

pavan

A news bulletin from the Centre for Wind Energy Technology

inaugural issue
July 2004



विलास मुत्तेमवार
Vilas Muttemwar



राज्य मंत्री (स्वतंत्र प्रभार)
अपारंपरिक ऊर्जा स्रोत
भारत सरकार
नई दिल्ली - 110 003
Minister of State (Independent Charge)
Non-conventional Energy Sources
Government of India
New Delhi - 110 003

Message

I am pleased to note that the Centre for Wind Energy Technology, an autonomous institution of this Ministry, has commenced the publication of a newsletter "PAVAN" meant for dissemination of information on wind energy and its applications with focus on Indian and regional development. Such a publication will go a long way in bringing out the achievements India has made in this field. It should highlight and inform the general public about the rapid progress India is making in the development and deployment of wind energy converters and their applications. I congratulate C-WET on this occasion.

Vilas Muttemwar



Message

I congratulate the Centre for Wind Energy Technology on this occasion of having started the publication of a quarterly newsletter meant for highlighting events, landmark achievements and future trends in the field of wind energy utilization. With wind generated electric power finding a place in the energy mix of many state electricity utilities, it is very important that factual information from within this vibrant and successful renewable energy technology is made available to planners, technocrats and the general public. I am sure that this publication will promote the cause of wind power development and deployment in a healthy manner.

A.M. Gokhale
Secretary, Government of India
Ministry of Non-conventional Energy Sources

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editorial...

Wind as a source of energy has been employed from time immemorial although we do not consciously recognize this fact. Ships have been propelled across vast seas using sails that caught winds. Medieval economies have flourished exploiting wind energy.

During this period, windmill mechanics and owners were considered important members of the community. A portion of Holland was reclaimed from sea, windmills of that era playing a crucial role in this reclamation. Today, we have come a long way from those days when wind energy, where available, was used to run large grid-connected wind turbines for captive power generation. The best part is that though Electricity Boards have been publishing installed wind power capacity as part of their power supply mix, wind energy is still at the bottom of the list. For C-WET, it is at the top.

While windmills are addressed at the rural sector, wind turbines serve the industrial and commercial sectors. There has been a shift from the days of high-risk venture capital financing in wind to the present situation where the wind power sector is being wooed by financial agencies as a safe investment. It may not be out of place here to mention a few names and organizations that had the vision and grit to make India the fifth among wind power generating countries in the world and the first among developing countries. Starting with Mr Maheshwar Dayal, the first secretary of the then DNES, to Dr J. Gururaja and Mr Ajit K. Gupta, a host of others have stood by the field. Dr V. Bhaktavatsalam gave this field a corporate culture of the highest quality. Then there were quite a few subject experts such as Ms Anna Mani, Dr S.K. Tewari, and Mr N.V.C. Swamy, who provided the content. One name that is little heard of in the list of luminaries is that of Dr P. Neelakantan, founder Director of the National Aeronautical Laboratory who, among his various other achievements, had mentioned in one of his reports way back in the 1960s that Aralvoimozhi pass was an area that could use a large number of windmills. All wind enthusiasts know this location today. Of course, India has always produced enthusiastic industrialists – many of them have promptly taken up wind power generation. Electricity Boards, in general, have been supportive of wind power development.

With so much happening in the field today, a focused newsletter that will provide a platform for exchange of information and news and serves as a tool for spreading authentic and interesting information to a wide cross-section of the society, is being published by C-WET. Towards this end, we need your help and continued support. Write to us, participate in debates, and let us together boost a technology that has come to stay.

M.P. Ramesh
Executive Director

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FORTHCOMING EVENTS

New Zealand Wind Energy Conference 2004

July 15-17, 2004

Contact: James Glennie, CEO, NZWEA

Email: james@nzwea.org.nz

Website: www.windenergy.org.nz

SAIRP 2004 – International Seminar on Solar

Architecture: Building Integrated and Retrofit Photovoltaics

22-23 July 2004

National Academy of Construction, Hyderabad, India

Organised jointly by: National Academy of Construction, and Solar Energy Society of India

Contact: The Organising Secretary, SAIRP 2004

Institute of Architecture and Design

National Academy of Construction

Kondapur Post, Cyberabad, Hyderabad — 500 032, India

Tel: (91) (40) 23111915-18 Ext: 2077/2078

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E-mail: nac@satyam.net.in nac_iad@yahoo.com

