINGH	K. NARASIMHAM
General Manager(F&A)	Executive Director	President / Chairman	Partner

Place : Chennai
Date : 29.08.2003

RECEIPTS AND PAYMENTS ACCOUNT

RECEIPTS	Current Year	Previous Year
I. Opening Balances		
(a) Cash in hand		
(b) Bank balances		
i) In Current Account	2,912,054	5,743,304
ii) In Deposit Accounts	2,600,000	2,600,000
(c) Stamps on hand	1,202	1,170
II. Grants Received		
(a) From Government of India	41,571,449	15,000,000
(b) From Government of India for execution of Wind Resource Assessment Project	2,000,000	225,000
III. Income on Investments		
IV. Interest Received		
(a) On Bank deposits	532,059	708,254
V. Other Income		
(a) Fees for services	5,739,855	3,125,000
(b) Income from publications	327,590	394,400
(c) Energy receipts	1,806,803	1,094,342
(d) Misc. income	29,393	40,978
VI. Amount borrowed		
VII. Any other receipts		
(a) Fees received in advance (Consultancy)	3,355,211	589,087
(b) Other advance	206,779	8,477
(c) Dues received from MNES	-	126,651
(d) Security deposit	15,510	-
(d) Service Tax	335,897	141,750
TOTAL	**61,433,802**	**29,798,413**

FOR THE YEAR ENDED 31ST MARCH 2003

PAYMENTS	Current Year	Previous Year
I. Expenses		
(a) Establishment Expenses (Corresponding to Schedule-10)	5,747,758	4,460,974
(b) Administrative Expenses (Corresponding to Schedule-11)	5,418,958	4,967,081
II. Payments made against funds for various projects		
(a) Wind Resource Assessment Project - 2002-2003	-	147,826
(b) North-Eastern Project	36,280	150,000
(c) Wind Energy Resource Survey Project	927,956	1,936,138
(d) Micro-survey & preparation of Master Plan	765,000	1,020,000
(e) Seminar & Information dissemination	98,029	
(f) R&D project expenses	45,153	
(g) HRD and manpower training	56,485	
(h) Advance for execution of projects	957,938	382,062
III. Investment and Deposits made		
IV. Expenditure on Fixed assets & Capital Work-in-Progress		
(a) Purchase of Fixed assets	4,360,219	2,738,436
(b) Expenditure on Capital Work-in-progress	16,025,862	3,107,855
(c) Advance on capital account	11,281,537	4,899,418
V. Refund of Surplus Money		
(a) Balance of Grants-in-aid to Government of India	-	154,237
VI. Other Payments		
(a) Refund of Security Deposits	15,510	7,200
(b) Expenditure on Consultancy Projects	1,033,632	25,343
(c) Advance & Deposits	262,002	6,995
(d) Dues from MNES	-	-
(e) Prior period expenses	755	7,592
(f) Advance to sub-contract services	-	269,000
(g) Advance to Group Gratuity Trust	-	5,000
(h) Service tax remittances	1,88,849	-
VII. Closing Balances		
(a) Cash in hand		
(b) Bank Balances		
i) In Current Account	7,289,264	2,912,054
ii) In Deposit Accounts	6,910,950	2,600,000
(c) Stamps on hand	11,665	1,202
TOTAL	**61,433,802**	**29,798,413**

For Centre for Wind Energy Technology

As per our Report attached
For K. Gnanandandulu & Co.,
Chartered Accountant

T. NAGESHA RAO	M.P. RAMESH	AJAI VIKRAM SINGH	K. NARASIMHAM
General Manager(F&A)	Executive Director	President / Chairman	Partner

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2003

(Amount in Rs.)

