वार्षिक प्रतिवेदन
Annual Report
2012 - 2013

C-WET

पवन ऊर्जा प्रौद्योगिकी केन्द्र
Centre for Wind Energy Technology

An Autonomous R & D Institution, Ministry of New and Renewable Energy, Government of India

नवीन और नवीकरणीय ऊर्जा मंत्रालय, अधीन स्वायत्त अनुसवधान एवं विकास संस्था, भारत सरकार

माननीय नवीन और नवीकरणीय ऊर्जा मंत्री, डॉ. फारुक अदुल्ला द्वारा 28 नवंबर, 2012 को सी–वैट का भ्रमण और सौर विकिरण संसाधन निरर्धारण (एसआरआरए) सुविधा राष्ट्र को समर्पित ।

Hon'ble Union Minister for New & Renewable Energy, **Dr. Farooq Abdullah** visited **C-WET** on 28th November 2012 and **dedicated** the **Solar Radiation Resource Assessment** (SRRA) facility to the **Nation**

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ISO 9001 : 2008

Centre for Wind Energy Technology

An Autonomous Research & Development Institution
Ministry of New and Renewable Energy, Government of India
Chennai - 600 100 - India

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Executive Director's Report

Centre for Wind Energy Technology (C-WET) proactively plans and executes various programmes within the objectives of the centre, in the development of wind power sector in the country. Year after year, C-WET's experience has been very fruitful in providing value added services to all wind energy stakeholders and has been in the forefront to ensure orderly development of wind power sector in the Country. In addition, C-WET is all set to provide authentic Solar Radiation Resource data also to Solar Project developers and stake holders, in a mission mode.

Wind Resource Assessment, Micrositing, Due-diligence Analysis of wind power projects, feasibility and Detailed Project Report (DPR) preparation, Wind Turbine Testing, Certification, Evaluation of Certificates, Research and Development with institutional collaboration, preparation of standards, release of RLMM list, empanelment list of Small Wind Energy Systems (SWES) and their field performance testing are some of the highlights of C-WET's activities, Significant efforts have been initiated by C-WET through research proposal as well as National and international ITEC/SCAAP (MEA) sponsored training programmes in imparting the much needed training and human resource development for the wind energy industry of India. With the SRRA mission mode project executed by C-WET, it contributes to research in other renewable energy areas as assigned by MNRE; C-WET's efforts towards initiation of Indian Offshore Wind Resource Assessment Project at Dhanushkodi, finalizing Offshore Policy, modernizing resource assessment merging latest IT and communication techniques along with research infrastructure development at Kayathar as well as at Chennai are special developments in this year.

During the year 2012-13 the significant activities by the various units are as under:

Research And Development Unit

C-WET's R&D programme is co-ordinated multi-institutional research activity initiated through request for proposal (RFP), review by experts & approval by Research and Development Council of C-WET. Three of the first set of RFP projects are nearing completion, closely monitored by periodical reviews and milestones achieved under each project. The progress in the areas of power evacuation studies for grid integrated conversion systems, power quality issues in grid integrated wind farms and identification of remedial measures and a small project on "Every Body's Battery Charger" are in advanced stages of completion. The project on "Study and control of weak grid connected matrix converter based DFIG system" and two projects for "Human Resource Development and Capacity Building in Wind energy" at PSG college of Technology and Amrita Vishwa Vidyapeetham University are progressing as per the schedule. Two batches of students have completed specialized courses

under this programmes at PSG College, Coimbatore and the second batch is under progress at Amrita Vishwa Vidyapeetham University.

The academic project on "Study of Experimental characteristics of wind turbine blade over full 0 – 360 degree of attack" has been focusing at Park College of Engineering and Technology involving wind turbine tests on NAL developed aerofoil shapes. The data collection in the in-house project on the "Health/Condition Monitoring on the 2 MW R&D Experimental Wind Turbine at WTRS facility, Kayathar" has been remotely monitored in this windy season. The results of the analysis would throw highlights on the significance of online monitoring of wind turbine performance related parameters.

The R&D Unit is also processing small wind turbines for nearly 8 machines with rated capacities varying from 0.6 kW to 5.4 kW at WTRS, Kayathar. Installation and commissioning for 2 models are in progress, Documentation are under review for 6 models.

Wind Resource Assessment Unit

Wind resource have been measured at 703 locations cumulatively till 31.03.2013 & 236 stations have been found to have wind power density in excess of 200 W/m^2 at 50 m above ground level. Over 118 consultancy projects involving micro-siting, verification of data collection procedure and some for preparation of due diligence report. 6 new monitoring stations have been installed under consultancy projects.

The contract on erection and commissioning of 100 m tall guide mast for Offshore Wind Resource Assessment project at Dhanuskodi, Rameshwaram, Ramanathapuram District has been awarded to M/s KEC International and the work is in progress.

Wind shear measurement with 120 m tall mast at Kayathar is in progress with civil foundation, erection and commissioning activities.

MNRE sanctioned 75 locations for wind resource assessment with 100 m mast for validation of wind atlas predicted potential of 103 GW in 7 States of India. The site identification in co-ordination with SNA for NOC has been in progress and as on March, 2013, 21 Masts are erected in 3 States. Procurement of instrumentation and sensor are in progress.

As on March 2013, 92 wind monitoring stations are in operation in 15 States and 1 Union Territory. In 2012-13 a total of 38 wind monitoring stations have been commissioned in 10 States.

The Unit also is working with wind forecasting integrating NCMRWF model to reduce the error. A set of measurements at Kayathar using SODAR and LIDAR and met-mast have been carried out towards understanding the wake behind wind turbine. A Computational Fuild Dynamics (CFD) simulation and analysis is in progress.

Two special training programmes for officials of SNAs, one at C-WET, Chennai during 15^{th} -16^{th} October 2012 and the other at Guwahati, Assam during 9^{th}-10^{th} January 2013 specially for SNA's from North-East Regions have been completed.

Wind Turbine Testing Unit

A test facility at WTTS, Kayathar where Wind Turbine can be tested according to international standards IEC 61400-12-1,13,1 is equipped to undertake type testing and testing of wind turbines. An Inter Laboratory Comparison (ILC) for Power Curve Measurements has been completed as per the requirements of IEC 61400-12-1 between C-WET and NREL, USA under the project

"NREL-C-WET", ROUND ROBIN 2011 involving proficiency testing. Two wind turbines, one from M/s Elecon 600 kW and the other Garuda 700 kW have been taken up for testing, data analysis and reporting during this period. An agreement has been signed with M/s Jyothi Limited. An Inter Laboratory Comparison (ILC) with 18 laboratories around the World has been taken up for power curve measurements as per the requirements of IEC 61400-12-1 under the IEC TC 88 CAC Advisory sub-committee on test laboratories. The results of 18 laboratories were analyzed by NREL, USA and sent back to C-WET for necessary action. With NABL accreditation for wind turbine testing along with ISO 17025 compliance C-WET's test reports are recognized for wind turbine performance evaluation by Internationally Accredited Certification Bodies.

Wind Turbine Research Station

C-WET owned R&D infrastructure machines at Kayathar comprises of first generation 9 WTGs of 200 kW capacity which are 22 years old and in operation, one 600 kW constant speed WTG, and one latest generation WTG of 2000 kW (variable speed) capacity are kept in operation with continuous monitoring for research on experimental techniques and measurements. A novel battery operated vehicle has been converted by the technical staff of WTRS, C-WET for solar charging instead of charging from grid. This people-cum-material mover in the site can be operated by any unskilled person and it is fully now powered with solar energy showcasing the carbon emission reduction possible in avoiding fossil fuel powered vehicles. Inauguration of the battery operated vehicle by Shri Anil Jain, Member Planning Commisssion (Energy) and Shri Alok Srivastava, Joint Secretary (WE), MNRE need special mention. The technical staffs and materials required for O&M/Testing/R&D activities at WTRS are being successfully transported within the campus by Solar Powered Battery Operated Vehicle and the results are very encouraging. During this period two Swedish delegation involving SIDA-Life Academy Course participants visited the Station. Several students have come and visited the WTRS facilities as part of their industrial visit.

Standards and Certification Unit

Standards and Certification unit is implementing TAPS 2000 (amended) for certification of Wind Turbines which has been prepared in line with requirements of international standards taking into account of Indian External and GRID conditions. S&C unit has completed renewal of certificates for four Wind Turbine models, 2 of M/s RRB Energy and 1 of M/s Southern Wind Farms Limited. Bureau of Indian Standards (BIS) has formulated Wind Turbine Sectional Committee (ET 42) for preparation of Indian Standards on Wind Turbines under the Chairmanship of Executive Director of C-WET. Presently, 5 nos. of draft Indian Standards are under process by BIS. Based on the MNRE guidelines, to facilitate healthy and orderly growth of wind power sector in the country Revised List of Models and Manufacturers of Wind Turbines (RLMM), is being issued by C-WET periodically. This year, co-ordinating with Bureau of Indian Standards (BIS), the Wind Turbine Sectional Committee (ET-42) has made progress in releasing the Documents on Wind turbines Part 21, 24 and Electro technical Vocabulary Part 415 for printing. The division has also facilitated proto-type wind turbine models as per the MNRE guidelines for grid connection.

Information, Training and Commercial Services Unit

The unit had successfully organized two National training programmes (during July & December 2012) and Two International programmes were conducted, one during September 2012 and was attended by 31 participants from 22 different countries and the other was initiated on 20th March,

2013 specially for participants from African Countries both of them sponsored by MEA, GOI under ITEC/SCAAP and AIFS - II programme and supported by MNRE.

Global Wind Day as usual was celebrated on June 15, with a special lecture on "Success of Wind Energy in Tamil Nadu and its Sustainability" delivered by Shri Rajeev Ranjan, I.A.S.

ITCS Unit also continues the PAVAN Newsletter, Modern Library and C-WET's bilingual website activities throughout the year. Several hundreds of students from 21 Engineering Colleges visited C-WET and along with many International participants to get to know on wind energy technology and the activities of C-WET.

Solar Radiation Resource Assessment

With the commissioning of 51 dedicated automatic SRRA stations the solar data collection and analysis including data quality checking have been well established and the one year processed data is already available for public. During this year, Hon'ble Minister of New & Renewable Energy, Dr. Farooq Abdullah dedicated the Solar Radiation Resource Assessment facility to the Nation and released the SRRA brochure. To mark the occasion, the 1st set of quality checked solar data was released by the Hon'ble Minister, to the solar power developers in the County.

Dr. Richard Meyer, Mr Kaushal Chhatbar, Mr. Marko Schwandt of M/s. Suntrace, Germany visited C-WET in connection with the development/modification/up gradation of algorithm for SRRA data quality checking. The GIZ programme under the Indo-German Energy program has been very fruitful in developing algorithms for India in the Solar Radiation data processing. The success of coming out with reliable SolMap for India is the interest of GIZ which has been reassured by Dr. Jens Burgtorf, Director, Indo-German Energy Programme, GIZ, who made a visit to C-WET in March, 2013.

Engineering Service Division

A new division has been formed on 15th March, 2013 at C-WET by re-allocating the existing man power with additional charges. The Unit is intended to cater to the hi-tech needs of managing ever increasing Information Technology infra structure (IT infra structure) involving several internet/intranet nodes connected to networked servers with highly dedicated leased lines with Software Technology Parks of India (STPI). The cyber security and reliable uninterrupted power supply for the net-work of servers and computers, the computational infrastructure in terms of hardware and software, the civil infrastructure of building premises, air-conditioning and features of renewable energy penetration in day-to-day demand of energy at C-WET, energy auditing and bringing energy efficiency would be the duties of this Division.

STANDING PARLIAMENTARY COMMITTEE ON ENERGY (2012-13) conducted an on the spot study of C-WET/MNRE activities at Ahmedabad on 5th January 2013.

FOUNDATION DAY OF C-WET was celebrated for the first time on 21st March, 2013 with a special invited Foundation Day lecture by former Executive Director of C-WET Shri M. P. Ramesh.

Dr S Gomathinayagam,
Executive Director, C-WET.

THE CHARTER

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

Mission

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

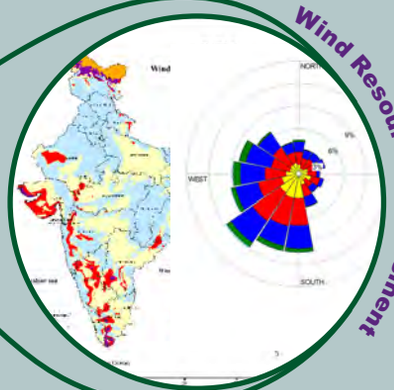
Objectives

- To serve as the technical focal point for wind power development in India, for promoting and accelerating the pace of utilization of wind energy and support the growing wind power sector in the country.
- To develop and strengthen the facilities and capabilities, evolve strategies, promote, conduct, co-ordinate and support research and development programmes to achieve and maintain reliable and cost effective technology in wind power systems.
- To analyze and assess wind resources, based on the data available from various sources and prepare wind energy density maps / wind atlas / reference wind data.
- To prepare and establish Indian standards on wind turbines and to develop and implement certification system in India.
- To establish world class facilities, conduct and coordinate testing of complete wind power systems and components according to internationally accepted test procedures and criteria, whereby the total performance that includes power performance, power quality, noise level, dynamics and operation and safety systems is tested according to agreed protocols.
- To accord type approval/type certification to wind turbines in accordance with Type Approval Provisional Scheme TAPS 2000 (amended).
- To undertake Human Resource Development programmes for the personnel working in the wind energy sector.
- To promote commercial exploitation of know-how, know-why results and offer various consultancy services to the customers.
- To promote the development and commercialization of any other wind energy systems including stand-alone systems.
- To carry out any other activity in the field of renewable energy for R&D as may be assigned to it by the Ministry of New and Renewable Energy (MNRE) from time to time.

From the Units....

Research and Development

Wind Resource Assessment



Wind Turbine Testing

Wind Turbine Research Station

Standards & Certification

Information, Training and Commercial Services

Solar Radiation Resource Assessment

RESEARCH AND DEVELOPMENT

The Research and Development (R&D) Unit supports time bound and mission oriented research & development programmes to achieve world class, reliable and cost effective technology in wind power systems. The Unit continues to improve its knowledge and skills through continuous learning to keep pace with state-of-the-art technology and excels through its effective networking with other Academic & Research Institutions. The Unit carries out in-house R&D through networking in relevant research areas with a mutually beneficial interdisciplinary approach for most of the projects. Strategic collaboration that could assist in most suitable technological developments for our Country is nurtured by funding and technical support. Immense pool of knowledge base in the Country and abroad is accessed to meet the goals set. C-WET undertakes R&D projects which are having deliverables useful to the wind Industry in India. The brief of the work executed during the year 2012-13 are detailed as under:

Research Projects

- **Power evacuation studies**

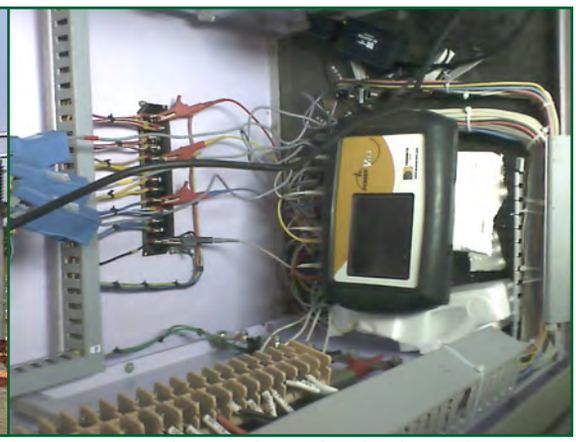
The power evacuation study for Grid Integrated Wind Energy Conversion system is one of the major issues faced both by Wind Turbine Industry and Utility in power evacuation of wind turbines, particularly in the State of Tamil Nadu. The weak Buses have been identified by short circuit analysis. The power flow studies with Thyristor Controller Series Capacitor (TCSC) and Voltage Source Convertor (VSC) based High Voltage Direct Current Transmission (HVDC) systems on the weak buses have been conducted.

The work is nearing completion and thereafter the final recommendations will be provided for the benefit of the wind turbine stakeholders.

- **Study on power quality issues in grid connected wind farms**

The power quality is also one of the major areas of interest and particularly in weak grid scenario. For this purpose, R&D Unit has initiated a project jointly with Tamil Nadu Energy

Peethampalli Substation where power quality mesurements are underway



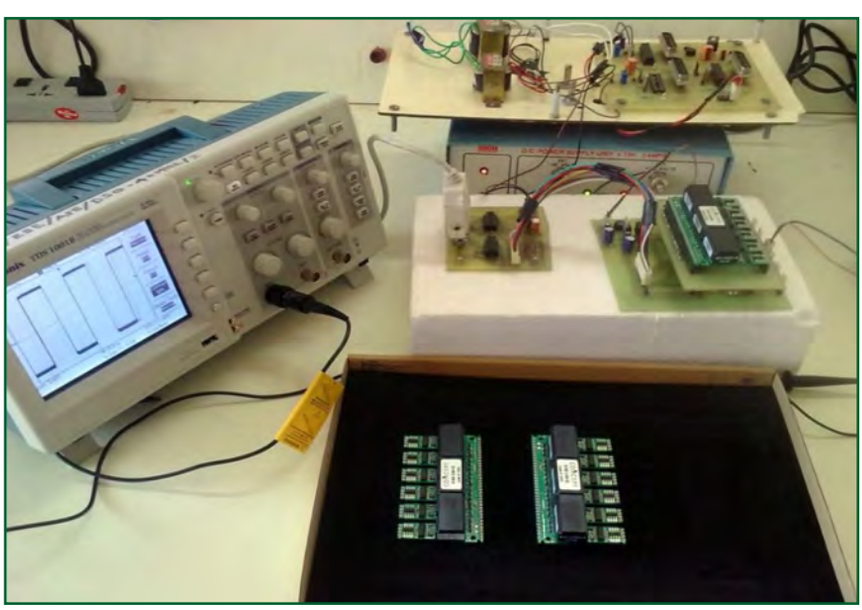
Power quality analyzer depolyed at substation

Development Agency (TEDA), RMK Engineering College and Amrita School of Engineering to undertake the power quality issues in the grid connected wind farms and to recommend appropriate integration of the new wind generation system foreseen for the Indian wind power based on measurements at site together with simulation studies.

Power quality data has been collected from the Coimbatore circle, Peedamppally and Pathappampatty substations which are exclusively connected with wind turbines. The measurement is planned for a substation with synchronous generators during the ensuing windy season. The data from the measurements performed are being used for the simulation work.

- **Study and control of weak grid connected matrix converter based DFIG Systems**

R&D Unit has initiated a project with the help of SSN college of Engineering, approved by the Research Council of C-WET to undertake simulation of the Matrix Converter controlled Doubly Fed Induction Generator (DFIG) for a 5 kW wind power system and development of needed hardware modules. The project aims at implementing a novel method of increasing the reliability of the system under fault conditions by using a partially redundant converter that supports the system. The control strategy will



Laboratory hardware set up for testing the matrix converter algorithm

also account for the Maximum Power Point Tracking to improve the performance of the system for a wide wind speed range. The project has achieved its first milestone on Simulation Results of MATRIX Converter controlled DFIG Systems and Power module hardware development and the second milestone on Completion of system integration of power module using Driver Circuit, FPGA and DSP interfacing, Motor - Generator set in the power converter setup.

Human Resource Development Project

• Capacity building in wind energy at PSG College of Technology

Human Resource Development (HRD) is one of the key areas where industry is facing hardship in getting the trained technician / qualified personnel particularly for O&M of wind turbine for its expected design life of 20 years. Accordingly R&D Unit of C-WET has initiated courses in two colleges. One of the beneficiaries is PSG College of Technology, Coimbatore. Three certificate courses of 6 month duration and two post graduate diploma courses of 9 months duration were sponsored by C-WET at PSG college of Technology.

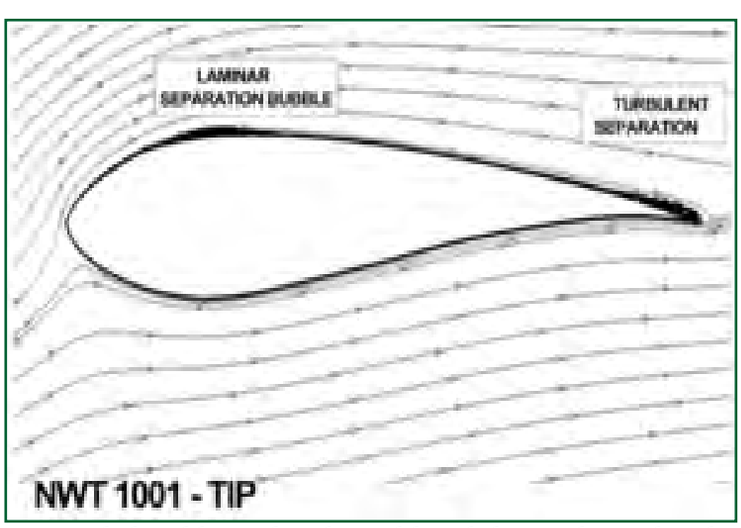
The 2nd batch of course has commenced since January 2012.