Plant Modification (De-bottlenecking) for Performance and Profit Margin Improvements

25-26 August 2004

JW Marriott Hotel, Kuala Lumpur

Contact: Nancy Phua, Event Executive

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The Centre for Wind Energy Technology: A Profile

Energy from wind holds high promise in India as a non-conventional energy source that can supplement grid power generation. To help develop and accelerate the pace of utilization of wind energy in the country, the Ministry of Non-conventional Energy Sources (MNES) set up the Centre for Wind Energy Technology (C-WET) in Chennai as an autonomous institution of the Government of India. A Wind Turbine Test Station with technical and partial financial support by DANIDA, Government of Denmark, was established at Kayathar, in Thoothukudi District, Tamil Nadu, as an integral part of the Centre. C-WET is envisioned to serve as a technical focal point of excellence to foster the development of wind energy in the country.

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, coordinate 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,

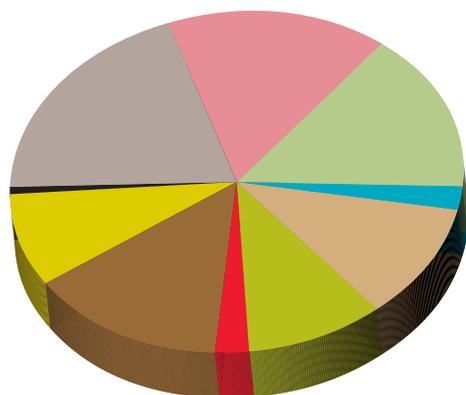
Mission

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 to promote export of products and services to other countries.

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 such as power performance, power quality, noise level, dynamics, and operation and safety systems are 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 personnel

Wind energy potential in India



* Assuming 1% land availability towards power generation in potential areas at 50m level.

working in the wind energy sector.

- To promote commercial exploitation of know-how and know-why results and offer various consultancy services to the customers.
- To promote the development and commercialization of any other wind energy systems including stand-alone systems.

Management Structure

The Governing Council (GC), consisting of 12 members appointed by the Government of India, is the highest policy-making body of C-WET, to provide direction and advice. The Governing Council is assisted by the Management Committee, Finance Committee, and Research and Development Council.

The Secretary, Ministry of Non-Conventional Energy Sources, Government of India, is the ex-officio President of the Society and also ex-officio Chairman of the Governing Council.

The affairs of the Society are managed and administered in accordance with the Memorandum of Association and the Rules and Regulations of the Society approved by the Government of India.

The Executive Director is the executive head and is assisted by unit heads.

Organisational Structure and Services Offered

C-WET comprises five interactive units that offer total and integrated solutions to its clients and users in the wind energy sector. These are listed below:

Research and Development

- The R&D Unit of C-WET focuses on innovations in development of components as well as sub-systems of wind turbines in association with other R&D institutions and industry.
- The R&D activities of C-WET are classified into 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.

Wind Resource Assessment*

- The Wind Resource Assessment Unit conducts wind resource surveys for effective harnessing of wind energy and analysis of collected data to identify high wind areas at macro/micro-level and provide support in micro-siting.