	Current Year	Previous Year
SCHEDULE 1 - CORPUS / CAPITAL FUND :		
Capital Fund (Grants-in-Aid)		
Balance as at the beginning of the year	20,224,726	23,023,751
Add : Grants-in-Aid received	43,571,449	15,000,000
Add: Grants received in kind (DANIDA)	3,876,247	-
Less: Transferred to capital reserve	3,876,247	5,932,922
Less: Grants for sponsored projects	2,256,053	2,959,057
Less: Book value of Assets sold	-	7,696
Less: Excess of expenditure over income	9,247,472	8,899,350
Balance at the end of the year (A)	**52,292,650**	**20,224,726**
Corpus Fund		
Balance at the beginning of the year	-	1,990,199
Add: Additions during the year	-	-
Less: Transfer to General Reserve	-	1,990,199
Balance at the end of the year (B)	**-**	**-**
TOTAL (A+B)	**52,292,650**	**20,224,726**
SCHEDULE 2 - RESERVES AND SURPLUS		
Capital Reserve :		
Balance at the beginning of the year	5,932,922	
Addition during the year	3,876,247	
	9,809,169	
Transfer from Capital Fund		5,932,922
General Reseve :		
Balance at the beginning of the year	2,910,950	1,990,199
Addition during the year	2,182,466	920,751
	5,093,416	
TOTAL	**14,902,585**	**8,843,872**

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2003

(Amount in Rs.)

	Current Year	Previous Year
SCHEDULE 3 - CURRENT LIABILITIES AND PROVISIONS:		
A. CURRENT LIABILITIES		
Sundry Creditors for expenses		
Expenses Payable	307,031	319,712
Salary payable	412,358	329,020
	719,389	648,732
Advances Received	5,444,191	2,088,980
Statutory Liabilities	3,00,084	148,834
Other Current Liabilities	338,016	139,178
TOTAL (A)	**6,801,680**	**30,25,724**
B. PROVISIONS		
Accumulated Leave Encashment	450,890	146,320
Bonus & Ex-gratia	42,499	39,622
Gratuity & Pension contribution	35,907	65,711
TOTAL (B)	**529,296**	**2,51,653**
TOTAL (A + B)	**7,330,976**	**3,277,377**

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2003

SCHEDULE - 4 FIXED ASSETS

(Value in Rs.)

Description of Assets	Gross Block				Depreciation				Net Block	
	As on 01.04.02	Addn.	Deln. 31.03.03	As on 31.03.03	Upto 31.03.02	For 2002-03	Deln.	Upto 31.03.2003	As on 31.03.2003	As on 31.03.2002
Land	163,170	-	-	163,170	-	-	-	-	163,170	163,170
Building	-	2,082,581	-	2,082,581	-	128,378	-	128,378	1,954,203	-
Furniture & Fittings	1,489,917	242,802	-	1,732,719	227,315	166,476	-	393,791	1,338,928	1,262,602
Instruments & Equipment	13,391,295	4,868,295	-	18,259,590	2,999,415	2,000,373	-	4,999,788	13,259,802	10,391,880
Computers	2,302,277	740,690	-	3,042,967	1,386,350	940,957	-	2,327,307	715,660	915,927
Vehicles	974,296	-	-	974,296	282,916	194,819	-	477,735	496,561	691,380
Infrastructure facilities	4,545,535	722,343	-	5,267,878	513,476	497,103	-	1,010,579	4,257,299	4,032,059
Total	**22,866,490**	**8,656,711**	-	**31,523,201**	**5,409,472**	**3,928,106**	-	**9,337,578**	**22,185,623**	**17,457,018**
Add: Capital Work in Progress	3,107,855	15,400,862	-	18,508,717	-	-	-	-	18,508,717	3,107,855
Add : Capital Stores in Transit	-	293,342	-	293,342	-	-	-	-	293,342	-
	25,974,345	**24,350,915**	-	**50,325,260**	**5,409,472**	**3,928,106**	-	**9,337,578**	**40,987,682**	**20,564,873**
Previous Year figures	**19,750,505**	**3,124,715**	**8,730**	**22,866,490**	**1,671,497**	**3,739,009**	**1,034**	**5,409,472**	**20,564,873**	-

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH, 2003

(Amount in Rs.)

	Current Year	Previous Year
SCHEDULE 5 - CURRENT ASSETS, LOANS & ADVANCES		
A. CURRENT ASSETS:		
Inventories		
Stock of stationeries	36,968	27,240
Cash Balances in hand		
Stamps in hand	11,665	1,202
Bank Balances:		
With Scheduled Banks:		
– On Current Account	7,289,264	2,912,054
– On Deposit Account	6,910,950	2,600,000
Sundry Debtors	858,095	-
TOTAL (A)	**15,106,942**	**5,540,496**
B. LOANS, ADVANCES AND OTHER ASSETS		
Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	16,085,955	4,899,418
b) Prepayments	90,594	54,223
c) Receivable from TNEB	345,531	218,868
d) Deposits	62,680	57,400
e) Others	1,795,427	1,009,201
Income Accrued:		
On Deposits with Bank	51,400	1,496
TOTAL (B)	**18,431,587**	**6,240,606**
TOTAL (A + B)	**33,538,529**	**11,781,102**

SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2003

(Amount in Rs.)