• HRD through tie-up with Amrita Vishwa Vidyapeetham University

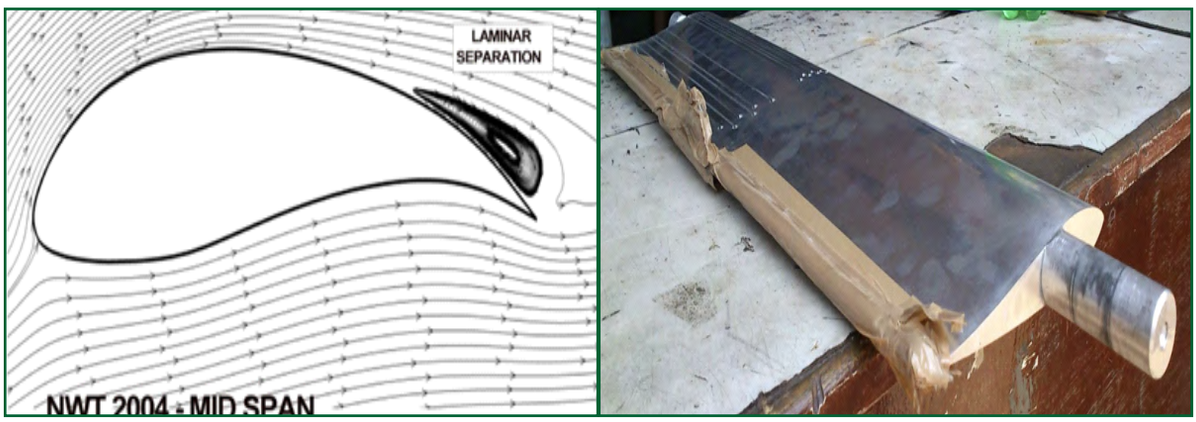
C-WET has recently initiated short term Post Graduate Diploma courses in Wind Power Development & Wind Resource Analysis and for the purpose an MOU was inked with Amrita Vishwa Vidyapeetham University, Coimbatore on 12th May 2011. The courses would help in developing skilled manpower which is the need of the hour for the wind industry.

During the visit of Students to C-WET campus

Many lecture sessions were handled by C-WET's scientists both at C-WET and also at the Coimbatore campus of the University. The second batch of various courses will be completed during May 2013.



Aerofoil profiles used in the model made for wind tunnel studies



Aerofoil profiles used in the model made for wind tunnel studies

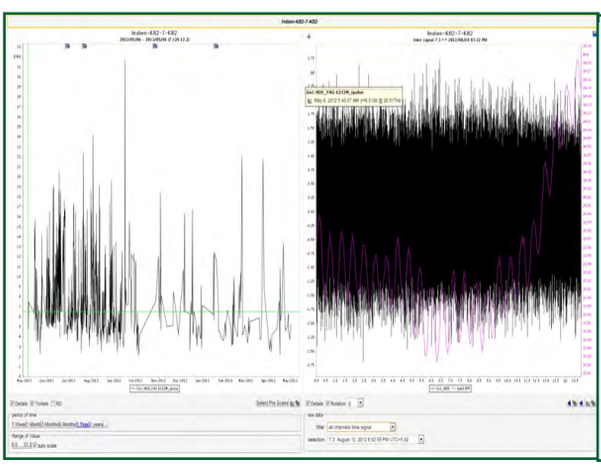
Experimental characteristics of wind turbine blade over full 0 – 360 degree angle of attack

Under this project, the Aeronautical department of Park College of Engineering and Technology, Coimbatore, various aerofoils suiting to low and moderate wind regime have been placed inside wind tunnels and their stall hysteresis characteristics are being studied. Preliminary studies have been completed and exhaustive data collection is under way which will be further bench-marked against the Computational Fluid Dynamics (CFD) data. This study is pursued with an emphasis to create a database on aero-foils that could be used for low wind regime wind turbine designs.

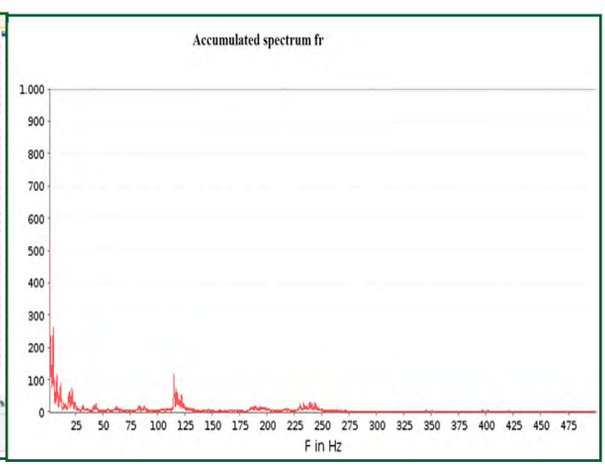
The project is scheduled to be completed in December 2013 and data validated by CFD methods will be available to the stakeholders.

♦ Health / Condition Monitoring

The health / condition monitoring system installed for the drive train and blades on the 2 MW Experimental / Research Wind Turbine at Wind Turbine Research Station, Kayathar facility has started streaming generation data. Work has been started on the fault prediction algorithm that would help identify defects on the drive train & the blades. The measurements from the



Spectrum plot of a sub-component on the drive train



Accumulated spectrum of a blade signal

components would be used to study the dynamics of the system and identify areas of defect / malfunction or deviation in operational characteristics. This defect prediction method of prognosis in the future would become the guiding line for any kind of operation and maintenance activity that the wind industry would want to perform. Details of the turbine specific details are awaited from the manufacturer to enable a good fault detection algorithm.

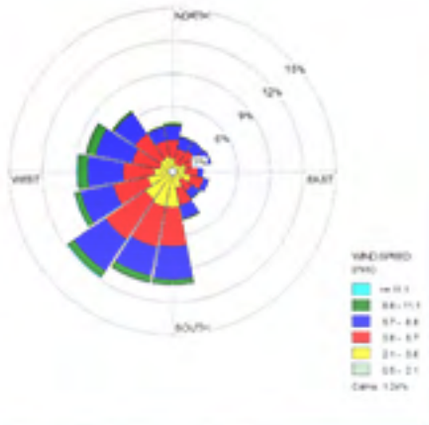
Technical Services to the Stakeholders

Testing of Small Wind Turbine

The Unit is presently in the process of type testing eight Small Wind Turbines (SWT) of ratings from 0.6 kW to 5.4 kW at WTRS, Kayathar as per the requirements of IEC-61400-2 together with IEC 61400-12-1. The measurements are underway and is likely to be completed during the current windy season (April - September 2013).

Installation & Commissioning for two models with ratings of 1 & 3.5 kW have been completed at WTRS and will be taken for testing in the next windy season along with a already installed 10 kW SWT.

The Unit has done document review of 6 SWT models and has also released the 7th list of SWT Empanelment during the period.



WIND RESOURCE ASSESSMENT

The Unit has been implementing Nation wide Wind Resource Assessment programme sponsored by the Government of India, in association with State Nodal Agencies. In order to extend support to the industry and developers, the Unit takes up validation exercises, technical due diligence studies, micrositing and evaluation of production estimates of the proposed wind farms. The Ministry of New and Renewable Energy (MNRE), Government of India has been sponsoring programmes to measure, analyze and publish wind data in our country for the last two decades. Winds have been measured at seven hundred & three locations for periods ranging from one to five years since 1986. As on March 2013, ninety two stations are in operation in fifteen States and One Union Territory. During 2012-13, a total number of thirty eight wind monitoring stations were commissioned. Details of new Wind Monitoring Stations installed and in operation are given in the following table.

Status of Wind Monitoring Stations (2012-2013)

S. No.	State/Union Territory	Number of Stations		
		Established till 31.3.2012	Installed (new) during 2012-2013	In operation as on 31.03.2013
1.	Andaman & Nicobar	19	-	1
2.	Andhra Pradesh	78	-	15
3.	Arunachal Pradesh	6	3	3
4.	Assam	6	-	-
5.	Bihar	5	1	3
6.	Chattisgarh	7	-	-
7.	Goa	4	-	-
8.	Gujarat	69	-	1
9.	Haryana	6	-	-
10.	Himachala Pradesh	6	-	-

S. No.	State/Union Territory	Number of Stations		
		Established till 31.3.2012	Installed (new) during 2012-2013	In operation as on 31.03.2013
11.	Jammu & Kashmir	24	-	15
12.	Jharkhand	3	-	-
13.	Karnataka	59	-	12
14.	Kerala	29	-	2
15.	Lakshadweep	9	-	-
16.	Madhya Pradesh	37	-	-
17.	Maharashtra	112	20	24
18.	Manipur	8	-	-
19.	Meghalaya	3	-	1
20.	Mizoram	4	1	1
21.	Nagaland	3	-	-
22.	Orissa	9	6	6
23.	Pondicherry	4	-	-
24.	Punjab	10	-	-
25.	Rajasthan	36	-	1
26.	Sikkim	4	-	-
27.	Tamil Nadu	68	2	2
28.	Tripura	5	-	-
29.	Uttarkhand	11	5	5
30.	Uttar Pradesh	11	-	-
31.	West Bengal	10	-	-
	Total	665	38	92

Of the cumulative total of 703 stations established till 31.03.2013, 236 stations have been found to have Wind Power Density (WPD) in excess of 200 W/m^2 at 50 m agl. Summary of these 236 stations are given in the following table.

WPD Distribution at the 236 Stations

WPD range (W/m^2)	Number of Stations
200-250	107
251-300	59
301-350	26
351-400	19
>401	25
	236

WRA in the uncovered area

State wise details of the wind monitoring stations commissioned during 2012-2013 in the country under various programmes are given in the table given below. All the masts are of, 50 m and 80 m height. Sensors are placed at 10 m, 30 m, 50 m (50 m height mast), 20 m, 50 m, 78 m (80 m height mast) levels & above ground.

State wise installations of WMS established during 2012-2013

S.No.	Stations Established	State	District	Commissioned On
1.	Ittarai	Tamilnadu	Erode	26.05.2012
2.	Vellamadam		Tuticorin	28.05.2012
3	Morewadi	Maharashtra	Kolhapur	31.05.2012
4	Shembawani		Kolhapur	02.06.2012
5	Aadiware		Ratnagiri	04.06.2012
6	Hivarapahadi		Pune	06.06.2012
7	Chinchwe		Nashik	08.06.2012
8	Khandala		Aurangabad	10.06.2012
9	Pimpri		Washim	23.06.2012
10	Isapur		Yeawatmal	25.06.2012
11	Mirkhel		Parbhani	27.06.2012
12	Palsi		Aurangabad	29.06.2012
13	Bombhale		Satara	03.07.2012
14	Khokade		Satara	17.07.2012
15	Uswad		Nashik	20.07.2012
16	Dhanger		Aurangabad	22.07.2012
17	Rohilagad		Jalna	26.07.2012
18	Nimbhora		Aurangabad	30.07.2012
19	Moregaon		Parbhani	12.10.2012
20	Suryamal		Thane	08.10.2012
21	Kodhali		Kolhapur	21.11.2012
22	Isapur		Kolhapur	31.12.2012
23	Malari	Uttarkhand	Chamoli	26.07.2012
24	Maneshwar		Champawat	04.08.2012
25	Pithoragargh		Pithoragargh	31.12.2012
26	Dwarahat		Almora	03.01.2013
27	Haathipaon		Dehradun	06.01.2013
28	U Allupur	Orissa	Ganjam	14.10.2012
29	Ariputraghati		Koraput	16.10.2012
30	Zillagaon		Kalahandi	19.10.2012
31	Dhilipanbandha		Rayagada	22.10.2012
32	Paradeep		Jagatsinghpur	24.10.2012
33	Kadakala		Keonjhar	24.10.2012
34	Mechuka	Arunachal Pradesh	West Siang	21.10.2012

S.No.	Stations Established	State	District	Commissioned On
35	Hawai	Arunachal Pradesh	Anjaw	10.03.2013
36	Anini		Dibang Valley	21.03.2013
37	Chalfil Tlang	Mizoram	Aizwal	09.11.2012
38	Chikini	Bihar	East Champaran	02.12.2012

C-WET has released partial funds to the following State Nodal Agencies (SNAs) to install wind monitoring stations during this financial year. Details are given in the following Table.

Fund released for SNAs to install WMS during 2012-2013

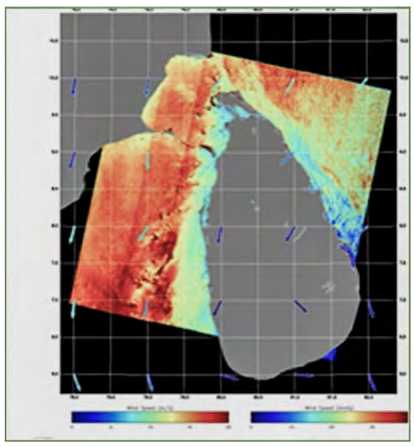
S.No.	State	No. of Stations Sanctioned	Mast Height (m)	Amount (Rs. in Lakhs)
1.	Arunachal Pradesh	3	50m	0.65
2	Kerala	2	80m	7.50
3	Odisha	3	80m	4.50
4	Karnataka	10	80m	25.00
5	Maharashtra	20	80m	59.20
6	Jammu & Kashmir -Kargil	5	50m	1.56
	Total			98.41

Consultancy Projects

In addition to the wind monitoring projects, funded by MNRE, the Unit has carried out 118 consultancy projects during the year 2012-13. These short-term projects were to provide micrositing services and preparation of due diligence reports. Under the direction from the Ministry, verification of data collection procedure adopted by private firms were undertaken. 6 nos. of wind monitoring station have been installed under consultancy projects.

Offshore Wind Resource Assessment at Dhanuskodi

The principal objective of this project is to examine the feasibility for setting up of offshore wind farm project in this region. In order to assess the potential, a satellite techniques (Synthetic Aperture Radar- SAR) was used. The results indicates that the region has considerable potential for offshore wind farm development. In order to validate this results it was decided to install a 100 m met tower at this region. For this soil investigation has been carried out. Based on this result a tender has been floated for design, fabrication transportation, and installation and commissioning of 100 m mast. Initially none of the fabricator had quoted. Then Expression of interest meeting was conducted and three fabricator had quoted for the same. The screening committee after detailed scrutiny had selected a fabricator. The work order had been issued to the selected fabricator. A work order also placed for offshore measuring instruments.



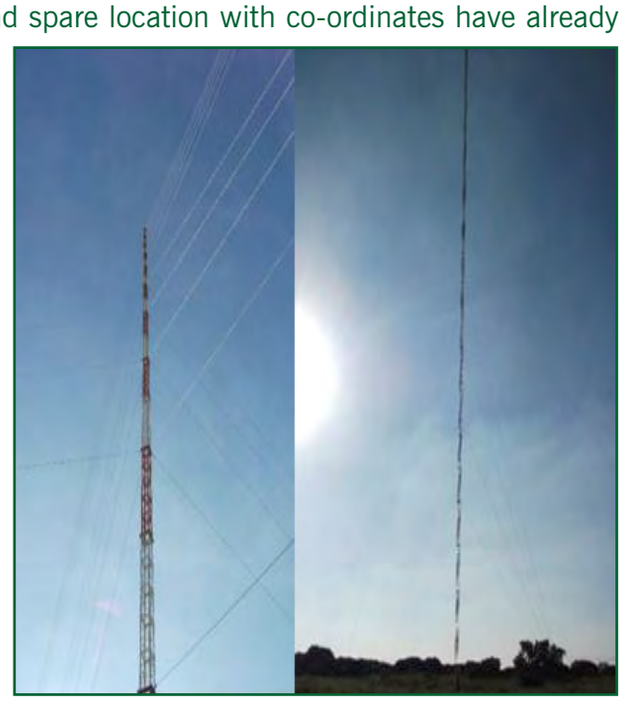
Wind shear measurement at 120 m level

For the 5th station, land has been procured. civil, foundation Erection and commissioning of wind monitoring station had been completed by August 2013.

Estimation and validation of Wind Power Potential at 100 m level in 7 States of India

As per the Indian Wind Atlas, installable wind power potential has been estimated as 49 GW at 50 m agl with the assumption of 2% land availability (as land assessment was not a part of the Wind atlas preparation, the assumption was made as per the results of micro survey studies done for a few stations in the country) and the indicative to be validated potential of 103 GN at 80 m level.

The approximate locations with alternate and spare location with co-ordinates have already been identified and informed to State Nodal Agencies by WRA unit and finalized 75 sites till date after the field inspections by WRA staffs. 69 location's NOC's for land utilization has also been obtained through respective SNA's. Order has been placed for the fabrication and transportation and foundation of 100 m lattice masts. The civil, foundation works are under progress. The instruments have been procured and are under testing. As on March 2013, 21 masts has been erected in 3 States. The commissioning of these sites will be carried out in July 2013. The detailed current status of this program is as follows.



100 m mast

S. No.	State	No.of1 sites to be finalized	No. of sites visited	No. of sites finalized after the field visit	No. of NOC obtained for the finalized sites	Remarks
1	Andhra Pradesh	10	11	10	10	Nil
2	Karnataka	13	15	13	13	Mast materials to 12 sites have been dispatched and erection of masts at 7 locations completed.
3	Rajasthan	12	19	12	9	All 12 sites are finalized and awaiting for the NOC's for the remaining 3 sites.
4	TamilNadu	12	13	12	12	NOC's for all 12 sites had been obtained and land agreement is going to be executed between the landlords and TEDA.
5	Maharashtra	8	13	8	8	Erection of masts at 7 locations completed. Since the Maharashtra forest Dept. had raised concern in erecting the 100 m mast at Nidalewadi site Dist. Pune, an alternate location is identified in the nearby region with similar terrain at Village - Ragewadi, for which NOC obtained.

S. No.	State	No. of sites to be finalized	No. of sites visited	No. of sites finalized after the field visit	No. of NOC obtained for the finalized sites	Remarks
6	Gujarat	12	20	12	9	SNA has to obtain the NOC's for the remaining 3 finalized sites. Reminder letter/emails already are sent to SNA.
7	Madhya Pradesh	8	9	8	8	Mast materials are dispatched to the sites and erection of 7 mast are completed.
	Total	**75**	**100**	**75**	**69**	

Development of Wind Forecasting model with special reference to complex terrain

Wake is being measured behind 2 MW wind turbine by using LIDAR

The main objective of the project is to lead a reliable forecast of the output powers from wind farms and integrating wind power effectively into the overall electric supply. To assess wind power forecasting a Prediktor tool has been using which is developed by Riso National Laboratory, Denmark in the identified wind farm. In this system, large scale flow is simulated by an NWP model. The system's main idea is to use the wind speed and direction from a NWP, then to use power curve, transform these variables to the local site and finally use the power curve including the wake effects. A statistical improvement module MOS can either set in before the transformation to the local wind or before the transformation to power or at the end of the model chain trying to change the power. A combination of all these is also possible. The outcome of the results indicates that the system need local region winds speed data as GPS data making quite high error for complex terrain in India after several attempts made to improve the performance using MOS, RISO is trying to use NCMRWF model to reduce the error and the same has been initiated.

Wind Turbine Wake Study

The objectives of the project is to study the wake effect of the wind turbine at various wind speeds by developing a CFD Model of the identified wind turbine using CFD tools and to carry out actual measurements in the downstream of wind turbine at different spacing. CFD analysis and on site measurement using SODAR and LIDAR has been carried out. The analysis and Validation of CFD result with actual measurement is under progress.

Wind Measurement at 120 m level

Four 120 m tall wind masts are operational at Lamba (Gujarat), Akal (Rajasthan), Jagmin (Maharashtra) and Jogimatti (Karnataka) during current financial year. Measurements have been carrying out at 10, 30, 60, 90 and 120 m level and data are being measured.

120 m tall lattice tower for wind measurement

Special Training Programmes

WRA unit had successfully conducted a two days Training programme on "Wind Resource Assessment Methodology & Techniques" for officials from SNA's on 15th & 16th October 2012. Twenty five officials from nine SNA's participated and they are all Assistant Directors, Project officers, Engineers & Technicians.