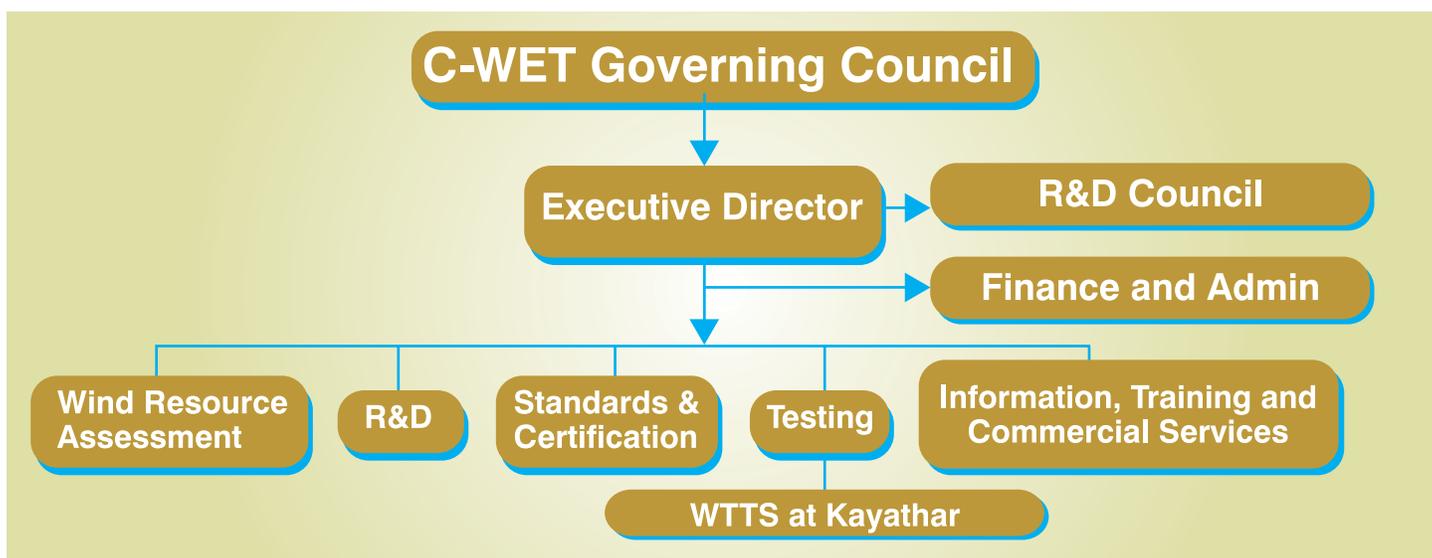
- Carry out countrywide Wind Resource Assessment and prepare an Indian Wind Atlas.
- Consultancy services for feasibility studies, micro-siting and preparing DPRs through state-of-the-art software tools to wind farm developers.

Testing*

- Conduct testing of complete wind power systems according to international standards and Type Approval Provisional Scheme (TAPS-2000) at Wind Turbine Test Station with infrastructural facilities using sophisticated data acquisition systems and instruments.
- Conduct power performance test at wind farm sites using mobile equipments.

Wind Turbine Test Station (WTTS), Kayathar

C-WET has established a test facility at its Wind Turbine Test Station (WTTS), Kayathar, where Wind Turbine Generator Systems (WTGS) can be tested according to international standards. WTTS is presently equipped to undertake Provisional Type Testing (PTT) of wind turbines of the client manufacturers at this test station. Under this category, the following tests are normally carried out as per international standards of IEC-



* For information on the types of projects implemented, write to C-WET.

61400–Part 1,12 & 13 and Danish recommendations:

- Power Performance Test
- Safety and Function Tests
- Yaw Efficiency Test
- Load Measurements

Facility at WTTS

- Two test beds, one with a capacity to test wind turbine up to 1,250 kW and the other with a capacity up to 400 kW.
- Readily available grid connection.
- Two met masts in front of each test bed for recording the wind data at the hub height of the test turbine.
- Two control rooms, one for each test bed with latest data acquisition systems and one office building.
- In-house laboratory for calibration and check-up of instruments.

Standards and Certification*

- Develop and establish certification systems. Accord type approval/type certification to wind turbines upon design

verification in accordance with TAPS-2000.

Taking into consideration the Indian conditions, especially wind and grid conditions, the certification scheme for India, viz., Type Approval – Provisional Scheme (TAPS-2000) has been developed in line with international standards. The scheme was approved and issued by the Ministry of Non-conventional Energy Sources, New Delhi. As per TAPS-2000, the Provisional Type Certification (PTC) is being carried out under three categories, as detailed below:

- Category–I: PTC for wind turbine generators already possessing valid type certificate or approval.
- Category–II: PTC for wind turbine generators already possessing valid type certificate or approval with minor modifications/changes, including PTT/measurements at the test site of C-WET.
- Category–III: PTC for new or significantly modified wind turbine generators including PTT/measurements

at the test site of C-WET.

- Prepare and establish standards.

Preparation of standards on wind turbines in line with international standards (IEC) in the form of National Application Documents (NADs) to be used in association with corresponding IEC standards has been completed for their wind stations.

Information, Training and Commercial Services

- Establish and update the data bank and serve as information centre for selective dissemination.
- Collate and disseminate information from other research activities/institutions.
- Conduct training programmes, and international/national seminars and workshops.
- Offer consultancy service to all categories of clients and users in the wind energy sector.