	Current Year	Previous Year
SCHEDULE 6 - INCOME FROM SALES / SERVICES		
Income from Services		
Fees for Professional and Consultancy Services	6,597,950	3,125,000
Energy receipts	1,933,466	1,313,210
TOTAL	**8,531,416**	**4,438,210**
SCHEDULE 7 - INCOME FROM PUBLICATION		
Sale of Books & Reports	52,390	241,200
Receipts from processing and handling Time-series data	275,200	153,200
TOTAL	**327,590**	**394,400**
SCHEDULE 8 - INTEREST EARNED		
On Term Deposits		
- With Scheduled Banks	532,059	708,254
TOTAL	**532,059**	**708,254**
SCHEDULE 9 - OTHER INCOME		
Insurance claims	-	6,866
Miscellaneous Income	29,393	34,112
TOTAL	**29,393**	**40,978**
SCHEDULE 10 - ESTABLISHMENT EXPENSES		
Salaries and Allowances	5,301,369	4,101,545
Bonus & Ex-gratia	40,911	38,034
Contribution to Provident Fund	349,904	305,455
Contribution to pension & gratuity	283,637	168,624
Staff Welfare Expenses	26,400	-
Medical Reimbursement	120,639	47,433
TOTAL	**6,122,860**	**4,661,091**

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE YEAR ENDED 31ST MARCH, 2003

(Amount in Rs.)

	Current Year	Previous Year
SCHEDULE 11 - OTHER ADMINISTRATIVE EXPENSES		
Labour Hiring Charges	455,114	373,430
Electricity and Power	204,546	135,133
Water charges	49,750	29,950
Insurance	60,885	34,304
Rates & taxes	5,550	-
Repairs and maintenance	834,775	236,155
Rent for Office building & Guesthouse	589,100	516,468
Vehicles Running and Maintenance	332,615	176,791
Postage & Courier	58,523	80,944
Telephone and Communication charges	425,101	441,095
Printing and Stationery	270,439	330,206
Travel and Conveyance	1,160,637	1,557,310
Expenses on Seminar & Meetings	227,520	263,836
Expenses on Books, Data & Periodicals	65,531	1,21,736
Expenses on Fees (Sitting Fees & Honorarium)	37,420	55,000
Auditors Remuneration	22,050	22,312
Hospitality Expenses	168,943	97,120
Professional Charges	33,600	29,400
Advertisement and Publicity	10,000	280,799
Training and Development	72,450	161,396
Office expenses & maintenance	92,605	76,460
Guest house maintenance	41,224	53,586
Freight & forwarding charges	39,269	-
Other expenses	61,014	28,190
TOTAL (A)	**5,318,611**	**5,101,621**
Consultancy Project Expenses		
Expenses on consultancy project **(B)**	**1,115,132**	**20,344**
TOTAL (A+B)	**6,433,743**	**5,121,965**

SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2003

(Amount in Rs.)

	Current Year	Previous Year
SCHEDULE 12 - PRIOR PERIOD EXPENSES		
Advertisement charges	-	-
Professional charges	-	-
Bonus & Ex-gratia	-	-
Reimbursement of Newspaper charges	755	171
Electricity charges	-	7,237
Calibration charges	-	7,300
Expenses on painting	-	30,784
	755	**45,492**
Less: Excess provision of Gratuity & Pension	-	7,116
TOTAL	**755**	**38,376**

SCHEDULE 13: SIGNIFICANT ACCOUNTING POLICIES

1. General information

1.1 The Centre for Wind Energy Technology (C-WET) is an Autonomous Institution of Ministry of Non-Conventional Energy Sources, Government of India. The C-WET is formed as a Society on 18th February 1998 and registered as a society under Section 10 of the Tamil Nadu Societies Registration Act, 1975 on 21st March 1998 with the object to serve as the technical focal point for Wind Power Development in India, support Research and Development Programme, assess Wind Resources, establish Standards, Testing and Certification of wind power systems, sub-systems and components and undertake Human Resource Development Programmes.