The welcome address was given by Dr. S. Gomathinayagam, Executive Director, C-WET. The lectures were delivered by the following staff members :

Title	Speaker
Wind Resource Assessment Techniques	K. Boopathi
Siting Guidelines for Wind Measurements	A. Haribhaskaran
Measurement Parameters and Data Analysis	G. Arivukkodi
Monitoring Station Instrumentation and Installation	A. Haribhaskaran T. Sureshkumar R. Vinodkumar
Software Modelling	K. Boopathi B.Krishnan

Participants and C-WET staff during field visit

The second day participants were engaged with Industrial visit to M/s. Gamesa Wind Turbines Pvt. Ltd. and the participants informed that industrial visit was really a boost and add on knowledge about Wind Turbines. The experience is beneficial for upcoming commissioning of Wind Turbines and preliminary actions, trouble shooting at the site & overall planning of Wind Energy Projects.

The training was well received and appreciated by the participants.

Review Meeting / Special Training Programme

WRA Unit had conducted a Review Meeting of ongoing WRA Programme in North East (NE) Region and Special Training course on Wind Resource Assessment Methodology & Techniques for officials from NE region, SNAs at Guwahati, Assam on 9th & 10th January 2013. Twenty two officials from nine SNA's participated including Project Directors / officers, Engineers & Technicians.

Shri. Anirudha Rout I.A.S, Chief Executive Officer, Orissa Renewable Energy Development Agency (OREDA), Shri. Haresh Chandra Dutta, ACS, Director, Assam Science Technology & Environment Council & Shri. D.R. Das, Scientist 'F', Guwahati Regional Office, Ministry of New and Renewable Energy (MNRE) also participated as a Special Invitees.

Shri. K. Boopathi, Scientist & Unit Chief (i/c) welcomed all the participants and presented a brief report on the C-WET activities and on various facets of a Wind Resource Assessment programme that is being carried out throughout India. State wise review / discussion was made and deliberations were also taken up simultaneously.

Second day, Shri. A. Haribhaskar, Scientist, WRA, C-WET gave a detailed presentation on the tools / sensors / instruments that are widely used for Wind resource assessment and the procedure involved in selecting the site for erecting a met mast. SNA officials were given detailed training on handling the GPS (Global Positioning System), Various Data loggers, Sensors (Anemometers, Wind Vanes, Temperature & pressure Sensor), Software's (Google

Participants and C-WET staff

Inaugural Function

Earth, Windographer etc.) that are being used for wind resource assessment by C-WET engineers (B.Krishnan, T. Suresh Kumar and R. Vinod Kumar).

In general, all the participants from each SNA had requested C-WET to arrange for a tripartite meeting inviting all the private manufactures from the wind industry, officials from MNRE & C-WET and SNA officials from each State (especially from NE region, J&K and Kargil regions) to develop wind power projects in NE regions.

Also, all the participants from each SNA had requested C-WET to conduct a full fledge training programme for two weeks covering all the facet of wind turbine technologies especially for officials from State Nodal Agencies.

WIND TURBINE TESTING

Wind Turbine Test Station (WTTS) near Kayathar in Tamil Nadu was established with the technical assistance of Riso National Laboratory, Denmark under Danish International Development Agency (DANIDA) grant and with partial financial assistance and guidance from the Ministry of New and Renewable Energy (MNRE), Government of India. The Test Station has the following facilities:

- Availability of two test beds to test wind turbines up to a total capacity of 1650 kW, the capacities of which are expandable based on requests from potential customers.
- Readily available grid connection for each test bed.
- Readily available reference met masts in front of each test bed, designed for heights of 75 m and 50 m for acquiring meteorological data at the hub heights of the test turbines.
- Two control rooms, one for each test bed with state-of-art data acquisition systems and one office building.
- Availability of Industrial PC based data acquisition systems for measurements at the control room of each test bed.
- Availability of an office cum workshop building at WTTS with facilities of carrying out functionality check of instruments and sensors.
- Availability of sensors and transducers as per the requirements of IEC standards which are stored as per the Quality management system procedures.
- Availability of 9 No's of 200 kW Micon make wind turbine for development of new measurements techniques.

Elecon 600 kW Blade Instrumentation - Strain gage mounting

- In-house laboratory for calibration and functionality check-up of instruments.
- In-house laboratory for data warehousing, signal conditioning, equipments design, training calibration etc.

Contributions

C-WET has established a test facility at Wind Turbine Test Station (WTTS), Kayathar, where wind turbines can be tested according to International Standards. WTTS is presently equipped to undertake Type Testing (TT) of wind turbines and to conduct the testing of wind turbines as per the requests of customers / manufacturers and the following tests are normally carried out as per International standards IEC 61400-12-1, 13, 1.

1. Power performance measurement
2. Yaw efficiency test
3. Safety and functional test
4. Load measurements
5. User defined measurements

The above mentioned tests are also being carried out at field sites subject to the site meeting the requirements of IEC Standards.

The testing facilities are certified as per the requirements of ISO 9001:2008 and accredited as per the requirements of ISO / IEC 17025:2005.

The unit contributes to the wind energy community by knowledge transfer through National and International training programmes and by contributing technical papers to various National / International journals on a periodic basis.

Elecon 600 kW - Shaft strain gage strain measurement

Elecon 600 kW Site Instrumentation Data acquisition configuration

Power Transducer wiring

Participants of C-WET – NREL Interaction Meeting & Training

Yaw transducer wiring

Height Safety and Rescue training participants

Achievements

- The draft test reports of GARUDA 700 kW wind turbine at Melamaruthappapuram Village", in (SF.N.141/5) V.K. Pudur Taluk in Tirunelveli District has been issued to the customer and the same has been reviewed by the customer for release of final report.
- Measurements for Type Testing of Elecon 600 kW wind turbine of M/s. Elecon Engineering Company Ltd. at Chettikurchi site, Kovilpatti Taluk, Tuticorin District have been completed and test reports have been issued to the customer.
- An agreement was signed between C-WET and M/s. Jyoti Ltd. for Type testing of wind turbine of JYOTI – SE 850 – 56 / 70 kW wind turbine at WTTS, Kayathar. The measurements are expected to be started during the windy season of 2013.
- An Inter Laboratory Comparison (ILC) for Power Curve Measurements as per the requirements of IEC 61400-12-1 was completed and the results were sent to NREL, USA for analysis and further action.
- An Inter Laboratory Comparisom (ILC) for Power Curve Measurements as per the requirements of IEC 61400-12-1 was carried out between 18 laboratories under the IEC TC 88 CAC Advisory sub-committee on test laboratories.
- The results of 18 laboratories were analyzed by NREL, USA and sent back to C-WET for necessary action, which will be useful for sustaining NABL accreditation.

- National Accreditation Board for Testing and Calibration Laboratories (NABL) Reassessment Audit ISO / IEC 17025:2005 held on 3rd November 2012 and 4th November 2012 at WTTS, Kayathar. The Assessment has been successful and the accreditation has been renewed.

Achievements by Unit Staffs

S.A.Mathew, Scientist & Unit Chief

- Invited and participated in the IEC TC 88 Certification Advisory Committee Test Laboratory Subgroup Meeting held at the TUL NEL, Glasgow, London during 22nd and 23rd May 2012.
- Invited and participated in the 2nd IEC CAC test laboratory meeting from 7th – 9th November 2012 held at Florida, USA as an expert in power curve measurements as per the requirements of IEC 61400-12-1.

Testing Unit

- S. A. Mathew, M. Anvar Ali, M. Saravanan, Bhukya Ramdas, S. Paramasivan, M. Karuppuchamy, A. R. Hasan Ali and Y. Packiyaraj from Testing Unit were invited to attend the C-WET – NREL Interaction Meeting and training programme on "Wind Turbine Testing" between 11th – 14th December 2012 in Boulder Colorado hosted by US Department of Energy (DOE) and the National Renewable Energy Laboratory / National Wind Technology Center.

New Facilities Introduced

An indigenous data acquisition equipment development has been completed and same is currently being tested at the site.

Visitors to the Centre

Ms. Monika Kramer from M/s. Windtest Grevenbroich GmbH, Germany at C-WET on 27th November, 2012.

IEC TC 88 Certification Advisory Committee Test Laboratory Subgroup Meeting held at the TUL NEL, Glasgow, London

WIND TURBINE RESEARCH STATION

C-WET established experimental Wind Turbine Research Station at Kayathar, Thoothukudi District, Tamil Nadu away from Chennai around 600 kms in Senkottai pass area, spread over approximately 100 acres of land, with more than 22 years old 9 x 200 kW Wind Electric Generators (WEG), 1 x 600 kW WEG and 1 x 2000 kW WEG for conducting various R&D related activities in addition to Type Testing facilities and Small Wind Turbine performance testing facilities.WTRS Unit successfully renovated the 22 years old, 9 nos of 200 kW WEG`s by replacing old controllers, sensors etc. Strategic efforts were made to improve the machine efficiency with suitable new controllers by bringing down the reactive power consumption by adding specially designed suitable additional capacitor banks incorporated in all the first 9 generation WEGs (200 kW).

Operation & Maintenance and Machine Efficiency Improvement Methods Carried out on 9 Nos of 200 KW Wind Electric Generators at WTRS, Kayathar

WTRS Unit effectively carried out the O&M and machine efficiency improvement strategies on 200 kW WEGs on an experimental basis by replacing High speed Pinion Shaft along with bearings in two machines, Generator main bearing in one machine and the results are encouraging. WTRS Unit carried out comparative studies for maintaining unit power factor in all the machines by suitably designing additional capacitor banks. WTRS/ C-WET conducted studies in reducing the gear oil temperature by incorporating

200 kW Micon Wind Electric Generators at WTRS, Kayathar

suitable cooler arrangements with sensing controllers at nacelle itself and satisfactory results obtained in limiting the gear oil temperature within tolerance level during operation of peak windy periods, thus minimizing the mechanical break downs.

Gear Oil Cooler to reduce the Gear Oil Temperature

Movements of Technical staff / materials in WTRS, campus

WTRS / C-WET actively involved in converting Battery Operated Vehicle into Fully Solar Powered Vehicle by suitably designed power controllers to operate with 600 W solar PV panels, 48 V batteries with charge controller. The Technical staff and materials required for O&M / Testing / R&D activities at WTRS are being successfully transported within the campus by Solar Powered Battery Operated Vehicle and the results are very encouraging.

Industrial Visit to R&D facilities WTRS, Kayathar

- 29 Students and 2 staff members from Amrita Institute of Technology, Coimbatore on 20th April 2012.
- 28 Students and 4 staff members from PSG College of Engineering, Coimbatore on 21st April 2012.
- Internship / Field Training programme conducted for the 3 M.Tech Students from National Institute of Technology, Suratkal from 4th June 2012 to 13th June 2012.
- 10 officials from WRA Unit of Suzlon Energy Limited, Bangalore on 11th July 2012.
- 60 Students and 4 staff members from Ultra College of Engineering & Technology for Women, Madurai on 3rd August 2012.
- 56 Students and 4 staff members from Mohamed Sathak Engineering College, Kilakarai, Ramnad District, Tamil Nadu on 9th August 2012.

Battery operated vehicle at WTRS designed to operate by Solar PV Panels

Industrial visit by Technical Institution

Students viewing erection of small aerogenerators

- 110 Students and 10 staff members from Maamallam Institute of Technology, Vadamangalam, Chennai, Tamil Nadu on 7th September 2012.
- 58 Students and 4 staff members from Sethu Institute of Technology, Kariapatti, Virudhunagar District, Tamil Nadu on 14th September 2012.
- 16 Students and 2 staff members from Vellore Institute of Technology, Vellore, Tamil Nadu on 13th October 2012.
- 60 Students and 2 staff members from Dhanalakshmi Srinivasan Engineering College, Perambalur District, Tamil Nadu on 8th March 2013.
- 28 Students and 2 staff members from Amritha School of Engineering, Coimbatore, Tamil Nadu on 28th March 2013.

Special Visit to R&D facilities WTRS, Kayathar

- 19 delegates from Swedish International Development Agency (SIDA) on 6th November 2012.
- 23 delegates from Swedish International Development Agency (SIDA) on 4th March 2013.
- The Joint Secretary (Wind), MNRE, New Delhi and Advisor, Planning Commission, New Delhi visited WTRS and dedicated the Battery Operated Vehicle at WTRS, Kayathar for transportation of staffs / materials within the campus on 28th June 2012.
- 30 participants and 5 coordinating staffs of the 9th International Training Course on “Wind Turbine Technology and Application “on 20th September 2012.

STANDARDS & CERTIFICATION

Wind Energy Sector is continuously growing in India with the introduction of more new wind turbine models and more installed capacity. Type Certification of wind turbines plays an active role to facilitate the orderly growth of wind energy sector. TAPS-2000 (amended), the Indian Certification Scheme for wind turbines has been approved and issued by Ministry of New and Renewable Energy (MNRE). The Scheme has been prepared in line with the requirements of International standards viz., IEC standards while taking into account of Indian external conditions. Standards & Certification unit of C-WET is implementing TAPS-2000 (amended) for certification of wind turbines.

S&C unit has completed three projects on renewal of certificates of wind turbine models during the year. One project on renewal of certificate of a wind turbine model is ongoing.

Certification - Renewals Completed / Ongoing (2012-2013)

Sl No.	Manufacturer's Name	Wind Turbine Model / Capacity	Validity
1.	M/s. RRB Energy Limited	V 39 – 500 kW with 47 m rotor diameter	20.04.2013
2.	M/s. RRB Energy Limited	Pawan Shakthi- 600 kW	04.07.2013
3.	M/s. Southern Wind Farms Limited	GWL 225 / 225 kW	05.01.2014
4.	M/s. RRB Energy Limited	V 39 - 500 kW with 47 m rotor diameter	Ongoing

Standards

Bureau of Indian Standards (BIS) has formulated a separate committee viz., Wind Turbines Sectional Committee (ET 42) for the preparation of Indian standards on wind turbines, under the Chairmanship of Executive Director, C-WET. S&C Unit plays an active role in supporting

Issuing renewed Certificate to M/s. RRB Energy Ltd.

Issuing renewed Certificate to M/s. Southern Wind Farms Ltd.

Bureau of Indian Standards (BIS) in preparation of Indian standards on wind turbines. S&C Unit also provides support to BIS in voting of draft IEC standards.

C-WET has formulated a Working Group on standards consisting of experts from various stake holders to assist C-WET in the standards related works. C-WET organized the first Working group meeting to discuss the draft Indian Standards circulated by BIS. Unit Chief, S&C along with ED, C-WET participated in 4th Wind Turbines Sectional Committee (ET42) meeting held at Bureau of Indian Standards, New Delhi. During the meeting, the following three draft Indian Standards have been accepted by ET 42 committee of BIS, which will be taken up for printing by BIS.

Doc ET 42 (6422)	Wind turbines – Part 21: Measurement and assessment of power quality characteristics of grid connected wind turbines (IEC 61400-21)
Doc ET 42 (6423)	Wind turbines – Part 24: Lightning protection (IEC 61400-24)
Doc ET 42(6424)	Electro technical Vocabulary – Part 415: Wind Turbine Generator Systems (IEC 60050-415:1999)

Revised List of Models and Manufacturers of Wind Turbines (RLMM)

Ministry of New and Renewable Energy (MNRE) has been issuing the guidelines for Wind Power Projects to streamline the development and facilitate healthy and orderly growth of the Wind Power Sector in the Country. Based on the MNRE guidelines, Revised List of Models and Manufacturers of Wind Turbines (RLMM), finalized by the Committee appointed by MNRE, is being issued by C-WET periodically. The list, issued by C-WET, is being widely referred by various State Nodal Agencies, State Electricity Boards and various financial institutions. RLMM Main list and Addendum to the Main list have been issued during the year. The works in connection with issue of Addendum – II to Main List dated 31.07.2012 is under progress.

Prototype Wind Turbine Models

MNRE has issued guidelines dated 22.05.2012 & addendum dated 20.09.2012 for installation of prototype wind turbine models in India. The guidelines document is implemented by S&C Unit, C-WET. C-WET has formed a committee to take the suitable decision on issue of the recommendation to permit installation of a maximum number of 5 (five) wind turbine(s) of a specific prototype wind turbine model in India and synchronize with the Indian grid system. C-WET has organized two meetings of the Committee on prototype wind turbine models and letters have been issued by C-WET for those prototype wind turbine models which met the requirements of MNRE guidelines, as decided by the Committee, to the concerned State Nodal Agency and / or State Electricity Board in connection with grid synchronization.

Quality Management System

Wind Turbine certification services of C-WET are certified as per the requirements of ISO 9001: 2008 by Det Norske Veritas. Periodic Audit was successfully completed by DNV team and recommended for continuation of certification. The continual improvement and maintaining the Quality Management System as per ISO 9001:2008 are ongoing.

Discussion during C-WET's Working Group Meeting on Standards

INFORMATION, TRAINING & COMMERCIAL SERVICES

Information, Training and Commercial Services Unit of C-WET is providing excellent facilities and also reaching out the public as well as industries to promote wind energy in the country. The following are the activities of the Unit during the period from April 2012 to March 2013.

Training Programmes

Apart from the collation, process, preserve and dissemination of wind related information, the prime activities of this Unit is organizing training courses for National & International participants. ITCS Unit had trained 858 National and 232 International professionals through its National and International training programmes since 2004. During the year 2012 - 2013, a total of 4 training courses, 2 National and 2 International training courses have been conducted successfully, where in 105 National from almost all part of the country and 52 International participants from 29 countries have been trained. The course content for the training was very comprehensive syllabus and the lectures of the course delivered by eminent scientists, engineers and other wind energy professionals with years of experience drawn from C-WET, wind turbine industries and academic institutions. As part of every training course, a Course Material (compilation of the write-ups of all the presentations / lecturers submitted by the lecturers) specially prepared for that particular content of the course for the benefit of the participants, for a ready reference. The programmes were highly acclaimed for course structure, intellectual level, hospitality and the organizing capabilities.

The training courses are being organized with the aim of providing complete overview of Wind Energy Technology and Applications starting from what is wind to its various technology available, Wind Resource Assessment, layout of wind farms, installation and commissioning, O&M and financial benefit.

National Training Courses

National training courses are of 3 days duration designed to orient the participants towards Wind Energy Technology starting from wind resource assessment to wind farm development including installation & commissioning, O&M and financial aspects & benefits. The Unit had organized 12th and 13th National training courses on "Wind Energy Technology" during July and December 2012 respectively. 105 participants from diverse background across the country participated in the training and there have been many suggestions and request demanding frequent and special training courses. The chart given below shows the year wise distribution of participants in the National training courses.

Year wise distribution of participants

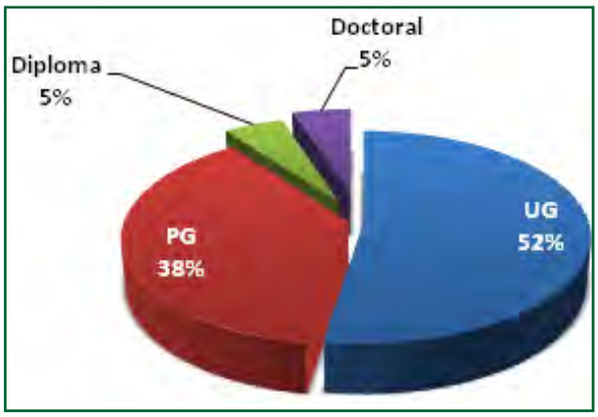
12th National Training Course

The 12th National training course on "Wind Energy Technology" during 18th - 20th July 2012 was exclusively organized for students because of the overwhelming response received from students community in attending the previous training courses in large number.

Shri. D. V. Giri, Secretary General, IWTMA delivering the inaugural address

The course was inaugurated by Shri. D. V. Giri, Secretary General, Indian Wind Turbine Manufacturer Association (IWTMA) and was attended by 40 student participants from various educational disciplines like Energy, Power, Electrical, Mechanical, Electronics, Power System and Aero Mechanical Engineering and also Energy Audit, Management, Heat Power, Renewable Energy and Environment Engineering.

Shri. C. V. Shankar, I. A. S, Principal Secretary to Government, Environment & Forest, Tamil Nadu delivered the valedictory speech and distributed the certificates to the course participants.



Qualification of the participants

Shri. C. V. Shankar, I. A. S distributing the Course Certificate

13th National Training Course

The 13th National Training Course on "Wind Energy Technology" was successfully organized during 12th - 14th December 2012 and was attended by 65 participants comprising of wind turbine manufacturers, developers, investors, consultants and academicians from 18 States across the country.