For current activities, see next page.

An artist's view of the new campus for Centre for Wind Energy Technology at Pallikaranai, Chennai.



* For information on the types of projects implemented, write to C-WET.

Current Activities

Developments in R&D Unit

In-house Projects

- Grid related investigations of wind farms: C-WET will carry out mathematical simulation as well as experiments simulating field conditions in laboratory with necessary inputs from industry.

External Projects

- Failure analysis of gearboxes of wind turbines: The project has been completed by the Centre for Energy Technology, Osmania University, Hyderabad.
- Proposal on blade development: The R&D Council of C-WET, during its Seventh Meeting, has approved the proposal on blade development submitted by the National Aerospace Laboratories, Bangalore.

Projects sponsored by the Ministry of Non-Conventional Energy Sources (MNES)

- Parameterization of flow distortion around the wind turbine nacelle: C-WET has submitted a proposal to MNES for approval.
- Scanning of wind profiles in Palghat gap: C-WET has submitted a proposal to MNES for approval.

Establishment of R&D Laboratory

The following equipments/software have been procured: (1) MATLAB with SimPowerSystems; (2) AutoCad Mechanical 2004; (3) Bladed Software. Procurement of MATLAB toolboxes (SimMechanics, control system toolbox, simulation performance toolbox), Data Acquisition System and sound level meter is under progress.

Move on in WRA Unit

In-house Project

Wind Energy Resource Survey

- Thirty-two Wind Monitoring Stations

are operational under the Wind Energy Resource Survey Programme covering nine states and one union territory.

- One Wind Monitoring mast of 50 m height is operational to measure the wind shear at Vankusavade in the Satara district of Maharashtra under the National Wind Resource Survey Programme.

Micro-Survey on Wind Resources

Micro-survey study of 97 Wind Monitoring Stations completed and reports are available for sale.

Northeastern Project: Northeastern India is endowed with low-level wind resource potential compared to the other regions of the country as per general climatological considerations. It was therefore felt that the conventional approach for selecting sites in this region might not yield good results. Realizing this, a “Special Programme” was initiated to locate windy sites in this region including Sikkim. A project was sanctioned by MNES in January 2003 for 21 sites in the state of Arunachal Pradesh, Mizoram, Manipur, Tripura and Assam. The works of commissioning of the 21 stations are in various stages of progress.

Wind Resource Assessment in uncovered/new areas: Under the Wind Energy Survey Programme in various states, specific regions in some were left out owing to low wind resources availability in the region. In order to scientifically investigate this, MNES has sanctioned this project in 12 states for commissioning of 22 stations with 50 m tall masts. The stations are expected to be commissioned by May 2004.

Steps Forward in Testing Unit

The testing unit of C-WET has completed two projects relating to Provisional Type Testing, one of 1,250 kW pitch regulated wind turbine of Suzlon make and the other of 250 kW stall regulated wind turbine of TTG make, both at the Wind Turbine Test

Station, Kayathar.

In addition, the testing unit completed two more projects relating to power performance measurement on two wind turbines at site: one, on a 1,000 kW pitch regulated wind turbine at Jaisalmer and second, on a 230 kW stall regulated and variable speed wind turbine of Enercon make in Karnataka state.

Currently, the testing unit is programming to take up Provisional Type Testing on two wind turbines during the wind season of 2004 at the clients' site.

Marching Ahead in S&C Unit

- S&C Unit is carrying out Provisional Type Certification for four models of wind turbines.
- TAPS-2000 with amendments and approved by MNES is being implemented.
- Selection of wind turbines for certification during the current year is in progress. Site selection for wind turbines to be taken up for certification has been carried out.

Highlights from ITCS Unit

Academic

In view of the growing need for qualified manpower in the wind energy sector both at the national and international level, it is necessary to start a masters level course in wind energy in universities/colleges. This may help to get suitable manpower in the wind industry/universities/research institutions. Hence, a syllabus committee has been formed under the chairmanship of Prof Sujay Basu, Director, School of Energy Studies, Jadavpur University, Kolkata to draw up a suitable curriculum, which in turn will be recommended to colleges and universities for implementation.

Intranet

Efforts are on to set up an intranet facility on the campus for flawless communication.