1.2 All the income, movable and / or immovable properties of C-WET are solely utilised and applied towards the promotion of objectives as set forth in the Memorandum of Association and no profit thereof is paid or transferred directly or indirectly by way of dividend, bonus, profit, or in any manner whatsoever, to the present or past members of C-WET or to any of them or in any manner through anyone or more of the members. No members of C-WET has any personal claim on any movable and/ or immovable properties of C-WET or make any profit whatsoever, by virtue of his / her membership of C-WET.

1.3 The Department of Scientific and Industrial Research, Ministry of Science and Technology, Govt. of India, vide their letter no. 11/378/2000-TU-V dated 16.03.2000 recognized Centre for Wind Energy Technology as a Scientific and Industrial Research Organisation for a period upto 31.03.2006. The Director of Income Tax (Exemptions), Chennai, vide order no. DIT(E) No. 2 (268) / 98-99 dated 21.10.1999, granted registration under section 12AA of the Income Tax Act, 1961, as Public Charitable Trust.

2. Accounting Convention

2.1 The financial statements are prepared on the basis of historical cost convention and on the accrual method of accounting.

2.2 The income on consultancy / professional projects has been accounted on the year in which the project is completed.

3. Fixed Assets

3.1 Fixed Assets are stated at cost of acquisition inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisition.

3.2 Fixed Assets received by way of non-monetary grants are capitalized at values stated, by corresponding credit to Capital Reserve.

4. Depreciation

4.1 Depreciation is provided on straight-line method as per rates specified in the Income-tax Act, 1961.

4.2 In respect of additions to / deductions from fixed assets during the year, depreciation is considered on pro-rata basis.

4.3 No depreciation is charged on the fixed assets received by way of non-monetary grants and land.

5. Grants-in-Aid from Government

5.1 Grants-in-aid from Government are accounted on realization basis.

5.2 Grants-in-aid received during the year from Government has been accounted under the head "Capital Fund".

6. Foreign Currency Transactions

6.1 Transactions denominated in foreign currency are accounted at the exchange rate prevailing at the date of the transaction.

7. Retirement Benefits

7.1 Gratuity liability for the employees of C-WET are covered under the Group Gratuity policy with Life Insurance Corporation of India. The premium paid towards the policy is charged off to revenue.

7.2 Provision towards Gratuity and Pension for the employees who are on deputation has been remitted / provided as per terms and conditions of deputation.

7.3 Provision for accumulated leave encashment to the employees is accrued and computed on the assumption that employees are entitled to receive the benefit.

7.4 Contributory Provident Fund Account of the employees of C-WET are maintained at the Office of the Regional Provident Funds Commissioner, Chennai. The contribution paid as per Act is charged off to revenue.

7.5 Provision for Non-productivity Linked Bonus has been provided based on the rules applicable for Autonomous Institutions.

8. Uniform Format of Accounts for Central Autonomous Bodies.

8.1 The accounts are prepared based on the Uniform Format of Accounts for Central Autonomous Bodies from the year 2001-2002.

8.2 In order to suit the requirements of Uniform Format of Accounts for Central Autonomous Bodies, the previous year accounts are regrouped / reclassified wherever considered necessary to make them comparable with current year's figures.

9. As desired by the Ministry of Non-Conventional Energy Sources, Government of India, the salary expenditure and project consultancy expenditure are being met from the internal sources generated by C-WET. The balance of revenue after meeting the expenditure is transferred to General Reserve Fund.

SCHEDULE 14: NOTES FORMING PART OF ACCOUNTS

1. Contingent liabilities:

Contingent liabilities not provided for: NIL (previous year NIL)

2. Capital commitments:

Government of Tamil Nadu granted permission to enter-upon land measuring about 4.41 acres at Survey No. 657/1A2 at Pallikaranai Village, Tambaram Taluk, Kancheepuram District for construction of Campus and possession of the land was taken in March, 2001. The value of land is yet to be ascertained. The construction management is entrusted with CPWD. A sum of Rs. 334 lakhs has been deposited towards the construction activities. The civil and internal electrification works are under progress. The expenses incurred for architect's fee, earth-filling etc., are accounted under Capital Work-in-Progress.

The tentative date for completion of the building is 31-10-2003. The balance amount of deposits has been accounted under the head Advance to Capital Accounts.