The training course was inaugurated by Shri. A. Mehar Prasad, Professor, Department of Civil Engineering, Indian Institute of Technology Madras, Chennai.

Shri. A Mehar Prasad inaugurating the course

Shri. Ajit Kumar distributing the course certificate

Shri. Ajit Kumar, CEO & Editor, Radiance Media, New Delhi was the Chief Guest of the valedictory function and he had distributed the Course Certificate to all the participants after his valedictory address.

International Training Programme

Two International trainings were organized during this period, one under Indian Technical & Economic Cooperation (ITEC) & Special Commonwealth Assistance for Africa Programme (SCAAP) and the other under Africa India Forum Summit - II (AIFS-II). International training programme are generally designed for 3 to 4 weeks covering class-room lectures with practical classes apart from organizing visits to wind turbine manufacturing facilities and wind farms.

Participants in front of C-WET Campus

About 45 lectures were delivered by C-WET Scientists, Industrialists, Academicians, Entrepreneurs, Manufacturers, Consultants and other National Experts. During this period, about 52 participants across 3 continents have participated and the participants are mostly Government officials from Ministries who are in the process of implementing the introduction of renewable energy in their countries. Over 96% of participants who rated the courses as good to excellent.

Ninth International Training Programme

ITCS Unit had successfully organized the Ninth International Training Programme on "Wind Turbine Technology and Applications" during 5th - 27th September 2012. This is a special training course for Indian Technical and Economic Co-operation (ITEC) and Special Commonwealth Assistance for Africa Programme (SCAAP) partner Countries organized by Centre for Wind Energy Technology, Chennai, India under the ITEC / SCAAP programme of Ministry of External Affairs (MEA), Government of India with the support of Ministry of New and Renewable Energy (MNRE), Government of India. Thirty one participants attended the course coming from 22 countries (Afghanistan, Ethiopia, Ghana, Iraq, Kazakhstan, Kenya, Lesotho, Malaysia, Mongolia, Myanmar, Niger, Nigeria, Peru, Philippines, South Africa, Sri Lanka, Sudan, Syria, Thailand, Tanzania, Ukraine and Vietnam). The training course was inaugurated by Shri. Mooza Raza I. A. S,

Shri. Moosa Raza I.A.S inaugurating the course

Participants in the process of manufacturing Small Wind Turbine

Dr. M. Sekar, Dean, CEG, Anna University distributing the certificate

Padma Bhushan Awardee, Member, RFD-ATF, New Delhi, Former Chief Secretary to Government of J&K & Secretary to Government of India.

As part of the training course, the practical training with Wind Resource Assessment, instrumentation, Testing & R&D equipments was arranged, apart from the factory visits to M/s. ReGen Powertech at Tada where they had a chance of listening from the industry experts who is actually in the process of making wind turbines and visiting the manufacturing facilities.

To provide hands on experience, the participants have been taken to M/s. MinVayu facilities at Auroville where all the participants had a chance of manufacturing Small Wind Turbine themselves after getting theoretical training of how to manufacture the Small Wind Turbine with the local materials at low cost. The participants also travelled to southern part of Tamil Nadu to visit Wind Turbine Test / Research Station, Kayathar and got to know about large and small wind turbine testing process and they also had an opportunity of visiting wind farms in and around Kanyakumari, where wind turbines are installed in large numbers like coconut trees.

Shri. Dr. M. Sekar, Dean - CEG, Anna University, Chennai was the Chief Guest for the valedictory function and distributed the course certificates to all the participants.

10th International Training Programme

The 10th International Training Programme on "Wind Turbine Technology and Applications" was successfully organized by the Unit during 20th March - 12th April 2013 specially for African Countries sponsored by Ministry of External Affairs (MEA), Government of India and supported by Ministry of New and Renewable Energy (MNRE), Government of India.

The 10th International training programme was inaugurated by Shri. M. P. Ramesh, President, Wind World (India) Ltd. and the former Executive Director, C-WET.

Practical training with Wind Resource Assessment, instrumentation, Testing equipment, R&D equipment was made available and factory visits to M/s. Leitner Shriram Manufacturing Ltd., Gummidipundi, M/s Gamesa Wind Turbines Pvt. ltd., Chennai & M/s. MinVayu facilities (Small

Chief Guest releasing the Course Material

Participants in front of the C-WET campus

Wind Turbine Training), Auroville, Pondicherry and wind farm visit to Wind Turbine Research Station, Kayathar, Tamil Nadu were arranged.

Global Wind Day 2012

"Global Wind Day 2012" was celebrated on 15th June 2012 at C-WET. As part of the programme, a special lecture was organized at the Conference Hall, C-WET on "Success of Wind Energy in Tamil Nadu and its Sustainability" delivered by Shri. Rajeev Ranjan, I.A.S., Chairman-cum-Managing Director, Tamil Nadu Generation and Distribution Ltd. Chennai marked the year's Global Wind Day. All C-WET staff and some of the TNEB officials participated in the event. The issues related to the Wind Energy and Tamil Nadu were highlighted in his special lecture.

The Chief Guest, Shri. Rajeev Ranjan was taken to C-WET campus tour, where the C-WET activities and services where explained.

Shri Rajeev Ranjan delivering the address on Global Wind Day & visiting SRRA Station

C-WET's Newsletter – PAVAN

ITCS Unit is regularly publishing the C-WET's bilingual (Hindi & English) Newsletter PAVAN every quarter, which carries information about C-WET activities and services, wind energy news, technical articles and information on wind energy related events, which is very much useful for the wind industry. During this period, ITCS Unit had published four issues of PAVAN

from 33rd to 36th issue. The publication has received good feedback over the years. The PAVAN aims to keep the industry professionals, students and researchers updated about the progress in wind energy sector and C-WET activities & services.


pavan

C-WET

A News Bulletin from CENTRE FOR WIND ENERGY TECHNOLOGY, Chennai

ISSUE - 36
January - March 2013

EDITORIAL

Contents

Editorial Board

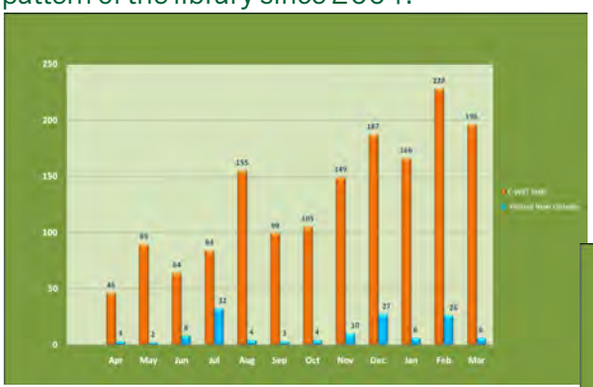
Prof. Anna Mani Information Centre

ITCS Unit has established and managing the state-of-art C-WET library named after renowned meteorologist "Prof. Anna Mani" as Information Centre, with more than 2300 books on renewable energy in general and wind energy in particular with allied subjects. Prof. Anna Mani Information Centre plays a vital role in Wind Research and Development by way of providing necessary assistance in terms of facilitating important information resumes in both printed and e- document form related to the Wind Energy and its core subjects. It identifies, evaluates, procures, processes and then makes learning resources available to the Scientist and Technical and Non- Technical Staff for their learning and research assignments. The library provides effective information support towards accomplishing different activities of C-WET. The library is being strengthened regularly by adding more books, periodicals (Indian & foreign journals and magazine), standards, reports, dictionaries, encyclopedias and etc. The collection is concentrated towards subjects like wind energy, renewable energy, energy, sustainable energy and related subjects like electrical, electronics, mechanical and environmental sciences and good collection in computer disciplines as well as general facets. Library has the seating Capacity of 14 with 700 square feet of space approximately.

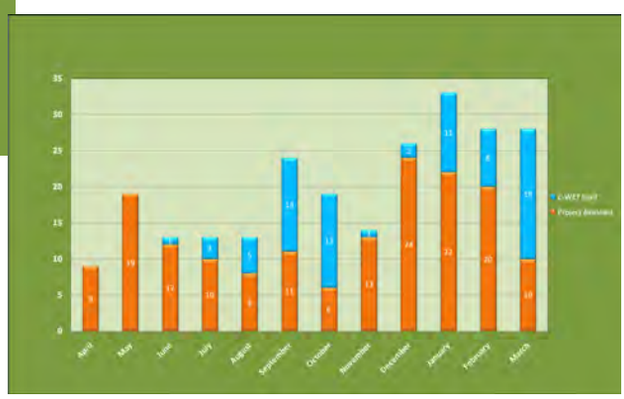
For easy and quick reference, the library has been automated by using library automation software and also Online Public Access Catalog (OPAC). The library also has subscription to membership with leading libraries like IIT Madras, Anna University and American Library for reference purposes. Apart from C-WET staff, the library is widely used by many students and

C-WET Library is not only useful and used for C-WET Staff but also used by many researchers and users from educational institutions, manufacturers, developers, investors, consultants etc.

research scholars for their project and research works. The following graph show the user pattern of the library since 2004.



Library User report for the period April 2012 – March 2013



Books Issued for the period April 2012 - March 2013

In this financial year, Prof. Anna Mani Information Centre is added with 100 new books and magazines. The library also compiles news and latest developments related to wind energy every month from all information sources and making it available for its users.

Library Collection

Print – Resources		E-Resources	
Total collection	2,455	CD & DVD Collection	124 (Standards)
Books	1,719	Online Periodicals	20
Donated Books	630	**Others**	
Periodicals (Subscribed)	48	Standards (ISO, IEC & IS)	124 (CD/DVD)
Free Periodicals	20	NABL	32 (Printed Document)
National Journals	11	Technical Reports	316
International Journals	19	Annual Reports	82
National Magazines	8	Souvenirs & Manuals	27
International Magazines	7	Conference Proceedings	321
Membership	3		
Newspapers	10		

Services Provided by Prof. Anna Mani Information Centre

• Circulation Service	• Web based On-line Public Access Catalogue
• Information alert service	• Current awareness service
• Reference Service	• User Orientation/Information Literacy
• Referral Service	• Document Delivery Service
• Literature Search	• Selective dissemination of information
• Photocopy service	• New Arrival Display service

C-WET's Bi-lingual Website

Home page of C-WET's Bilingual website

The ITCS Unit has designed and managed a well structured and resourced bilingual (Hindi & English) website of C-WET until September 2012 and now taken care by the newly formed information Technology Management Cell (ITMC). The websites can be accessed through its URL, http://cwet.res.in (hosted on C-WET server) and www.cwet.tn.nic.in (hosted in NIC server). The website has detailed information about activities & services of C-WET and useful information on wind energy. The website is continuously updated with latest information on wind energy and it also has information resources like glossary frequently asked questions and free quarterly Newsletters, Annual Reports carrying latest developments and technical updates in the wind industry. An average of 200 visitors daily browse the C-WET websites from all over the world.

IT Services

The ITCS Unit has planned and executed the establishment of IT infrastructure and services including Internet, Intranet, inter and intra websites, email & e-security facilities to support smooth and efficient execution of activities and services of C-WET.

C-WET IT operations are not much energy intensive, however, significant measures have been taken to reduce energy consumption by using energy-efficient computers and IT Equipments. Continued efforts has been taken towards restructuring the existing data centers and server rooms for efficient and quick services with very good Uninterrupted Power Supply (UPS) System. Since September 2012, the IT facilities and services is now managed and taken care by the temporarily formed Information Technology Management Cell (ITMC) under the direct supervision of Executive Director, C-WET.

C-WET – IWTMA Event

To keep pace with the latest technologies among the working professional of the wind energy, C-WET and IWTMA jointly organized a one day workshop on MAST Software of Vortex for Wind Resource Assessment on 4th April 2012 and a one day seminar on Innovation Impacts on Wind Turbine Simulation and Test Process by LMS International on 25th June 2012. Professionals from wind industry, C-WET Scientists & Engineers attended the seminar.

Participation in Exhibitions

ITCS Unit had established and managed, C-WET stalls during exhibitions and trade fairs and demonstrated the activities and services of C-WET along with environmental benefits of harvesting wind energy. C-WET representatives took part in the following events and

interacted with thousands of wind energy professionals, researchers, students and general public:

C-WET participated in the following exhibitions during 2012-13:

- 2nd International Conference and Exhibition "Wind Power India - 2012" held during 28th - 30th November 2012 at Chennai Trade Centre, Chennai.
- 100th Indian Science Congress 'Pride of India' Exhibition held during 3rd to 7th January 2013 at Kolkata.

Visitors to the Centre

To motivate the students towards research on wind energy, achieving the indigenization and also to create awareness about the activities and services of C-WET, we encourage School and College students to visit the campus. During the period from April 2012 to March 2013, the following visits were coordinated by ITCS Unit with a presentation on wind energy and its status along with C-WET's activities & services and the campus renewable energy facilities were also explained / showcased in detail.

School Students Visit

- 40 students along with 3 staff from The Gateway Hi Complete School on 27th November 2012.
- 83 students of 4th to 7th Standard of Ponvidhyasramam, Chennai on 20th February 2013.

The School Children's listening the wind energy lecture

College students tour to C-WET Campus

College Students Visit

No	Name of the Institution / Organization College / Schools	Department	No.of Visitors	Date of Visit
1	Anna University, Chennai	Institute of Energy Studies	32	04-05-2012
2	Rajalakshmi Engineering College, Chennai	Electrical & Electronics Engineering	52	04-04-2012

No	Name of the Institution / Organization College / Schools	Department	No.of Visitors	Date of Visit
3	Aalim Muhammed Salegh College of Engineering, Avadi, Chennai	Electrical & Electronics Engineering	40	06-08-2012
4	SRM University, Chennai	Electrical and Electronics Engineering	51	08-08-2012
5	Anna University, Chennai	ME Power Systems	19	10-08-2012
6	SKR Engineering College, Chennai	ME Power Electronics	20	29-08-2012
7	Sai Ram Engineering College, Chennai	Electrical and Electronics Engineering	42	12-07-2012
8	Hindustan University, Chennai	Electrical and Electronics Engineering	52	24-07-2012
9	Hindustan University, Chennai	Electrical and Electronics Engineering	54	26-07-2012
10	Velammal Engineering College, Chennai	ME Power Electronics	19	26-07-2012
11	Easwari Engineering College, Chennai	Electrical and Electronics Engineering	64	03-10-2012
12	Easwari Engineering College, Chennai	Electrical and Electronics Engineering	64	05-10-2012
13	N.P.R College of Engineering and Technology, Natham	Electrical and Electronics Engineering	69	08-10-2012
14	Sri Sai Ram Engineering College, Chennai	Mechanical Engineering	60	06-11-2012
15	SJS Paul Memorial College, Pondicherry	Mechanical Engineering	65	05-02-2013
16	Panimalar College of Engineering, Chennai	Computer Science and Engineering	82	06-02-2013
17	Panimalar College of Engineering, Chennai	Computer Science and Engineering	65	08-02-2013
18	Amrita School of Engineering, Coimbatore	PGD WPD & WRA	29	13-02-2013
19	SA Engineering College, Chennai	Electronics and Communication Engineering	70	15-02-2013
20	Kamaraj College of Engineering, Virudhunagar	Mechanical Engineering	48	18-02-2013
21	Jerusalem College of Engineering, Chennai	MBA	52	19-02-2013
22	Velammal Engineering college, Chennai	ME Mechanical	45	25-02-2013

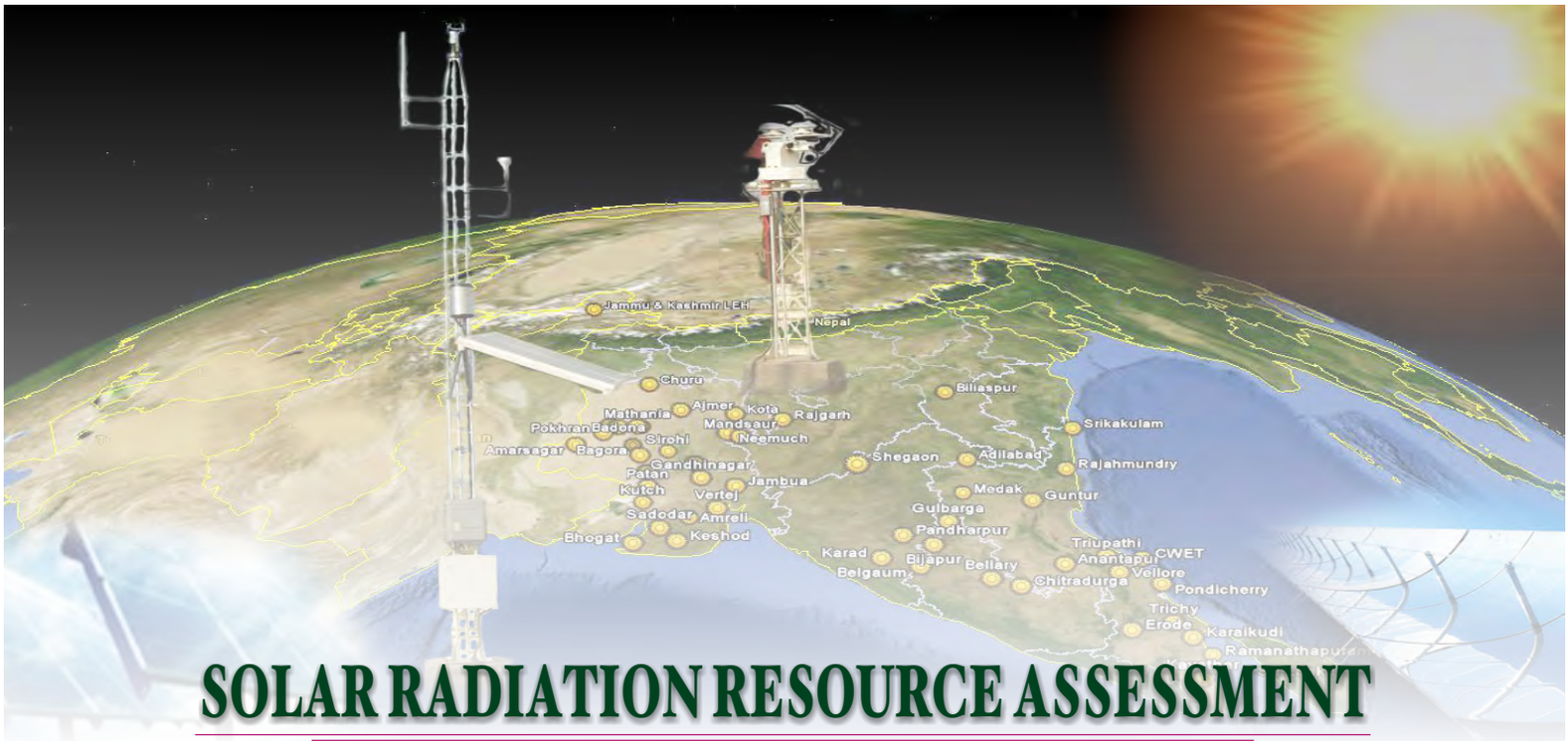
Special Visits

- 42 participants from Bangladesh and Nepal Journalists & Editors on 18th May 2012.
- 18 Participants from National Institute for Technical Teachers Training visited on 4th July 2012.
- 30 International participants of the training course on "Wind Power Development and Use" organized by LIFE Academy, Sweden as part of the Regional Phase on 2nd November 2012.
- 22 International participants of the training course on "Wind Power Development and Use" organized by LIFE Academy, Sweden as part of the Regional Phase on 1st March 2013.
- 12 participants of the ITEC training programme on "Decentralized Distributed Generation and Rural Distribution Management" from Institute for International Power Executives organized by Rural Electrification Corporation Ltd., Hyderabad on 14th March 2013.

Joint Secretary, MNRE & Sr. Advisor (Energy), Planning Commission visit to C-WET

The Joint Secretary, MNRE, Shri. Alok Srivastava, I.A.S., & Shri Anil Jain, Sr. Advisor (Energy), Planning Commission visited C-WET on 28th June 2012 and interacted with Executive Director, Unit Chiefs and Scientists. All the Unit Chiefs made presentations highlighting their respective unit's activities and progress since beginning of C-WET. After the brief presentation by the Executive Director a visit to all the units and infrastructure facilities were arranged and expressed their appreciation for C-WET's effort so far and offered valuable suggestions towards the future development.

Also they had visited WTRS/WTTS, Kayathar along with Executive Director and General Manager (F&A) on 29th June 2012 and dedicated the Battery Operated Vehicle for facilitation of man & material (Equipment) movement, within C-WET's research wind farm & WTG test beds.