International Training Programme on “Wind Turbine Technology and Applications”

The Centre for Wind Energy Technology (C-WET) had organized an international training course on “Wind turbine technology and applications” during 9-20 February 2004 sponsored by MNES, Government of India. It was designed to help the countries in the region of Asia and Africa in wind farm development. The objective of the training course was to transfer knowledge and special skills needed by the wind energy personnel working in the technical and operational fields and to share the experiences from the lessons learnt over the last two decades. The course provided an invaluable platform for dialogue and open exchange of views and experiences. The course content for the training was a carefully thought out syllabus with subject experts giving lectures and quoting specific case studies.

The training programme was inaugurated by Mr Ajit K. Gupta, Adviser, MNES and the keynote address was delivered by Dr A. Raza (MNES). Eminent speakers from the wind energy sector conducted grueling yet enlightening sessions covering the entire gamut of wind energy technology. Apart from theoretical concepts, visits to manufacturing facilities were organized during the course to give a complete picture of the know-how and process to go about setting up a coordinated wind energy programme at a national level.

To make the training more interactive, the course participants were asked to make a presentation on “Country Policies and Perspective on Wind Energy”, summarizing the learning at the training programme and their vision ahead.

The training programme was well received and many more are being organized on the same lines in the near future.



Participants at the C-WET office – Chennai.

Issues addressed by the training programme

- Wind resources: physics and estimation
- Wind turbine technology and grid integration
- Wind turbine testing
- Standards and Certification
- Wind diesel hybrid systems
- Implementation of wind power projects:
 - Planning including design of wind farms
 - Installation and commissioning
 - Post installation activities including O&M
- Financing opportunities
- CER related issues via-a-vis wind turbine technology
- Cost benefit analysis of wind energy projects
- Field visits to:
 - Wind turbine manufacturing plants
 - Wind turbine testing station and wind farms
 - Wind turbine blade manufacturing facility



Participants at a factory visit of NEG Micon – Chennai

Wind Energy for Water Pumping and Off-grid Power Generation

Wind energy can be harnessed for water pumping and off-grid power generation in decentralized mode, using water pumping windmills, aerogenerators (small wind electric generators) and wind-solar hybrid systems. The Ministry of Non-Conventional Energy Sources (MNES) is implementing a programme to promote these systems.

Water Pumping Wind Mill

The most commonly used windmills have horizontal axis rotor with 12-24 blades mounted on the top of a tower (10-20 m high) made of mild steel. It starts lifting water at a wind speed of about 8-10 km per hour and is capable of pumping water in the range of 10,000-25,000 litres per day. The unit cost of a water pumping windmill varies from Rs 35,000 to Rs 90,000 depending on its type.

MNES provides Central Financial Assistance (CFA) to the beneficiaries through state nodal agencies (SNAs) up to 50 per cent of the ex-works cost, subject to upper ceilings of Rs 20,000-40,000 depending upon the type of windmill. For unelectrified islands, CFA up to 90 per cent of the ex-works cost, subject to the upper ceiling of Rs 30,000-80,000, is provided.

Aerogenerator

An aerogenerator is a small wind electric generator up to unit capacity of 30 kW, which can be installed in stand-alone mode. It mainly consists of a rotor having 2-3 blades, permanent magnet generator, control devices, yaw mechanism, tower, storage battery, etc. The unit cost of the system is approximately Rs 200,000 per kW.

Wind-Solar Hybrid System

When a wind electric generator and solar photovoltaic system are interfaced, the power generated from them can supplement each other. The resultant hybrid system can offer a reliable and cost-effective electric supply to users in decentralized mode. The unit cost of the system is approximately Rs 250,000 per kW.

CFA is provided to the beneficiaries through SNAs. CFA of 50-90 per cent of ex-works cost of the system subject to a maximum of Rs 125,000-240,000 per kW, depending on the nature of beneficiary and area of installation, is provided for installing the aerogenerator and wind-solar hybrid systems.

For details, contact:

State Nodal Agency OR
Director (WE), Ministry of Non-Conventional Energy Sources
Block-14, CGO Complex, Lodi Road, New Delhi – 110 003



C-WET has shifted

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Chennai – 601 302; Tel: +91-44-2501 7984
Web: www.cwet.tn.nic.in

Location Map of C-WET
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Pallikaranai
Chennai 601 302
Ph: 2501 0049

Distance
Airport to C-WET 14 km
Central Railway station to CWET 17.6 km

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