Capital Work in Progress

Sl.No.	Particulars	Amount (Rs.)	
1.	Utilized for construction as per CPWD Certificate as on 31-03-2002	21,95,582/-	
	Add : Current year addition	1,84,42,304/-	
	Less : March Month Utilizaiton (Since, U.C. received on 23.04.2003	29,33,646/-	1,77,04,240/-
2.	Payment to Consultant Architect as on 31-03-2002	1,12,000/-	
	Add : Current year additions	4,95,454/-	6,07,454/-
3.	Other payments as on 31-03-2002	1,75,273/-	
	Add : Current year additions	21,750/-	1,97,023/-
	Capital WIP as on 31-03-2003		1,85,08,717/-

Tamil Nadu Energy Development Agency granted permission to enter-upon land measuring about 8.64 acres at Ayyanaruthu and Panikerkulam Village, Kovilpatti Taluk, Thoothukudi District for establishment of Wind Turbine Test Station and the land was taken during March, 2000. The value of land is yet to be ascertained. In-addition, land measuring about 4.81 acres has been purchased from private parties and registered in the name of C-WET, during March, 2000. The construction management of the office-cum-workshop was entrusted with CPWD. The construction was completed during August, 2002 for a total value of Rs. 20.83 lakhs.

3. Current Assets, Loans and Advances:

In the opinion of the management the current assets, loans and advances have a value on realization in the ordinary course of business, equal at least to the aggregate amount shown in the Balance Sheet.

4. Taxation:

In view of there being no taxable income under the Income Tax Act, 1961, no provision for income tax has been considered necessary.

5. **Foreign Currency Transaction:**

(a) A sum of Rs. 154 lakhs has been received from RISO, Denmark in Foreign Currency towards reimbursment of travel expenses incurred for expert training and planning programme undertaken at RISO National Laboratory to Study the Danish and International Practice of monitoring wind turbine system performance and also to study Wind Energy Centre operation.

(b) A sum of Rs. 4.01 lakhs has been spent in foreign currency towards purchase of instruments & equipments.

6. **Remuneration to Auditors:**

As Auditors	Rs. 12,600/-
For tax audit	Rs. 3,150/-
For Services	Rs. 2,100/-
For Certification	Rs. 4,200/-

7. (i) The value of instruments worth Rs. 38,76,247/- received by way of non-monetary grants from RISO, Denmark has been shown under Capital reserve.

(ii) Excess of expenditure over income transferred to Capital Fund Account.

(iii) Advance includes :

(a) Imported software WAsP Rs. 79,125/- from M/s. RISO Denmark not put into use since it was received at the fag end of the financial year.

(b) Import of software (Surfer) from M/s. Golden Software USA Rs. 31,402/- not received as on 31-03-2003.

(iv) Software purchased for Rs. 5,91,690/- towards establishment of R&D Lab has been capitalized (under computer) and depreciation charged.

(v) An imported material of Rs. 2,93,342/- kept in Capital WIP (instrument & equipment A/c) transferred to Capital Stock in transit since received on 10.04.2003.

8. The Ministry of Non-Conventional Energy Sources vide letter no. 51/18/2000-WE(PG) dt.05.07.2002 permitted to retain the sale proceeds of Wind Energy Resource Survey data, Handbook and Micro-survey reports and accordingly the same has been accounted under the head income. The number of Handbook on Wind Energy Resource Survey in India and Micro-survey reports available in stock as on 31.03.2003 is 925 (Volume-V:344; Volume-VI:146 and Micro-survey reports: 435).

9. The value of fixed assets as on 31.03.2003 in different locations are furnished below:

GROSS VALUE OF ASSETS (Value in Rs.)

Sl. No.	Description of Assets	C-WET Chennai	WTTS Kayathar	WRA Projects	Total
1.	Land	-	1,63,170	-	**1,63,170**
2.	Building		20,82,581		**20,82,581**
3.	Furniture & Fittings	15,88,807	93,462	50,450	**17,32,719**
4.	Instruments & Equipment	20,48,743	106,11,418	55,99,429	**1,82,59,590**
5.	Computers	29,84,163	6,200	52,604	**30,42,967**
6.	Vehicles	4,91,014	4,72,582	10,700	**9,74,296**
7.	Infrastructure facilities		52,67,878		**52,67,878**
	Total	**71,12,727**	**1,86,97,291**	**57,13,183**	**3,15,23,201**

NET VALUE OF ASSETS (Value in Rs.)