SOLAR RADIATION RESOURCE ASSESSMENT

Ministry of New and Renewable Energy (MNRE), Government of India has sanctioned a project for the establishment of nation-wide network of Solar Radiation Resource Assessment (SRRA) stations to make available good quality measured solar radiation data to meet the specific challenges in the implementation of Jawaharlal Nehru National Solar Mission (JNNSM). One of the major objectives of JNNSM is to establish India as a global leader in Solar Energy. The SRRA project is implemented by Centre for Wind Energy Technology, Chennai, an autonomous R&D institution under the Ministry, because of its rich experience all over India in Wind Resource Assessment and development of Wind Atlas of the nation. An exclusive SRRA unit, on a mission mode was established at C-WET to collect and analyze solar and other relevant meteorological data crucial for planning and implementation of solar power plants. The scope of the SRRA project is to assess and quantify the ground data of solar radiation, data processing & quality assessment of data collected, modelling and development of Solar Atlas of the country.

Contribution

SRRA project was sanctioned in February 2011 for establishing 51 SRRA stations in 10 States and one Union Territory (Puducherry). All the 51 stations have been successfully commissioned during the period May to October 2011. A SRRA station consists of two towers of 1.5 m and 6 m tall. The 1.5 m tall tower houses a solar tracker equipped with Pyranometer, Pyranometer with shading disc and Pyrheliometer to measure solar parameters, such as, global, diffuse and direct radiation respectively. The 6 m tall tower houses instruments measuring ambient temperature, relative humidity, atmospheric pressure, wind speed and direction. Besides this, a tipping bucket rain gauge is also installed at the SRRA station for measuring rainfall. All the sensors are traceable to World Radiometric Reference with high accuracy to ensure good quality of recorded data. Each SRRA station is uniquely identified by it's GPS locator and is totally

powered by 160 watt SPV panels with two 42 AH batteries. The 'GPRS' embedded data acquisition and transfer system records 37 measured and derived parameters. The activities of SRRA unit are highlighted below:

- Quality Control statistics and monthly quality check reports are generated for all the 51 SRRA stations on a monthly basis.
- Hon'ble Union Minister for New & Renewable Energy, Dr. Farooq Abdullah dedicated the Solar Radiation Resource Assessment Facility to the Nation and officially released the SRRA Brochure on 28th November 2012.

Hon'ble Minister of MNRE Dedicating SRRA facility to the Nation & releasing the SRRA brochure

- SRRA Website was launched on 7th December 2012 at Scope Complex, New Delhi by Shri. Tarun Kapoor, Joint Secretary, MNRE.
- Establishment of calibration laboratory, on the roof top of C-WET has been initiated.

Achievements of Unit

- A training program on the "Functioning and Maintenance of SRRA Station" for the station in-charges of Gujarat, Madhya Pradesh, Chhattisgarh, Maharashtra (Pandharpur) and Jammu & Kashmir (Leh) was organized at PDPU, Gandhi Nagar on 26th April 2012.
- SRRA Data Centre with dedicated 24 x 7, multi-level redundancy server with a 'Compute-Server' for performing quality assessment of SRRA data were established and started functioning from 20th July 2012.
- MNRE Approved Solar Data Sharing and Accessibility Policy (SDSAP-2012) was uploaded in C-WET website on 17th August 2012.
- Quality Control algorithm version for data analysis upgraded from V1.0 to V1.1 after data resolution was changed to one minute averaging from 10 minutes in October 2012 to comply with WMO standards. Quality Control Algorithms were developed by Shri. Kaushal Chhatbar, Suntrace official, engaged by GIZ, of Germany under the Indo-German collaboration on Energy.
- A Calibration Laboratory has been established on the terrace of C-WET main building.

- A level-3 (L3) SRRA data base without data gaps has been developed for the available data with upgraded algorithm.

Future Plans

- Setting up of additional 60 more SRRA stations under SRRA Phase-II program to cover the uncovered States and Union Territories.
- Setting up of 4 Advanced Measurement Stations.
- Consultancy services in the measurement of Solar Radiation Resource Assessment , DPR preparation for SPV plants, energy estimation projects etc. Maharashtra Energy Development Agency (MEDA), Pune is in discussions with C-WET for setting up of 4 SRRA stations with their own funds.

Visitors to Unit

- Dr. Farooq Abdullah, Honorable Cabinat Minister, MNRE along with Mr. Tarun Kapoor, Joint Secretary, MNRE visited on 28th November 2012 and dedicated the SRRA facility to the nation.
- Dr. Richard Meyer, Mr. Kaushal Chhatbar, Mr. Marko Schwandt of M/s Suntrace,Germany visited in connection with the development / modification / up gradation of algorithm for SRRA Data quality check in July & December 2012 and February & March 2013.
- Ms. Preeti Malhotra, Director, Environmental Policies & Global Advocacy, visited on 1st February 2013.
- Dr. R.R.Sonde, Executive Vice President Thermax Limited, Pune visited on 4th February 2013.
- Dr. Jens Burgtorf, Director, Indo-German Energy Program, GIZ visited C-WET, Chennai in March 2013, which was organized by Dr. Indradip Mitra, who is posted at C-WET, Chennai from GIZ, New Delhi under Indo-German Energy Program.

Meeting with Dr. Jens Burgtorf, Director, Indo-German Energy Program, GIZ

INVITED LECTURES DELIVERED BY C-WET STAFF IN CONFERENCES AND SEMINARS

Dr. S. Gomathinayagam, Executive Director

- "Wind Energy conversion technology and power generation" at SERC campus for M.Tech (Renewable Energy) students of Academy of Scientific and Innovative Research (AcSIR) on 14th September 2012.
- "Grid Connected Wind Energy Conversion System-Current Trends" at SKR Engineering College, Poonamalle, Chennai on 27th August 2012.
- "Development of Renewable Energy Sources-Reference to Wind Energy" at the Madras Chamber of Commerce & Industry Conference on Tamil Nadu Power Dynamics and Future Perspectives at Chennai on 15th December 2012.
- "Wind power development in India - way forward" in the Regional Phase of International training programme 'Wind Power Development and Use' organized by LIFE Academy / SIDA, Sweden at Hotel Raj Park, Chennai on 31st October 2012.
- Wind Energy-Way for ward" at International Workshop on RE Climate Change & Energy Management 2013 organized by Federation of Indian Chambers of Commerce and Industry (FICCI) on 28th January 2013.
- "Wind Power Development in India- Way Forward" in the Regional Phase of the international training on "Wind Power Development and Use" organized by LIFE Academy / SIDA, Sweden at Hotel Raj Park, Chennai on 27th February 2013.
- Keynote address at World Renewable Energy Tech Congress on 26th April 2012.
- Chaired Inaugural Session and gave inaugural address for two days workshop on "Emerging Trends in Renewable Energy" at Dr. MGR University, Chennai on 20th September 2012.
- Meeting on Wind Energy update -Wind development forum India at Hotel Le Meridien, New Delhi and chaired the session "Venturing offshore-taking the first steps" on 7th September 2012.
- Inaugural function of Association of Aeronautical Engineers at MIT, Chrompet on 31st August 2012.
- Guest of Honor & delivered key note address at National Level Conference on "Recent Trends in Power Electronics for Renewable Energy Systems" of Dhanalakshmi College of Engineering, Tambaram, Chennai on 31st August 2012.
- Chaired a session on behalf of C-WET for Webinar on 'Offshore Wind Power' at British High Commission on 30th August 2012.
- Chief Guest for the Valedictory function for IEEE Tech Work shop on "Smart Grid" at Anna University, Alumni Centre on 26th August 2012.

- Chief Guest at Praudyotsav 12 at Prathyuksha Engineering College, Poonamallee, Thiruvallur on 14th August 2012.
- Chief Guest for the Annual General Meeting and Investors Meet at Coimbatore conducted by IWPA on 11th July 2012.
- Chief Guest at Arunai College of Engineering, Tiruvannamalai for inauguration of EEE Department Association on 7th July 2012.
- "Development of Renewable Energy Sources-Reference to Wind Energy" at the Madras Chamber of Commerce & Industry Conference on Tamil Nadu Power Dynamics and Future Perspectives at Chennai on 15th December 2012.
- Chaired Sessions / Panelist at Wind Power India 2012, 2nd International conference & Exhibition at Chennai Trade Centre, Chennai held during 28th to 30th November 2012.
- Chief Guest at "International Conference on Wind Energy" organized by BITS Pilani Hyderabad on 22nd November 2012.
- Chief Guest & inaugurated "Perspectives of Offshore Engineering" organized by Ocean Engineering Department, IIT Madras, Chennai on 19th November 2012. Conference
- Key Note Address in the Faculty Development Programme at S. A. Engineering College, Chennai on 15th October 2012.
- "Enhancing Energy Security in the Asia Pacific Region" in the "UN-ESCAP Regional Dialogue on Promoting Off-grid Renewable Energy Technologies" organized by UNESCAP at Hotel Raj Park, Chennai during 4th —5th October 2012.
- Panelist for the "Wind Power-Key to future sustainability" —Green Energy Summit 2013 at New Delhi on 14th February 2013.
- Chief Guest for the 4th National Level Symposium, Pradyotsava 12 at Prathyusha Engineering College, Thiruvallur on 21st February 2013.
- Chief Guest for Intra Departmental "TECHFEST" held at Jerusalem College of Engineering on 11th March 2013.

Research & Development

Rajesh Katyal, Scientist & Unit Chief

- Key Note address at National Seminar on "Exploring Research Areas in Harnessing Wind Energy" at VIT University, Chennai on 28th April 2012.
- "Wind Resource Potential and Way Forward for Offshore Development in India" at PSGR Krishnammal College for Women, Coimbatore on 30th August 2012.
- "Lightning protection – Wind Resources and Way-forward for development of offshore wind energy" at symposium organized by M/s. Dehn India Pvt. Ltd. on 9th May 2012.
- "Wind Turbine Technology" at SSN College of Engineering on 24th July 2012.
- "Wind-Solar Hybrid System" at India Habitat Centre, New Delhi, in a Symposium organized by M/s. Dehn India Pvt. Ltd., on 27th September 2012.

- "Small Wind Turbine and Hybrid Technology" in a "short-term training program for Architectural Faculty" organized by SRM University, Chennai on 19th December 2012.
- "R&D aspects of C-WET" was prepared and delivered at Income Tax (Exemptions) Dept. at Chennai.
- "Wind Turbine Towers and Foundations" and SWT and Hybrid System were delivered at AMRITA School of Engineering on 26th February 2013.
- "Small Wind Turbine testing and empanelment in India – How far we have come?" one-day conference on Small Wind and Hybrid Systems organized by Wind Power India at Chennai on 29th November 2012.

Deepa Kurup, Scientist

- "Power Quality Issues, Classifications, Assessment" during one Week Short Term Training Program on "Modelling & Simulation of Wind Turbine Generators for Power System Studies" organized by Sri Lakshmi Ammal Engineering College, Thiruvancheri, Chennai on 11th May 2012.
- "Grid Integration of Turbines" at S.A. Engineering College at Chennai on 17th October 2012.

Wind Resource Assessment

K. Boopathi, Scientist & Unit Chief i/c

- "Wind Resource Assessment and Techniques" in connection with the "International Workshop and Conference on Renewable Energy and Climate Change – Exploring Opportunities for Sustainable Development - IWCRECC – 2012" at Madurai Kamaraj University on 6th April 2012.
- "Wind Resource Assessment" to the students of IIT-Madras on 3rd November 2012.
- "Wind Resource Assessment Techniques" & "Wind Resource Assessment by using Remote sensing Instruments" at Amrita School of Engineering, Coimbatore on 15th March 2013.

Wind Turbine Testing

S. A. Mathew, Scientist & Unit Chief

- "Wind Turbine Testing" at Amrita School of Engineering, Coimbatore on 17th April 2012.
- "General Overview on Wind Industry" at Symposium for wind industry organized by DEHN India Pvt. Ltd. held at Radisson Blue, Chennai City Centre, Chennai on 9th May 2012.
- " Prospects & Challenges of Wind Energy Deployment in India" at the interactive discussion with senior officials from Tata Consultancy Services (TCS), IIT Research Park, Chennai on 28th June 2012.

M. Anvar Ali, Scientist

- "Grid Interaction of Wind Turbines" at BHEL campus, BHEL, Ranipet on 7th June 2012.
- "Wind Energy" to students of the Mechanical & Production department at Sathyabama University, Chennai on 16th August 2012.
- "Salient Features of Wind Power Generation and Grid Connectivity" at Central Institute for Rural Electrification (CIRE), Hyderabad on 18th September 2012.

Wind Turbine Research Station

A. Mohammed Hussain, Scientist & Unit Chief

- "Operation and Maintenance of Wind Electric Generators and Wind Farm" at Cape Institute of Technology, Nagercoil, Tamil Nadu on 2nd May 2012.
- "Indian Wind Energy Scenario" at National College of Engineering, Maruthankulam, Tirunelveli on 12th October 2012.

Standards & Certification

Arulselvan, Assistant Enigneer

- "Design requirements of control and protection system" in the faculty Development programme organized by S.A.Engineering College, Chennai on 17th October 2012.

Information Training and Commercial Services

P. Kanagavel, Scientist & Unit Chief i/c

- "Wind Power Development in India" in the International Workshop and Conference on Renewable Energy and Climate Change-Exploring Opportunities for Sustainable Development – IWCRECC – 2012 held during 5th - 7th April 2012 at Madurai Kamaraj University, Madurai on 6th April 2012.
- "Wind Energy: A solution for sustainable future" in the National level Seminar on Renewable Energy Xplorer organized by N.P.R College Engineering & Technology, Natham on 27th August 2012.
- "Renewable Energy" in the INSPIRE Science camp at Kamaraj College, sponsored by DST, Tuticorin on 30th November 2012.
- "Overview of Renewable Energy Development in India" in the Regional Phase of International training programme on "Wind Power Development and Use" organized by LIFE Academy / SIDA, Sweden at Hotel Raj Park, Chennai on 31st October 2012.
- "Role of C-WET in Wind Power Development" in the Regional Phase of International training programme "Wind Power Development and use" organized by LIFE Academy / SIDA , Sweden at C -WET, Chennai on 2nd November 2012.
- "Wind Energy: At a glance" in the Faculty Development Programme S.A. Engineering College, Chennai on 15th October 2012.
- "Overview of Development of Renewable Energy in India" in the Regional Phase of the international training on "Wind Power Development and Use" organized by LIFE Academy / SIDA, Sweden on 27th February 2013 at Hotel Raj Park, Chennai.
- "Role of C-WET on Wind Power Development in India" including C-WET's activities & services in the Regional Phase of the international training on "Wind Power Development and Use" organized by LIFE Academy / SIDA, Sweden on 1st March 2013 at C-WET, Chennai.

- "Wind Energy at a Glance" along with C-WET's activities & services for ITEC training participants of the course on "Decentralized Distributed Generation and Rural Distribution Management" organized by Rural Electrification Corporation Ltd., Hyderabad, while visiting C-WET campus on 14th March 2013.
- Inaugurated the CSIR Sponsored Two day Workshop on "Intelligent Controllers for Renewable Energy Systems" as Chief Guest organized during 22nd – 23rd March 2013 by the Department of Electrical & Electronics Engineering of Paavai Engineering College, Namakkal and delivered lecture on "Role of Renewable Energy Systems in Future Scenario & Building and Operation of Wind Energy Systems" on 22nd March 2013.

Solar Radiation Resource Assessment

Dr. G. Giridhar, Scientist & Unit Chief

- "National Solar Data Policy" in the PV Project Development Submit India, New Delhi during 30th to 31st July 2012.
- "Solar Photovoltaic and Solar Thermal Resource Characterization" in the meeting on United Nations ESCAP program on "Promoting off-grid Renewable Energy Technologies for Enhancing Energy Security in the Asia-Pacific Region" at Chennai on 4th October 2012.
- "Building integrated photo voltaic and green building" at SRM University, Chennai on 17th December 2012.
- Chief Guest and delivered keynote address in the Seminar on "Recent Development in Soft Energy Technology and ENERGY EXPO-2012" at Tirunelveli on 26th July 2012.
- Chief guest and delivered the keynote address in the two day national level Workshop on "Solar Energy" at Rajalakshmi Engineering College, Thandalam on 2nd August 2012.
- Inaugural address on Solar energy at Sri Ram Engineering College, Chennai on 1st March 2013.

R. Sasi Kumar, Scientist

- "Solar Radiation Resource Assessment" in the International workshop and conference on Renewable Energy and Climate Change" at Madurai Kamaraj University, Madurai on 5th April 2012.
- "Solar Radiation Resource Assessment in India" in the Hyderabad Solar Investment Summit at Hyderabad on 2nd February 2013.
- "National Convention on Challenges, Innovation & Opportunities to Enact Kyoto Protocol" at Sathyabama University, Chennai on 28th February 2013.
- Chief Guest in the National level symposium, Magnum Opus 2k12 at Annual Institute of Higher Technology on 21st September 2012.

R. Karthik, Scientist

- "Solar Power in India" in the Fifth Annual Conference at New Delhi during 26th – 27th June 2012.

The following staff delivered lectures(s) in National and International Training Courses organized by C-WET

12th & 13th National Training course on "Wind Energy Technology" during the year 2012

9th & 10th International Training Course on "Wind Turbine Technology & Applications" organised for ITEC/SCAAP Countries and Specially for African Countries respectively

Dr. S. Gomathinayagam, Executive Director

- Wind Energy Conversion Tech. and Power Generation : Introduction
- Wind Turbine Tower Concept

P. Kanagavel, Scientist & Unit Chief (i/c.), ITCS

- Role of C-WET in Wind Energy Development
- Environmental Aspects of Wind Turbine Technology
- Wind Energy Development in India

K. Boopathi, Scientist & Unit Chief (i/c), WRA

- Design and Layout of Wind farms
- Wind Turbine Components
- Wind Resources Assessment & Techniques
- Wind Resource Assessment by using Remote Sensing Instruments

J. C. David Solomon, Scientist, R&D

- Design Aspects of Drive Train
- Drive Train Concepts
- Wind Turbine Testing

M. Anvar Ali, Scientist,WTT

- Wind Electric Generators & Types
- Safety and Function Testing
- Wind Power Evacuation

S. Arulselvan, Asst. Engineer, S&C

- Design requirements of Control and Protection System
- Control and Safety System of Wind Turbine System

Rajesh Katyal, Scientist & Unit Chief, R&D

- Wind Turbine Foundation Concept
- Small Wind Turbines and hybrid systems

Deepa Kurup, Scientist, R&D

Grid Integration of Wind Turbines

A. Senthil Kumar, Scientist & Unit Chief, S&C

- Type Certification of Wind Turbines
- Type Certification of Wind Turbine and Overview of Design Requirements as per IEC 61400 - 1

S. A. Mathew, Scientist & Unit Chief, WTT

Wind Turbine Testing
Wind Turbine Testing & Measurement Techniques
Power Curve Measurements

Mohammed Hussain, Scientist & Unit Chief, WTRS

Indian Government Policies
Indian Government Policies, Schemes and Legal Frameworks
Overview of Testing facilities of WTRS

A.G. Rangaraj, Scientist, S&C

Wind Electric Generators & Types

A. Hari Bhaskar, Scientist, WRA

- Siting Guidelines for Wind Measurements
- Monitoring Station Instrumentation and Installation

G. Arivukkodi, Assistant Engineer, WRA

Measurement Parameters and Data Analysis

N. Raj Kumar, Scientist, S&C

Design aspects of Wind Turbine Gearbox

M. Saravanan, Scientist, WTT

Instrumentation for Wind Turbine Testing

R. Sasi Kumar, Scientist, SRRA

Wind - Solar Hybrid Systems

Practical Session at WRA Lab, C-WET and WTRS, Kayathar

G. Arivukkodi, Assistant Engineer & **T. Sureshkumar,** Junior Engineer

Wind Resource Assessment Lab (Instruments)

B. Krishnan, Junior Engineer & **R. Vinodkumar,** Technician

Wind Resource Assessment Lab (Remote Sensing & WAsP)

Instrumentation - Sensor wise at WTTS, Kayathar

A.R. Hassan Ali, Assistant Engineer & **Y. Packiyaraj,** Assistant Engineer
M. Karuppachamy, Assistant Engineer & **S. Paramasivam,** Junior Engineer

SEMINARS / CONFERENCES / TRAINING / EXTERNAL MEETINGS ATTENDED BY C-WET STAFF

Dr. S. Gomathinayagam, Executive Director

- Standing Parlimentary Committee on Energy meeting at New Delhi on 12th April 2012.
- India Wind Energy Summit on 20th April 2012.
- Sub Committee meeting on preparation of the draft policy guidelines on development of off-shore wind energy project at Ministry of New and Renewable Energy, New Delhi on 30th April 2012.
- 2nd Scientific Committee meeting at National Aerospace Lab, Bangalore on 16th May 2012.
- 3rd Organizing Committee meeting of IWTMA at Hotel Trident, Chennai on 19th May 2012.
- Chief Guest – Inauguration of R&D Centre at S.A.Engineering College, Chennai on 29th June 2012. Conference
- R&D Project review on "Everybody's Battery Charger" RMK College, Gummidipundi on 21st September 2012.
- Attended Stakeholder Consultation on India GHG protocol for Local Governments under project "Integrating Urban Climate Guidelines through Clean Technologies (RE & EE) at the State and City level to build Sustainable Low Carbon Cities", Tamil Nadu funded by the British High Commission (BHC), India at Raintree Hotel at Alwarpet, Chennai on 17th September 2012.
- Sub-Committee meet for preparation of Draft Policy Guidelines for development of offshore wind energy at MNRE, Newdelhi on 13th September 2012.
- Attended IEEE-PES two days workshop on "Advances in Distributed Generation, Microgrid, Net-metering and Renewable Integration at Bangalore and Chaired a session on "Storage Technologies on 24th August 2012. Conference
- Doctoral Committee Meeting to consider Ph.D. Synopsis Meeting at MIT, Department of Aerospace on 17th August 2012.
- R&D Conclave on New and Renewable Energy-prospects for cross cutting technology during 9th to 10th August 2012.
- Offshore sub-committee meeting conducted by TANGEDCO, on 8th August 2012.
- Government stake holder's workshop for discussing the draft project report on "Action plan for comprehensive renewable development in Tamilnadu on 6th August 2012.
- Round Table on "Wind Power Programme" conducted by MNRE on 1st August 2012.
- Project Monitoring Committee meeting of Technology Development Board (TDB/DST) on "Wind Turbine Development "at Vadodara on 27th July 2012.

- Parliamentary Standing Committee meet on Energy (2011- 2012) Examination of subject "International cooperation in New & Renewable Energy Sector" on 23rd July 2012.
- Industrial Exemption Committee Meeting on "Land Reforms under Sec 37-A Tamil Nadu" conducted by GoTN on 19th July 2012.
- "Environment Control - preparation of Tamil Nadu State Action Plan on Climate Change" conducted by GoTN/Energy on 12th July 2012.
- Invited guest for Industrial Meet at L&T construction on "Wind and Solar" at Manappakam on 6th July 2012.
- Wind Energy status review discussions with BHEL Senior Executives on 10th December 2012.
- Standing Committee Meeting on Energy - Examination of subject - International Co-operation in New & Renewable Energy Sector at Parliament House, New Delhi on 26th November 2012.
- Indo-ASEAN Ministerial Meeting at MNRE New Delhi on 7th November 2012 & Indo-ASEAN Meet at Delhi during 5th & 6th November 2012.
- Discussion on final Project Report on "Action Plan for Comprehensive Renewable Development in Tamil Nadu" at TEDA- organized by WISE, Pune on 30th October 2012.
- Visited the facilities at Great Lakes Institute of Management, Chennai on 22nd October 2012.
- TN State Council for Science & Technology (TNSCST) on 19th October 2012.
- Discussion of Draft Report on Offshore Wind Power Development at Ministry of New and Renewable Energy, New Delhi on 4th January 2013. Meeting.
- Adhoc Task Force (RFD) Meeting at New Delhi on 1st February 2013.
- Standards Working Group Meet on 5th February 2013.
- Solar Pump Tender meeting at TEDA on 11th February 2013.
- Hindi meeting at Ministry of New and Renewable Energy, New Delhi.
- Wind Turbines Sectional Committee (E42) meeting at BIS, New Delhi on 22nd February 2013.
- Round Table meeting at IIT Madras on Bureau of Energy Efficiency (BEE) on 23rd February 2013.
- "Pure Mobility Connect 2013" workshop on clean and sustainable transportation on 25th February 2013.
- TEDA meeting on Scheme on Energizing street lights with solar power on 1st March 2013.
- Committee meeting on Prototype wind turbine models on 12th February 2013.
- Secretary Meet at Ministry of New and Renewable Energy, New Delhi on "Findings on wind resource potential in India" on 14th March 2013.

- Doctoral Committee Meeting of Mr. Surendra Bogadi, Assistant Professor, Rajalakshmi Engineering College, Chennai.

Research & Development

Rajesh Katyal, Scientist & Unit Chief (i/c)

- Career Progression Path Scheme for Scientific Assistant - Assessment Committee of NIOT as an expert member on 27th June 2012.
- RTI – CPIOs Residential Training Program at Jaipur, during 12th – 14th July, 2012.
- Assessment Committee meeting at NIOT as a Member of the Committee on 15th November 2012.
- "Offshore Platforms" held at Ocean Department, IIT-Madras by Edinburgh Professor.
- Meeting with General Manager, Chennai Metro Rail Corporation for consultancy project.

J. C. David Solomon, Scientist

- International Conference on Wind Energy: Materials, Engineering and Policies" organized by BITS – PILANI Hyderabad campus from 22nd to 23rd November 2012.
- 100th Indian Science Congress and Exhibition organized at University of Calcutta, Kolkata during 3rd to 7th January 2013.
- "Offshore Platforms" held at Ocean Engineering Department, IIT-Madras by Edinburgh Professor.

Deepa Kurup, Scientist

- International Conference on Wind Energy: Materials, Engineering and Policies" organized by BITS – PILANI Hyderabad campus from 22nd to 23rd November 2012.

M.R. Gunasekaran, Sr. Stenographer

- Training programme on "Developing Executive Secretary, PA, PS & Office Staff for Future" organized by National Productivity Council at Jaipur during 25th to 29th June 2012.

Wind Resource Assessment

K. Boopathi, Scientist & Unit Chief (i/c)

- Renewable Energy (Wind Energy) Meeting held at Scope Complex, Ministry of New & Renewable Energy, New Delhi on 2nd May 2012.
- DPR Preparation and discussion with Chairman & Managing Director, JNPT, Mumbai for 50 MW wind farm development at Maharashtra.
- Technical Committee Meeting held on 4th May 2012 for recommending and appraising the technical bids received for "supply of anemometers, wind sensors & data loggers".
- Pre bid meeting held at Neyveli Lignite Corporation, Neyveli on 25th - 26th May 2012
- Agency for Non-Conventional Energy and Rural Technology (ANERT), 12th Technical Evaluation Committee meeting at Trivandrum, Kerala for developing 22 MW Wind Farm on 5th June 2012.

- Inspected and suggestions/advice were given to the fabricator (M/s. Shah Energy Inc. Davangere) for 100 m lattice mast fabrication work on 10th July 2012.
- Setting up of remote sensing instruments for Wind Turbine Wake Study & Validation of Triton SODAR, LIDAR with met mast at Kayathar on 22nd - 23rd July 2012.
- Inspected and suggestions/advice were given to the fabricator (M/s. Ramakrishna Iron Works, Maharashtra) for 100 m lattice masts fabrication work on 6th - 7th August 2012.
- Pre bid meeting at M/s.BEL, Bangalore on 9th August 2012.
- EOI meeting on Design, Fabrication, Transportation, Civil Work and Installation of 100 m tall offshore guyed latticed mast including foundation and operation & Maintenance for tower and guys at Dhanushkodi with the manufacturers/ private firms held at C-WET on 31st August 2012.
- Nowcasting Scientists/ Engineers at M/s.NAL, Bangalore and had a discussion with the team members for carrying out Wind Power forecasting on 10th August 2012.
- Pre bid meeting and provided consultancy services for M/s.THDC India Ltd., Rishikesh, Uttarakhand from 4th to 7th December 2012.
- Technical Committee Meeting to evaluate the bids received for erection, dismantling, transportation, civil works, lowering & hauling up of Wind Monitoring mast at C-WET on 14th December 2012.
- Technical Committee meeting for discussion & clarification received from vendors for Offshore 100 m met mast fabrication, installation and commissioning work at Dhanuskodi, Rameshwaram on 7th January 2013.
- To discuss the wind potential of Assam and establish WMS in Assam by OIL in collaboration with AEDA (Assam Energy Development Agency) convened by OIL (Oil India Limited) at Guwahati on 11th January 2013
- Techno Commercial meeting for M/s.THDC India Ltd., at Rishikesh, Uttarakhand from 11th - 14th February 2013.
- Wind Data Generator (WDG) software training conducted at C-WET on 27th February 2013.
- Techno Commercial meeting/discussion with NLC officials for the proposed 50MW wind farm project in India at Neyveli Lignite Corporation, Neyveli on 28th February - 2nd March 2013.
- Discussion/meeting with GM/officials of Karnataka Renewable Energy Development Agency, Karnataka on implementation of 100m Anemometry project and other ongoing WRA programmes in Karnataka on 11th March 2013.
- WAsP Engineering course and WAsP Certification at RISO- DTU, Denmark from 12th - 21st June 2012.

- "Finance for Non Finance Officials/Managers" organized Jaipur Productivity Centre, Jaipur at Goa during 19th - 23rd November 2012.

A. Haribaskaran, Scientist

- Wind Profile Measurement for 100 m offshore at Dhanushkkodi along with the Manufacturers / Private firms on 1st September 2012.
- Pre bid meeting of Southern Railways.
- Tamil Nadu Offshore meeting at the Chamber of Principal Secretary, Dept. of Energy, Govt. of Tamil Nadu on 21st May 2012.
- Technical Committee Meeting for recommending and appraising the technical bids received for "supply of anemometers, wind sensors & data loggers" on 4th May 2012.
- Wind Power developer's meet to formulate wind power policy for Uttar Pradesh at U.P.NEDA, Lucknow on 4th December 2012.
- Wind Turbine Wake Study & Validation of Triton SODAR, LIDAR with met mast for setting up of remote sensing instruments at Kayathar during 22nd to 24th July 2012.
- EOI meeting on Design, Fabrication, Transportation, Civil Works and Installation of 100 m tall offshore guyed latticed mast including foundation and operation & Maintenance for tower at Dhanushkodi with the manufacturers/ private firms at C-WET on 31st August 2012.
- Inspected and suggestions/advice were given to the fabricator M/s. Shah Energy Inc. Davangere for 100 m lattice mast fabrication work on 10th July 2012.
- Inspected and suggestions/advice were given to the fabricator M/s. Ramakrishna Iron Works, Maharashtra for 100 m lattice masts on 6th - 7th August 2012.
- Technical Committee Meeting for recommending and appraising the technical bids received for "Supply of Anemometers, Wind Sensors & Data loggers" on 4th May 2012.
- To discuss the wind potential of Assam and establish WMS in Assam by OIL in collaboration with AEDA (Assam Energy Development Agency) convened by OIL (Oil India Limited) at Guwahati on 11th January 2013.
- Discussion/meeting with GM/officials of Karnataka Renewable Energy Development Agency, Karnataka on implementation of 100 m Anemometry project and other ongoing WRA programmes in Karnataka on 11th March 2013.
- Training Programme on "Economics of Renewable Energy Based Power Generation" organized by Foundation for Innovation and Technology Transfer (FITT), Indian Institute of Technology (IIT), Delhi at IIT, Delhi during 29th May to 1st June 2012.
- Training on "Climate change and Carbon Mitigation" sponsored by Department of Science & Technology, Govt. of India at ICFRE, Dehradun from 19th to 23rd November 2012.
- Training on "Financing Renewable Energy Projects" at IIT, Delhi during 12th to 15th December 2012.

G. Arivukkodi, Assistant Engineer

- EOI meeting on Design, Fabrication, Transportation, Civil Works and Installation of 100m tall offshore guyed latticed mast including foundation and operation & Maintenance for tower at Dhanushkodi with the manufacturers/ private firms at C-WET on 31st August 2012.
- WAsP Engineering course and WAsP Certification at RISO- DTU, Denmark from 12th - 21st June 2012.

B. Krishnan, Junior Engineer

- Pre Bid meeting of Southern Railways
- Tamil Nadu Offshore meeting held at the Chamber of Principal Secretary, Department of Energy, Government of Tamil Nadu on 21st May 2012.
- Wind Turbine Wake Study & Validation of Triton SODAR, LIDAR with met mast for setting up of remote sensing instruments at Kayathar during 22nd to 24th July 2012.
- Field visit to Dhanushkkodi site along with the Manufacturers/Private firms for 100 m offshore wind profile measurement on 1st September 2012.
- To discuss the wind potential of Assam and establish WMS in Assam by OIL in collaboration with AEDA (Assam Energy Development Agency) convened by OIL (Oil India Limited) at Guwahati on 11th January 2013.
- WAsP Engineering course and WAsP Certification at RISO- DTU, Denmark from 12th - 21st June 2012.
- Training on "Financing Renewable Energy Projects" at IIT, Delhi during 12th to 15th December 2012.

T. Sureshkumar, Junior Engineer

- Wind Turbine Wake Study & Validation of Triton SODAR, LIDAR with met mast for setting up of remote sensing instruments at Kayathar during 22nd to 24th July 2012.
- EOI meeting on Design, Fabrication, Transportation, Civil Works and Installation of 100 m tall offshore guyed latticed mast including foundation and operation & Maintenance for tower at Dhanushkodi with the manufacturers/ private firms at C-WET on 31st August 2012.
- To discuss the wind potential of Assam and establish WMS in Assam by OIL in collaboration with AEDA (Assam Energy Development Agency) convened by OIL (Oil India Limited) at Guwahati on 11th January 2013.
- "Training Programme in MS Office Access for Officers & Staff" organized by ISTM, New Delhi from 4th to 6th February 2013.

R. Vinodkumar, Technician

- Wind Turbine Wake Study & Validation of Triton SODAR, LIDAR with met mast to set up remote sensing instruments at Kayathar from 22nd to 24th July 2012.

- EOI meeting on Design, Fabrication, Transportation, Civil Works and Installation of 100 m tall offshore guyed latticed mast including foundation and operation & Maintenance for tower with the manufacturers / private firms at C-WET on 31st August 2012.
- Wind Potential of Assam and establish WMS in Assam by OIL in collaboration with AEDA (Assam Energy Development Agency) convened by OIL (Oil India Limited) at Guwahati on 11th January 2013.
- "Training Programme in MS Office Access for Officers & Staff" organized by ISTM, New Delhi from 4th to 6th February 2013.

Wind Turbine Testing

S. A. Mathew, Scientist & Unit Chief

- Seventh Management Review Meeting for ISO/IEC 17025-2005 at C-WET on 14th June 2012.
- 32nd Residential Training Programme for CPIOs / CAPIOs / SPIOs / SAPIOs/Nodal Officers on the “Right to Information Act, 2005” at Hotel SMS Convention Centre of Rambagh Palace, Jaipur during 12th – 14th July 2012.
- External Audit by DNV pertaining to Quality Management System ISO 9001:2008 held at WTTS, Kayathar on 3rd & 4th September 2012 at C-WET.
- Three days training programme on “Measurement Uncertainty” organized by Bureau of Indian Standards at Bangalore on 10th - 12th September 2012.
- NABL Reassessment Audit ISO / IEC 17025:2005 held on 3rd & 4th November 2012 at WTTS, Kayathar.
- National Conference on “Embedded Systems and Advanced Communication Systems (ESAACS)” for the ECE & EEE students organized by Department of ECE & EEE Association of Ecentriconz held on 9th August 2012 at Vel Tech Dr. Rangarajan Dr. Sakunthala Engineering College, Chennai.

M. Anvar Ali, Scientist

- Seventh Management Review Meeting for ISO/IEC 17025-2005 at C-WET on 14th June 2012.
- Sectoral Working Group on “Energy Efficiency, Renewable Energy & Solar Mission” for the preparation of draft report on State Action Plan on Climate change (SAPCC) held under the chairmanship of the Principal Secretary, Energy organized by Tamilnadu Energy Development (TEDA) at Chennai on 27th July 2012.
- External Audit by DNV pertaining to Quality Management System ISO 9001:2008 held at WTTS, Kayathar on 3rd & 4th September 2012 at C-WET.

- NABL Reassessment Audit ISO / IEC 17025:2005 held on 3rd & 4th November 2012 at WTTS, Kayathar.
- One day Seminar on "TDS and section 35(1) (ii) of income tax Act 1961" conducted by Dr. Vinod K. Singhania a well known expert and author of many popular books and software by Taxmann on Income Tax held on 20th April 2012 at the Conference Hall, C-WET.
- 100th Indian Science Congress and Exhibition organized at University of Calcutta, Kolkata during 3rd to 7th January 2013.

M. Saravanan, Scientist

- Conference on "National Conclave for Laboratories" organized jointly by CII and NABL held on 4th and 5th April 2012 at New Delhi.
- Seventh Management Review Meeting for ISO/IEC 17025-2005 at C-WET on 14th June 2012.
- "Two Days Training program on understanding Laboratory Management System as per ISO/IEC 17025:2005" organised by Confederation of Indian Industry (CII) at Chennai on 13th & 14th July 2012.
- External Audit by DNV pertaining to Quality Management System ISO 9001:2008 held at WTTS, Kayathar on 3rd & 4th September 2012 at C-WET.
- Three days training programme on "Measurement Uncertainty" organized by Bureau of Indian Standards at Bangalore on 10th - 12th September 2012.
- NABL Reassessment Audit ISO / IEC 17025:2005 held on 3rd & 4th November 2012 at WTTS, Kayathar.

Bhukya Ramdas, Scientist

- "FPGA design and on-chip debugging" conducted by National Institute of Electronics and Information Technology (NIELIT) at Anna University Campus, Chennai 28th May to 8th June 2012.
- Conference on "National Conclave for Laboratories" organized by CII and NABL held on 4th & 5th April 2012 at New Delhi.
- "Two Days Training program on understanding Laboratory Management System as per ISO/IEC 17025:2005" organised by Confederation of Indian Industry (CII) at Chennai on 13th & 14th July 2012.
- External Audit by DNV pertaining to Quality Management System ISO 9001:2008 held at WTTS, Kayathar on 3rd & 4th September 2012 at C-WET.
- Three days training programme on "Measurement Uncertainty" organized by Bureau of Indian Standards at Bangalore on 10th - 12th September 2012.
- NABL Reassessment Audit ISO / IEC 17025:2005 held on 3rd & 4th November 2012 at WTTS, Kayathar.

Paramasivam, Junior Engineer

- Seventh Management Review Meeting for ISO/IEC 17025-2005 at C-WET on 14th June 2012.
- External Audit by DNV pertaining to Quality Management System ISO 9001:2008 held at WTTS, Kayathar on 3rd & 4th September 2012 at C-WET.
- NABL Reassessment Audit ISO / IEC 17025:2005 held on 3rd & 4th November 2012 at WTTS, Kayathar.

Wind Turbine Testing Unit

- "Safety & Rescue Training" both theoretical and practical training provided by M/s. Safecorp Safety Services Pvt.Ltd. at WTTS, Kayathar on 22nd - 23rd August 2012.

Standards & Certification

A. Senthil Kumar, Scientist & Unit Chief

- 4th Wind Turbines Sectional Committee (ET42) meeting at Bureau of Indian standards, New Delhi on 22nd February 2013.
- "Wind Power India 2012" conference and Expo at Chennai Trade Centre, Chennai during 28th – 30th November 2012.
- Seminar on "Structural Analysis and Design" organized by Bentley India at Park Hotel, Chennai.
- One day knowledge sharing seminar / lecture on "Software products of Vortex (Vortex MAST, Vortex FARM, Vortex Series, etc.,)" organized by C-WET and IWTMA.
- "Composites and material mechanics" by Mr.Bent F.Sorensen, Department of Wind Energy, RISO Campus, Roskilde organized by C-WET.
- "Solid works modeling software and OBJET 3D Printing (Rapid prototyping) by M/s. Best Engineering Aids & Consultancies Private Limited (BEACON) at C-WET.
- "Wind Turbine CFD modeling and Analysis" by Anna University professor and students.
- Various products and services offered by SKF for wind Industry by SKF team.
- "Romax Insight and services offered by Romax for Wind Industry"by Mr. Stephen Wilkinson, Group HS&E Manager, M/s. Romax Technology.
- Triton Sonic Wind Profiler organized by M/s. Shah Energy Inc., Karnataka, held at C-WET.
- One day seminar on "TDS and section 35(1) (ii) of Income Tax act 1961" conducted at C-WET, Chennai and organized by F&A.
- "Technology Acquisition Strategy in the age of Technological Globalization", University of Zurich, political science Department, Centre for Comparative and International Studies, Switzerland by Mr. Dhasuka Hayasi, at C-WET.