Sl. No.	Description of Assets	C-WET Chennai	WTTS Kayathar	WRA Projects	Total
1.	Land	–	163,170	–	**163,170**
2.	Building	–	19,54,203	–	**19,54,203**
3.	Furniture & Fittings	12,20,194	83,206	35,528	**13,38,928**
4.	Instruments & Equipment	11,37,685	104,46,626	16,75,491	**132,59,802**
5.	Computers	7,15,654	1	5	**7,15,660**
6.	Vehicles	2,13,427	2,78,630	4,504	**4,96,561**
7.	Infrastructure facilities	–	42,57,299	–	**42,57,299**
	Total	**32,86,960**	**1,71,83,135**	**17,15,528**	**2,21,85,623**
8.	Capital Work in progress	1,85,08,717	–	–	1,85,08,717
9.	Captial stores in Transit	2,93,342	–	–	2,93,342
					4,09,87,682

WRAP assets of Bangalore have been transferred to WRA, Chennai since entire operation was shifted to C-WET, Chennai and the assets are included in C-WET account.

10. The balance of revenue after meeting the salary and consultancy project expenditure is transferred to General Reserve Account, as shown below:

Income generated		94,20,458
Less: Salary component	61,22,860	
Consultancy Project expenses	11,15,132	72,37,992
Balance transferred to General Reserve Account		**21,82,466**

11. The details of utilization of Grants-in-aid received from Government of India are furnished below:

(Value in Rs.)

Details	**Balance as on 01.04.02**	**Receipts**	**Utilized**	**Balance as on 31-03-2003**
North-Eastern Project	–	20,00,000	36,280	19,63,720
Central financial assistance for C-WET	109	415,71,449	401,99,894	13,71,664
Total	**109**	**435,71,449**	**402,36,174**	**33,35,384**

The details of utilization of Central Financial Assistance are:

Execution of Wind Energy Assessment Project	9,27,956
Micro-Survey and Preparation of Master Plan	7,65,000
Execution of other projects	1,99,667
Advance for execution of projects	9,57,938
Administration expenses	54,19,713
Capital Expenditure	316,67,618
Advances & Deposits	2,62,002
Central financial assistance utilized	**401,99,894**

12. As per agreement entered into with the client / manufacturers, C-WET is entitled to retain the entire energy receipts realized from Tamil Nadu Electricity Board from the financial year 2002-2003.

13. 90% of the Provisional Type Testing fee of Rs. 36.11 lakhs has been taken to C-WET's revenue account for the year 2002-2003 on completion of First Phase of the work.

14. The figures shown in the accounts are rounded off to the nearest rupee.

15. Schedule 1 to 14 are annexed to and form an integral part of Balance Sheet as at 31st March, 2003 and Income and Expenditure Account for the year ended on the date.

Signatures to Schedule 1 to 14

For Centre for Wind Energy Technology

As per our Report attached
For K. Gnananandulu & Co.,
Chartered Accountant

T. NAGESHA RAO	M.P. RAMESH	AJAI VIKRAM SINGH	K. NARASIMHAM
General Manager(F&A)	Executive Director	President / Chairman	Partner

Place : Chennai
Date : 29.08.2003

CENTRE FOR WIND ENERGY TECHNOLOGY

(An Autonomous Institution of Government of India)

Chennai - 600 101.

Notice is hereby given that the Fifth Annual General Meeting of the Members of Centre for Wind Energy Technology (Registration No. 72 of 1998) will be held at Conference Hall of Centre for Wind Energy Technology, R-8, North Main Road, Anna Nagar West Extension, Chennai – 600 101 on Friday the 29th day of August, 2003 at 2.30 P.M., to transact the following business:

1. To receive, consider and adopt the Annual Report for the year 2002-2003, audited Balance Sheet as at 31st March, 2003, Receipts and Payments Account and Income and Expenditure Account for the year ended as on that date and Reports of the Auditors thereon.

2. To consider appointment of Auditors for the year 2003-2004.

For Centre for Wind Energy Technology

(M.P. Ramesh)

Executive Director

Place : Chennai

Date : 07.08.2003

CAMPUS For CENTRE FOR WIND ENERGY TECHNOLOGY at Pallikaranai, Chennai.

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