S. Arulselvan, Assistant Enigneer

- "DIGSILENT Power Factory" software by M/s. KLG Systel Ltd., Chennai at C-WETduring 10th & 11th September 2012.
- "Advances in distributed Generation: Micro-Grid, Net metering & Renewable Integration" organized by IEEE-PES Bangalore Chapter at Bangalore on 24th & 25th August 2012.
- "Wind Power India 2012" conference and Expo at Chennai Trade Centre, Chennai during 28th – 30th November 2012.
- "Wind Turbine CFD Modeling and Analysis" by Anna University Professor and students.
- Various products and services offered by SKF for wind Industry by SKF team.
- "Romax Insight and services offered by Romax for Wind Industry"by Mr. Stephen Wilkinson, Group HS&E Manager, M/s. Romax Technology.
- "Technology Acquisition Strategy in the age of Technological Globalization", University of Zurich, political science Department, Centre for Comparative and International Studies, Switzerland by Mr.Dhasuka Hayasi, at C-WET.

Shri. N. Raj Kumar, Scientist

- Presentation on "LIDAR" held at C-WET.
- "Wind Power India 2012" conference and Expo at Chennai Trade Centre, Chennai during 28th – 30th November 2012.
- "Composites and material mechanics" by Mr.Bent F.Sorensen, Department of Wind Energy, RISO Campus, Roskilde organized by C-WET.
- One day knowledge sharing seminar / lecture on "Software products of Vortex (Vortex MAST, Vortex FARM, Vortex Series, etc.,)" organized by C-WET and IWTMA.
- Various products and services offered by SKF for wind Industry by SKF team.
- "Romax Insight and services offered by Romax for Wind Industry"by Mr. Stephen Wilkinson, Group HS&E Manager, M/s. Romax Technology.
- Triton Sonic Wind Profiler organized by M/s. Shah Energy Inc., Karnataka, held at C-WET.
- "Solid works modeling software and OBJET 3D Printing (Rapid prototyping) by M/s. Best Engineering Aids & Consultancies Private Limited (BEACON) at C-WET.
- "Latest Developments in setting up of advance testing facilities for offshore renewables including wind"by faculties from 'University of Edinburgh' and IIT Madras.
- "Technology Acquisition Strategy in the age of Technological Globalization", University of Zurich, political science Department, Centre for Comparative and International Studies, Switzerland by Mr. Dhasuka Hayasi, at C-WET.

- Seminar on "Structural Analysis and Design" organized by Bentley India at the Park Hotel, Chennai.

A.G.Rangaraj, Scientist

- "Wind Power India 2012" conference and Expo at Chennai Trade Centre, Chennai during 28th – 30th November 2012.
- "Composites and material mechanics" by Mr.Bent F.Sorensen, Department of Wind Energy, RISO Campus, Roskilde organized by C-WET.
- One day knowledge sharing seminar / lecture on "Software products of Vortex (Vortex MAST, Vortex FARM, Vortex Series, etc.,)" organized by C-WET and IWTMA.
- "Romax Insight and services offered by Romax for Wind Industry"by Mr. Stephen Wilkinson, Group HS&E Manager, M/s. Romax Technology.
- Triton Sonic Wind Profiler organized by M/s. Shah Energy Inc., Karnataka, held at C-WET.
- "Latest Developments in setting up of advance testing facilities for offshore renewables including wind"by faculties from 'University of Edinburgh' and IIT Madras.
- "Technology Acquisition Strategy in the age of Technological Globalization", University of Zurich, political science Department, Centre for Comparative and International Studies, Switzerland by Mr.Dhasuka Hayasi, at C-WET.
- "Mesoscale modeling software for Wind Resource Assessment viz., Wind Data Generator" by Metetole at C-WET, Chennai.
- "DIGSILENT Power factory" software conducted by M/s. KLG Systel Ltd., Chennai at C-WET, Chennai during 10th - 11th September 2012.
- Various products and services offered by SKF for wind Industry by SKF team.

C. Stephen Jeremias, Junior Engineer

- "Composites and material mechanics" by Mr.Bent F.Sorensen, Department of Wind Energy, RISO Campus, Roskilde organized by C-WET.
- One day knowledge sharing seminar / lecture on "Software products of Vortex (Vortex MAST, Vortex FARM, Vortex Series, etc.,)" organized by C-WET and IWTMA.

Information Training and Commercial Services

P. Kanagavel, Scientist & Unit Chief i/c

- Meeting on Environment Control-preparation of Tamil Nadu State Action Plan on Climate Change conducted by GoTN/Energy on 12th July 2012.
- 27th Residential Programme on Finance for Non-Finance Officials / Managers organized by Jaipur Productivity Centre, Jaipur at Goa during 19th to 23rd November 2012.
- 100th Indian Science Congress and Exhibition organized at University of Calcutta, Kolkata during 3rd to 7th January 2013.

Solar Radiation Resource Assessment

Dr. G. Giridhar, Scientist & Unit Chief

- "Wind Energy Update" conference at New Delhi on 6th – 7th September 2012.
- Fifth Annual Conference at New Delhi during 26th – 27th June 2012.
- Chief guest at the inauguration of "Professional Chapters and association of Department of Electrical and Electronics Engineering" at Prathyusha institute of technology and management on 7th August 2012.
- Participated in the workshop on "Advances in distributed generation: Micro-Grid, Net-metering & Renewable Integration" organised by IEEE PES India Council Chapter, Bangalore and made a Presentation on the activities of SRRA during 24th to 25th August 2012.
- Chief Guest and delivered the key note address in the "Inauguration of R&D Centre" at Prathyusha Institute of Technology & Management on 29th August 2012.
- Presentation on SRRA activities jointly with Mr. Richard Meyer, Suntrace in the CSP today conference at New Delhi on 12th - 13th March 2013.
- Stakeholders meeting of SRRA held at New Delhi on 7th December 2012.
- Meeting on TMY preparation at GIZ office, New Delhi on 8th December 2012.
- Parliamentary Committee Meeting on Energy at Ahmedabad, Gandhi Nagar, Somnath, Rajkot during 2nd - 7th January 2013.
- UL Lab, CPRI, ETDC Bangalore for test/calibration equipment familiarization during the period 24th - 27th February 2013.

R. Sasi Kumar, Scientist

- National Solar Energy Summit at New Delhi during 13th – 14th December 2012.
- Workshop/training program on "Solar Radiation Resource Assessment and Modelling" held at IIT Rajasthan, Jodhpur during 6th to 10th August 2012.

R. Karthik, Scientist

- Workshop on "Advances in distributed generation: Micro-Grid, Net-metering & Renewable Integration" organized by IEEE PES India Council Chapter, Bangalore during 24th to 25th August 2012.
- M/s. SGS Weather and Environmental Systems Pvt. Ltd. New Delhi, for training on server related activities during the period 16th to 17th April 2012.
- Short course on "Foundation for Innovation and Technology Transfer" (FIIT), conducted by IIT, New Delhi during the period 29th May to 1st June 2012.
- Workshop/training program on "Solar Radiation Resource Assessment and Modeling" at IIT Rajasthan, Jodhpur during 6th to 10th August 2012.

- Short course on "Thin Film PV Technology-Cells to Systems" organized by SEMI India, in technical collaboration with the National Centre for Photovoltaic Research and Education (NCPRE) IIT, Bombay held at Bangalore during the period 4th to 9th November 2012.
- Calibration training on solar radiation and meteorological instruments at IMD, Pune during 10th to 21st December 2012.
- Meeting on TMY preparation at GIZ office, New Delhi on 8th December 2012.

Prasun Kumar Das, Scientist

- Short course on "Foundation for Innovation and Technology Transfer" (FIIT), conducted by IIT, New Delhi during the period 29th May to 1st June 2012.
- Workshop/training program on "Solar Radiation Resource Assessment and Modeling" at IIT Rajasthan, Jodhpur during 6th to 10th August 2012.
- Short course on "Thin Film PV Technology-Cells to Systems" organized by SEMI India, in technical collaboration with the National Centre for Photovoltaic Research and Education (NCPRE) IIT, Bombay held at Bangalore during the period 4th to 9th November 2012.
- Calibration training on solar radiation and meteorological instruments at IMD, Pune during 10th to 21st December 2012.
- Two days training program on PV Systems organized by M/s Steinbeis Centre for Solar Technologies & Training, Chennai, during 9th-10th March 2013.

Finance & Administraion

D. Lakshmanan, General Manager (F&A)

- 4th One day National Convention on Reservation for the persons with disabilities (PWDs) for Liaison Officers for PWDs, Head of Personnel, HR & CAOs organized by Institute of Public Administration at New Delhi on 12th May 2012.
- Two days Workshop on Outcome Budget for Group 'A' Officers organized by Institute of Secretariat Training & Management at New Delhi, during 1st & 2nd November 2012.
- Chairman of Selection Committee at National Institute of Ocean Technology, (Ministry of Earth Sciences), Chennai for various Project Positions on 04th October 2012.
- Expert Member at National Institute of Ocean Technology, (Ministry of Earth Sciences), Chennai for evaluation of tender on Testing, Assembly, Integration, Maintenance, Deployment and Retrieval buoys Systems – Meetings held on 16th August 2012, 14th September 2012 and 18th February 2013.
- Chairman of the Committee for deployment of Surplus Funds at Indian Maritime University, (Ministry of Shipping), Chennai meeting held on 28th January 2013 and 18th February 2013.

- Expert Member at National Institute of Ocean Technology, (Ministry of Earth Sciences), Chennai for Career Progression Scheme on 26th June 2013.
- Parliamentary Committee Meeting on Energy at Ahemdabad, Gandhi Nagar, Somnath, Rajkot during 2nd – 7th January 2013.

P. Venkatesan. Admn. & Accts. Officer (AAO)

- One day Workshop on Service Tax organized by MSME Development Institute at Chennai on 26th August 2012.
- Awareness Programme on Tax Deduction at Source and Service Tax related matters organized by National Institute of Ocean Technology at Chennai on 8th November 2012.

R. Girirajan, Section Officer

- Two days bi-lingual Workshop on e-auction organized by CSIR-SERC at Chennai during 30th April & 1st May 2012.
- One day SARAL TDS Training organized by Relyon Softech Ltd at Chennai on 21st June 2012.
- One day Workshop on Service Tax organized by MSME Development Institute at Chennai on 26th August 2012.
- Three days Workshop on Noting & Drafting for Section Officers / Dealing Assistants organized by Institute of Secretariat Training & Management at New Delhi during 8th to 10th October 2012.
- Awareness Programme on Tax Deduction at Source and Service Tax related matters organized by National Institute of Ocean Technology at Chennai on 8th November 2012.

K. Tamilselvi, Section Officer

- One day Workshop on Export/Import Documentation and Procedures organized by Management Study Centre at Coimbatore on 27th April 2012.
- One day SARAL TDS Training organized by Relyon Softech Ltd at Chennai 21st June 2012.
- Awareness Programme on Tax Deduction at Source and Service Tax related matters organized by National Institute of Ocean Technology at Chennai on 8th November 2012.

V. Shanmugam, Assistant

- Two days bi-lingual Workshop on e-auction organized by CSIR-SERC at Chennai during 30th April & 1st May 2012.
- Three days Workshop on Noting & Drafting for Section Officers / Dealing Assistants organized by Institute of Secretariat Training & Management at New Delhi during 8th to 10th October 2012.
- Awareness Programme on Tax Deduction at Source and Service Tax related matters on 8th November 2012 organized by National Institute of Ocean Technology at Chennai.

- Training Programme on Excel Macros during 9th to 17th February 2013 organized by MSME Development Institute at Chennai.

Anuradha Babu, Private Secretary

- Training programme on "Developing Executive Secretary, PA, PS & Office Staff for Future" organized by National Productivity Council at Jaipur during 25th to 29th June 2012.

B. Muthulakshmi, Sr. Stenographer

- Two days bi-lingual Workshop on e-auction during 30th April & 1st May 2012 organized by CSIR-SERC at Chennai.
- Training programme on "Developing Executive Secretary, PA, PS & Office Staff for Future" organized by National Productivity Council at Jaipur during 25th to 29th June 2012.

J. Rekha, Steno – Typist

- One day SARAL TDS Training organized by Relyon Softech Ltd at Chennai on 21st June 2012.
- "Role Excellence: Personal Assistants and Executive Secretaries" organized by Management Study Centre at Hotel GRT Grand, Chennai on 13th July 2012.

Trainings Organized by F&A

- Organised one day seminar on "TDS and related issues" by Dr. Vinod K. Singhania on 20th April 2012. Various participants from Government Organizations like CSIR, SERC, NIOT, IIITDM, CAG Auditor's Office, etc attended the training.

PUBLICATIONS

- Rajesh Katyal, Testing of Small Wind Turbines, Akshay Urja, Vol. 6 Issue - 2, October 2012, pp 31-34.
- Rajesh Katyal, "Wind Turbine Towers Using Parametric Approach" was prepared and hosted online in journal of Wind Engineering and Industrial Aerodynamics.
- Prasun Kumar Das and Dr. G Giridhar, Solar Energy Resources estimation of Assam, India, ISES Solar World Congress 2013. (Accepted)

VISITS ABROAD

- **Dr. S. Gomathinayagam, Executive Director** on behalf of MNRE, nominated to represent in the ESMAP Knowledge Exchange Forum – 2012 in Washington DC, on 9th May 2012, by World Bank.
- **Dr.G.Giridhar, Scientist & Unit Chief, SRRA** Indo US Dialogue on Energy led by Joint Secretary, MNRE along with Director of IREDA at Washington DC, USA during 24th September to 1st October 2012.
- **S.A.Mathew, Scientist & Unit Chief, WTT** 2nd IEC CAC test laboratory meeting at Florida, USA during 7th – 9th November 2012 & IEC TC 88 Certification Advisory Committee Test Laboratory Subgroup Meeting held at the TUL NEL, Glasgow, UK during 22nd – 23rd May, 2012.
- **S.R.Hasan Ali, Assistant Engineer, WTTS, Kayathar** Participated in the 2nd phase of Advanced International Training Programme 2012 on Wind Power Development and Use organized by SIDA, Sweden conducted by LIFE Academy, Sweden during 16th April – 10th May 2012.
- **G.Arivukkodi, Assistant Engineer, WRA** DEWEK 2012, 11 Germen Wind Energy Conference at Bremen, Germany held during 7th & 8th November 2012.
- **S. Arulselvan Assistant Engineer, S&C** Attended the workshop on "Wind Power Development and Use" organized by Life Academy, Sweden at Shangai, China during 30th & 31st January 2013.
- **WRA Unit : Mr. K. Boopathi, Unit Chief (i/c), Mrs. G. Arivukodi, Assistant Engineer & Mr. B. Krishnan, Junior Engineer,** Attended WAsP Engineering course and WAsP Certification at RISO- DTU, Denmark from 12th to 21st June 2012.
- **R&D Unit : S.A. Mathew, M.Anvar Ali, M. Saravanan, Bhukya Ramdas, S. Paramasivan, M. Karuppuchamy, A.R. Hasan Ali and Y. Packiyaraj** Participated in the C-WET – NREL Interaction Meeting and training programme on "Wind Turbine Testing" in Boulder Colorado hosted by US Department of Energy (DOE) and the National Renewable Energy Laboratory / National Wind Technology Center during 11th – 14th December 2012.

GENERAL INFORMATION

GOVERNING COUNCIL		
The following are the members of the Governing Council & Annual General Body (To administer and guide the affairs of the Centre)		
1.	Shri. Rattan P Watal, I.A.S., Secretary, MNRE, New Delhi,	President of the Society and Chairman
2.	Shri. Rajesh Lakhoni, I.A.S., Principal Secretary to Government Energy Department, GOTN, Chennai	Member
3.	Shri. Alok Srivasatava, I.A.S., Joint Secretary (Wind Energy) MNRE, New Delhi	Member
4.	Shri. J B Mohapatra, I.R.S., Joint Secretary and Financial Adviser, MNRE, New Delhi	Member
5.	Shri. Sunil Soni, I.A.S., Director General, BIS, New Delhi	Member
6.	Major Singh Member Planning, CEA, New Delhi	Member
7.	Shri. Shyam Chetty, Director, NAL, Bangalore	Member
8.	Shri. Debasish Majumdar, Chairman & Managing Director, IREDA, New Delhi	Member
9.	Shri. S.K. Soonee, CEO, Power System Operation Corporation Limited, New Delhi and Chairman, R&D Council, C-WET	Member
10.	Shri. Ramesh Kymal Chairman, IWTMA, Chennai	Member
11.	Dr. S. Gomathinayagam, Executive Director, C-WET, Chennai	Member Secretary

MANAGEMENT COMMITTEE		
The following are the members of the Management Committee (To take decisions as and when required and to inform GC from time to time)		
1.	Chairman, Governing Council, C-WET	Chairman
2.	Financial Adviser, MNRE	Member
3.	Executive Director, C-WET	Member

FINANCE COMMITTEE		
The following are the members of the Finance Committee (To review the financial performance of the Centre)		
1.	Shri. J.B. Mohapatra, I.R.S., Joint Secretary & Financial Adviser, MNRE, New Delhi	Chairman
2.	Shri.Rajesh Lokhani, I.A.S., Principal Secretary to Government, Energy Department, Tamil Nadu Government	Member
3.	Shri. Alok Srivasatava, I.A.S, Joint Secretary (Wind Energy), MNRE, New Delhi	Member
4.	Dr. S. Gomathinayagam, Executive Director, C-WET, Chennai	Member
5.	Shri. Dilip Negam, Director (Wind Energy), MNRE, New Delhi	Member
6.	Shri. R.P. Batra, Deputy Secretary (Finance) MNRE, New Delhi	Member
7.	Shri. D. Lakshmanan, General Manager (F&A), C-WET, Chennai	Member Secretary

RESEARCH AND DEVELOPMENT COUNCIL

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

1	Shri. S.K. Soonee, CEO, Power System Operation Corporation Ltd New Delhi – 110 016	Chairman
2	Shri. Alok Srivastava, I.A.S, Joint Secretary Ministry of New and Renewable Energy, New Delhi – 110 003	Member
3	Dr. B. S. K. Naidu. Ex-Director General, NTPI & CPRI and Chairman Great Lakhs IEMR, NCR, New Delhi	Member
4	Shri. Y. K. Sehgal, Executive Director (Smart Grid) Power Grid Corporation of India Ltd, Gurgaon – 122 001	Member
5	Smt. K. A. Fathima, Former Senior Director – C-DAC, Trivandrum – 695 030	Member
6	Shri. S. C. Bhan, Scientist-E, India Meteorological Department New Delhi – 110 003	Member
7	Shri. R. P. Mehrotra, DGM, M/s. Engineers India Ltd, New Delhi – 110 066	Member
8	Dr. N.K.Singh, Addl. General Manager Bharat Heavy Electricals Ltd, Hyderabad – 502 032	Member
9	The Chairman, Indian Wind Turbine Manufacturers Association, Chennai	Member
10	Dr. S. Gomathinayagam, Executive Director Centre for Wind Energy Technology, Chennai – 600 100	Member
11	Shri. Rajesh Katyal, Unit Chief , R&D Centre for Wind Energy Technology, Chennai – 600 100	Member Secretary

EMPANELMENT COMMITTEE ON SMALL WIND TURBINE

The following are the members of the Empanelment Committee on Small Wind Turbine (To review the status of various manufacturers of small wind energy system and their recommendations for empanelment of MNRE / CWET approved manufacturers)

1	Executive Director, C-WET	Chairman
2	Director, MNRE dealing with the SWES Programme	Member
3	Outside Expert – Shri. M.K. Deb, CECL, Bhopal	Member
4	Outside Expert – Prof. A.P.Haran Park College of Engineering, Coimbatore	Member
5	Representative from Industry, if needed in a particular meeting	Invitee
6	Rajesh Katyal, Unit Chief, R&D, C-WET	Member Secretary

REVISED LIST OF MODELS AND MANUFACTURERS OF WIND TURBINES (RLMM) COMMITTEE

The following are the members of the Revised List of Models and Manufacturers of Wind Turbines (RLMM) Committee

1	Dr. S. Gomathinayagam, Executive Director, C-WET	Chairman
2	Shri. G. Upadhyay, Director (Wind Energy), MNRE (till June 2012)	Member
3	Shri. Dilip Nigam, Director (Wind Energy), MNRE (from July 2012)	Member
4	Shri. A. A. Khatana, Executive Director, IREDA (from December 2012)	Member
5	Shri. V. Balaji, DGM, SRLDC (from December 2012)	Member
6	Shri. Ramesh Kymal, Hon.Chairman, IWTMA, Chennai	Member
7	Shri. K. Kasthurirangaian, Chairman, IWPA, Chennai	Member
8	Shri. A. Senthil Kumar, Unit Chief, S&C, C-WET	Secretary

PROTOTYPE WIND TURBINE MODELS COMMITTEE

The following are the members of the Prototype Wind Turbine Models Committee

1	Dr. S. Gomathinayagam, Executive Director, C-WET	Chairman
2	Shri. Mohamed Hussain, Director, MNRE & Unit Chief, WTRS, C-WET	Member
3	Shri. Siddhartha Bhatt, Additional Director, CPRI, Bangalore	Member
4	Shri. D.V. Giri, Secretary General, IWTMA, Chennai	Member
5	Shri. A. Senthil Kumar, Unit Chief, S&C, C-WET	Member Secretary

HINDI PROMOTION COMMITTEE

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

1.	Executive Director, C-WET	Chairman
2.	Shri. Rajesh Katyal, Scientist & Unit Chief, R&D, C-WET	Member Secretary
3.	Shri. D. Lakshmanan, General Manager, F&A, C-WET	Member
4.	Admin & Accounts Officer, C-WET	Member
5.	Shri. P. Kanagavel, Scientist & Unit Chief i/c, ITCS, C-WET	Member

Vigilance Awareness Week

Vigilance awareness week for the year 2012 was observed in C-WET from 29th October to 3rd November 2012 and all the employees have taken a pledge as instructed by the Central Vigilance Commission.

National Day Celebrations

The Independence and the Republic days were celebrated with reverence at the C-WET Campus. The Events begin with a parade of security personnel at C-WET followed by flag hosting and concluded with distribution of Sweets.

Committee for prevention of sexual harassment of women at work place

In pursuance of Government instructions, a Complaints Committee for women for redressal of complaints concerning sexual harassment in work place has been constituted in C-WET and the Committee conducted its quarterly meetings on 18th April 2012, 6th August 2012, 12th October 2012 & 19th March 2013 No complaints received during the year 2012-13.

C-WET Foundation Day Lecture by M.P. Ramesh

Foundation Day

Foundation day was celebrated in C-WET for the first time on 21st March 2013. Shri M.P. Ramesh, Former ED, C-WET was invited as chief guest and he delivered the foundation day lecture.

Official Language Act

C-WET has been an active member in the Town Official Language Implementation Committee, Chennai. The Hindi version of "PAVAN", the Quarterly News Bulletin of C-WET is considered a standard communications in Hindi.

Hindi fortnight was celebrated in C-WET from 14.09.2012 to 28.09.2012. Various competitions were conducted and prizes distributed.

The following workshops have been organized in C-WET with regard to official language during the year 2012-13

1. One day workshop on Unicode font on 15th June 2012.
2. Half-a-day workshop on Noting & Drafting on 27th August 2012.
3. Half-a-day workshop on Simple Hindi Grammar on 3rd January 2013.
4. Half-a-day workshop on Gender Differentiation on 15th March 2013.

Hindi books worth Rs.0.63 lakhs were purchased as recommended by Parliament Committee on Official language during the year 2012-13 and being used in all departments of C-WET.

Right to Information Act

During the year 2012-13, 16 applications were received seeking information under RTI Act, 2005 and requisite details have been given. No appeal has been preferred against the decision of CPIO.

Parliamentary Standing Committee visit

On-the-spot study visit of the Standing Committee on Energy (2012-13) held at Ahmedabad, on 5th January 2013.

Implementation of Persons with Disabilities Act 1995

The following facilities are being available to Persons with Disabilities

1. Though C-WET is functioning in a two storey building (where lift is not mandatory) a lift has been provided for the convenience of physically challenged.
2. A separate ramp has been provided to enable use of crutches / wheel chairs.
3. Low level steps laid by the side of the lift for easy access.
4. Post reservation for physically handicapped as per GOI rules.

HUMAN RESOURCE

Sl.No.	Name	Cadre
OFFICE OF EXECUTIVE DIRECTOR		
1.	Dr. S. Gomathinayagam	Executive Director
2.	Ms. Anuradha Babu	Private Secretary
3.	Shri. T. Ganeshamoorthi	Steno-Typist
FINANCE & ADMINISTRATION		
1.	Shri. D. Lakshmanan	General Manager (F&A)
2.	Shri. P. Venkatesan	Administrative & Accounts Officer (on deputation)
3.	Shri. R. Girirajan	Section Officer
4.	Ms. K. Tamilselvi	Section Officer
5.	Ms. B. Muthulakshmi	Senior Steno
6.	Ms. J. Rekha	Steno-Typist
7.	Shri. V. Shanmugam	Assistant
8.	Shri. M. Selvakumar	Daftary
9.	Shri. M. Malaravan	Senior Driver
10.	Shri. S. Maruthanayagam	Driver
RESEARCH & DEVELOPMENT		
1.	Shri. Rajesh Katyal Unit Chief	Scientist 'E'
2.	Shri. J.C. David Solomon	Scientist 'D'
3.	Ms. Deepa Kurup	Scientist 'C'
4.	Shri. M.R. Gunasekaran	Senior Steno
5.	Shri. R. Naveen Muthu	Technician
WIND RESOURCE ASSESSMENT		
1.	Shri. K. Boopathi Unit Chief in-charge	Scientist 'C'
2.	Shri. A. Haribhaskaran	Scientist 'B' from MNRE GoI
3.	Ms. G. Arivukkodi	Assistant Engineer

Sl.No.	Name	Cadre
4.	Shri. T. Suresh Kumar	Junior Engineer
5.	Shri. B. Krishnan	Junior Engineer
6.	Shri. R. Vinod Kumar	Technician
7.	Shri. K.A. Haji Abdul Ibrahim	Daftary
WIND TURBINE TESTING		
1.	Shri. S.A. Mathew Unit Chief	Scientist 'D'
2.	Shri. M. Saravanan	Scientist 'B'
3.	Shri. Bhukya Ramdas	Scientist 'B'
4.	Shri. S. Paramasivan	Junior Engineer
STANDARDS & CERTIFICATION		
1.	Shri. A. Senthil Kumar Unit Chief	Scientist 'D'
2.	Shri. N. Rajkumar	Scientist 'B'
3.	Shri. A.G. Rangaraj	Scientist 'B'
4.	Shri. S. Arulselvan	Assistant Engineer
INFORMATION, TRAINING AND COMMERCIAL SERVICES		
1.	Shri. P. Kanagavel Unit Chief in-charge	Scientist 'C'
ENGINEERING SERVICES DIVISION		
1.	Shri. M. Anvar Ali Unit Chief	Scientist 'D'
2.	Shri. C. Stephen Jeremias	Junior Engineer
SOLAR RADIATION RESOURCES ASSESSMENT		
1.	Dr. G. Giridhar Unit Chief	Scientist 'E', from MNRE, GoI
2.	Shri. R. Sasi Kumar	Scientist 'D'
3.	Shri. Prasun Kumar Das	Scientist 'B'
4.	Shri. R. Karthik	Scientist 'B'
WIND TURBINE RESEARCH STATION, KAYATHAR		
1.	Shri. A. Mohamed Hussain Unit Chief	Scientist 'E', from MNRE, GoI
2.	Shri. M. Karuppachamy	Assistant Engineer
3.	Shri. A.R. Hasan Ali	Assistant Engineer
4.	Shri. Y. Packiyaraj	Assistant Engineer

C-WET OFFICIALS ON EXTERNAL COMMITTEES, BODIES AND MEMBERSHIP OF ASSOCIATIONS

S. Gomathinayagam

- "Institution of Engineers (India)", Life Member / Chartered Engineer.
- "Computer Society of India", Life Member.
- "Instrument Society of India", Life Member.
- "Indian Society of Wind Engineers", Life Member.
- "Indian Meteorological Society", Life Member.
- "External Examiner of UGC-JRF PHD program for MIT", Anna University, Member.
- "Expert Advisory Committee", Tamil Nadu, Scientists Award- (TANSA) - 2008 for Engineering and Technology.
- "Executive Committee Member of Institute of Energy Studies", Anna University, Chennai.
- Member of Monitoring Committee, NIMITLI, Wind Turbine Development Project of CSIR.
- Chairman, Wind Turbine Sectional Committee ET42 of B/S.

D.Lakshmanan

- "National Institute of Personnel Management", Kolkata, Corporate Member.

Rajesh Katyal

- "Institution of Engineers (India)", Member.

A. Senthil Kumar

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

P. Kanagavel

- "Society for the Advancement of Library and Information Science (SALIS)", Member.
- Indian Academic Library Association (IALA), Member.

AUDITOR'S REPORT

The Chairman
Governing Council
Centre for Wind Energy Technology
Chennai – 600 100

Sir,

We have audited the attached financial statements of Centre for Wind Energy Technology (C-WET), Velachery – Tambaram, Pallikaranai, Chennai, which comprise the Balance sheet as at 31.03.2013, the Income & Expenditure Account and the Receipts and Payments Account for the year then ended and a summary of significant accounting policies and other explanatory information.

Management's Responsibility

C-WET's Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance and cash flows of the C-WET in accordance with the Accounting Standards issued by the Institute of Chartered Accountants of India. This responsibility includes the design, implementation and maintenance of internal controls relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with the ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements.

An audit involves performing procedures to obtain audit evidence about the amounts and the disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to C-WET's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the C-WET's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and reasonableness of the accounting estimates made by the management, as well as evaluating

the overall presentation of financial statements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

a) In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements, including the Balance Sheet, Income & Expenditure Account and Receipts and Payments Account dealt with by this report read together with schedules, accounting policies and notes thereon give a true and fair view in conformity with the accounting principles generally accepted in India:

   i. in the case of Balance Sheet, of the state of affairs of the above mentioned Centre as at 31st March, 2013 and

   ii. in the case of Income & Expenditure account of the Excess of Income over expenditure of this Centre for the year ended on that date; and

   iii. in the case of Receipts and payments Account of the Receipts and Payments of this Centre for the year ended on that date.

Report on Other Legal and Regulatory Requirements

We report that:

a) We have obtained all information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit;

b) In our opinion, proper books of account have been kept by the above mentioned Centre so far as appears from our examination of the books;

c) The Balance Sheet, Income & Expenditure Account and Receipts and Payments Account referred to in this report are in agreement with the books of accounts;

d) In our opinion the Balance Sheet, Income and Expenditure Account and Receipts and Payments Account dealt with by this report are prepared in accordance with the applicable Accounting Standards issued by the Institute of Chartered Accountants of India.

FOR R.JANAKIRAMAN & CO
CHARTERED ACCOUNTANTS
FRN: 001263S

Sd/-
J.Chandrasekaran
PARTNER
M.NO.027861

Place : CHENNAI
Date : 19.08.2013

BALANCE SHEET AS AT 31st MARCH, 2013

CENTRE FOR WIND ENERGY TECHNOLOGY

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

Chennai - 600 100

(Amount in Rs.)

FUND AND LIABILITIES	Schedule	31st March, 2013	31st March, 2012
CAPITAL ASSET FUND	1	20,90,98,061	30,30,72,085
RESERVES AND SURPLUS	2	32,51,33,682	25,88,87,391
CURRENT LIABILITIES AND PROVISIONS	3	20,66,69,731	15,19,05,234
TOTAL		**74,09,01,474**	**71,38,64,710**
ASSETS			
FIXED ASSETS			
(a) Created out of Central Government Grants	4	20,86,19,323	25,50,77,871
(b) Out of Internal Generation Grants		4,78,738	4,79,94,214
CURRENT ASSETS, LOANS AND ADVANCES	5	53,18,03,413	41,07,92,625
TOTAL		**74,09,01,474**	**71,38,64,710**
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Centre for Wind Energy Technology

As per our Report attached
for R. Janakiraman & Co.,
Chartered Accountants
Firm Regn No.001263S

Sd/-	Sd/-	Sd/-	Sd/-
D.Lakshmanan	**Dr. S.Gomathinayagam**	President/	**J.Chandrasekaran**
General Manager (F&A)	Executive Director	Chairman	Partner
			Membership No.027861

RECEIPTS AND PAYMENTS ACCOUNT

CENTRE FOR WIND
(An Autonomous R & D Institution under Ministry of
Chennai

RECEIPTS			31st March, 2013	31st March, 2012
I.	**Opening Balances**			
	(a)	Cheques in hand	3,05,397	24,89,082
	(b)	Bank balances		
		i) In Current Account	96,16,883	1,58,52,922
		ii) In Savings Bank Account	3,96,79,366	14,72,51,261
		iii) In Deposit Accounts	27,00,00,000	26,88,00,000
	(c)	Stamps on hand	622	50
			31,96,02,268	43,43,93,315
II.	Grants Received			
	(a)	From Government of India	20,00,00,001	5,00,00,000
	(b)	Sale of Fixed Assets	9,78,687	37,999
	(c)	From Government of India for execution various projects	(1,52,35,748)	
	(d)	From Government of India for SRRA Project	2,00,00,000	6,90,00,000
III.	Income on Investments			
IV.	Interest Received			
	(a)	On Bank deposits	2,59,29,469	2,99,39,142
	(b)	On Bank deposits SRRA	16,15,138	27,67,670
V.	Other Income			
	(a)	Fees for services	5,00,32,171	3,84,40,888
	(b)	Income from publications	2,28,450	2,44,100
	(c)	Energy receipts	2,56,67,241	1,65,73,615
	(d)	Misc. Income (including SRRA Income)	1,66,72,393	1,76,67,508
VI.	Amount borrowed			
VII.	Any other receipts			
	(a)	Fees received in advance on Consultancy projects	3,45,39,950	4,81,02,295
	(b)	Security deposit received	92,72,247	3,99,618
	(c)	Security deposit received SRRA		1,59,700
	(d)	Earnest money deposit received	76,57,000	1,50,34,550
	(e)	Earnest money deposit received SRRA	80,000	32,500
	(f)	Service tax realised	51,61,294	59,31,987
	(g)	Service tax realised SRRA	1,20,647	
	(h)	TDS to be remitted (Including SRRA)	3,62,912	6,75,402
	(i)	Advances and Deposits	53,96,268	95,34,691
	(j)	Advances and Deposits SRRA	5,37,644	
			38,90,15,764	**30,45,41,665**
		TOTAL	**70,86,18,033**	**73,89,34,980**

FOR THE YEAR ENDED 31st MARCH 2013

ENERGY TECHNOLOGY
New and Renewable Energy, Government of India)
600 100

(Amount in Rs.)

PAYMENTS			31st March, 2013	31st March, 2012
I.	**Expenses**			
	(a)	Employee related Expenses	2,82,90,511	2,27,91,316
	(b)	Administrative Expenses	3,09,60,411	2,53,43,371
II.	**Payments made against funds for various projects**			
	Out of CFA			
	(a)	In house R&D project expenses	6,85,90,954	2,17,65,830
	(b)	Seminar & Information dissemination	17,84,708	19,01,596
	(c)	Accreditation fee	61,822	25,411
	Out of Grants for projects			
	(a)	WRA Lakshadeep		3,05,900
	(b)	Wind Profile Measurment - Dhanushkodi	7,72,890	14,75,925
	(c)	WRA Karkil	3,52,283	7,72,536
	(d)	Wind Shear Assessment expenses 120m Mast	8,66,663	25,23,854
	(e)	North-Eastern Project 2006-07	1,91,785	7,02,115
	(f)	Study on Uncovered / New areas (2003-04 to 2010-11)	1,26,77,200	1,23,99,325
	(g)	Wind forecasting	9,99,122	2,56,677
	(h)	Solar Radiation Resource Assessment	2,17,34,331	18,53,63,475
III.	**Investment and Deposits made**			
IV.	**Expenditure on Fixed assets & Capital Work-in-Progress**			
	(a)	Purchase of Fixed assets (CFA)	2,86,51,399	3,65,32,323
	(b)	Purchase of Fixed assets (Internal Generation)	6,45,660	
	(c)	Expenditure on Capital Work-in-progress	24,64,564	3,57,767
	(d)	Advance on capital account (including imports)	98,533	7,99,954
V.	**Refund of Surplus Money**			
	(a)	Balance of Grants-in-aid to Government of India	2,20,300	1,71,608
VI.	**Other Payments**			
	(a)	Refund of Security deposits	56,83,307	51,64,328
	(b)	Refund of Security deposits SRRA		1,49,900
	(c)	Refund of Earnest Money Deposits	1,51,14,500	67,07,050
	(d)	Refund of Earnest Money Deposits SRRA	60,000	32,500
	(e)	Expenditure on Consultancy Projects	2,22,79,787	2,38,79,198
	(f)	Advance & Deposits	1,90,12,860	1,50,13,997
	(g)	Payment of TDS	6,75,952	3,50,517
	(h)	Service tax remittances	50,72,722	59,31,987
	(I)	Service tax remittances SRRA	1,05,061	
	(j)	Receivable from Debtors/other payments (Including SRRA)	(45,34,035)	95,18,252
	(k)	Festival advance paid	16,125	
	(l)	Transfer of fees received in advance	5,12,06,295	3,90,96,000
VII.	**Closing Balances**			
	(a)	Cheques in hand	7,234	3,05,397
	(b)	Bank Balances		
		i) In Current Account	22,52,216	96,16,883
		ii) In Savings Bank Account	3,23,00,402	3,96,79,366
		iii) In Deposit Accounts	36,00,00,000	27,00,00,000
	(c)	Stamps in hand	2,472	622
		TOTAL	**70,86,18,033**	**73,89,34,980**

For Centre for Wind Energy Technology

As per our Report attached
for R. Janakiraman & Co.,
Chartered Accountants
Firm Regn No.001263S

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

Sd/-
Dr. S.Gomathinayagam
Executive Director

Sd/-
President/Chairman

Sd/-
J.Chandrasekaran
Partner, Membership No.027861

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH, 2013

CENTRE FOR WIND ENERGY TECHNOLOGY
(An Autonomous R&D Institution under MNRE, Government of India)
Chennai - 600 100

(Amount in Rs.)

INCOME	Schedule	31st March, 2013	31st March, 2012
Income from Scientific & Technical Consultancy Services	6	7,45,17,497	6,87,33,744
Income from publication	7	23,79,000	24,19,598
Interest Earned	8	2,46,65,951	2,99,21,314
Other Income	9	1,51,08,568	1,55,93,680
Grants from Government of India allocated for Revenue expenditure during the year	11	3,07,80,953	2,55,92,332
Grants from Government of India allocated for in house project expenditure during the year		3,80,65,037	2,41,49,090
Closing stock		22,23,276	16,12,384
TOTAL (A)		**18,77,40,282**	**16,80,22,142**
EXPENDITURE			
Opening stock		16,12,384	9,84,537
Establishment Expenses	10	2,85,38,450	2,53,58,286
Other Administrative Expenses	11	5,26,38,714	4,95,97,356
In house project expenditure		3,80,65,037	2,41,49,090
TOTAL (B)		**12,08,54,585**	**10,00,89,269**
Balance being excess of Income over Expenditure (A-B)		6,68,85,697	6,79,32,873
Prior period adjustment	12	(6,254)	1,97,732
Transfer to Capital Asset Fund	4	6,45,660	2,37,02,711
BALANCE BEING SURPLUS TRANSFERRED TO GENERAL RESERVE FUND		**6,62,46,291**	**4,40,32,430**
SIGNIFICANT ACCOUNTING POLICIES	13		
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For Centre for Wind Energy Technology

As per our Report attached
for R. Janakiraman & Co.,
Chartered Accountants
Firm Regn No.001263S

Sd/-	**Sd/-**	**Sd/-**	**Sd/-**
D.Lakshmanan	**Dr. S.Gomathinayagam**	President/	**J.Chandrasekaran**
General Manager (F&A)	Executive Director	Chairman	Partner
			Membership No.027861

पवन ऊर्जा प्रौद्योगिकी केन्द्र
CENTRE FOR WIND ENERGY TECHNOLOGY

नवीन और नवीकरणीय ऊर्जा मंत्रालय, अधीन स्वायत्त अनुसवधान एवं विकास संस्था, भारत सरकार
An Autonomous R & D Institution, Ministry of New and Renewable Energy, Government of India

वेलचेरी - ताम्बरम प्रमुख मार्ग, पल्लिकरनै, चेन्नई - ६०० १००, तमिलनाडु, भारत
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