pavan

C-WET

An ISO : 9001 - 2000 Organisation

A News Bulletin from CENTRE FOR WIND ENERGY TECHNOLOGY, Chennai

www.cwet.tn.nic.in

ISSUE - 20
January - March 2009

EDITORIAL

At this moment, when I have joined at the Centre there is an excellent growth of wind power utilisation all over the world. The growth rate is sustained at 20-25% in the wind energy sector. We are happy to note that the manufacturing of wind turbines is happening now in India with Pune, Pondicherry and Chennai as important hubs having facilities for manufacturing MW class wind turbines in India. In addition, it will be interesting to observe that there is also a blade testing facility set up with the private-private partnership with foreign investment at Vadodara near Pune.

While we appreciate the manufacturing capability development of wind turbines in India, it is rather little annoying to see that most of the manufacturing units make use of Indian work force rather than Indian designs. Most of them execute drawings as well as manufacturing processes with foreign IPRs through licensing and joint ventures. This trend needs to be changed at the earliest to cut down the cost of wind generated electricity in India.

C-WET which is a matured institution started with the humble beginning with Shri. Ajith K Gupta as first Executive Director from MNRE and Shri. J.P.L.N. Sastry as Officer on Special Duty. Later, a well conceived and constructed laboratory at Pallikaranai established by the earlier Executive Director, Shri. M. P. Ramesh and followed up consciously by Shri. K. P. Sukumaran during his additional tenure as Executive Director at C-WET. At this stage C-WET is well geared up to sustain the growth of the Institution with more emphasis into R&D. C-WET has started realising the limitations of R&D; which is, without the strong will and support by the Industry, R&D would not yield meaningful results. Because any design done by R&D experts needs a platform to implement and no laboratory can become a factory, producing the components. However, in its constant endeavour to continue its support to the wind energy development, R&D unit of C-WET is engaged in the development of Grid code preparation for wind power generation in India in association with Power Research & Development Consultancy, Bangalore. In search of offshore wind power feasibility the scientists of C-WET along with the executives of public sectors like NTPC, ONGC, NIOT, NPCIL, IIT, IOCL made a joint visit at the tip of Dhanuskodi Island to explore the possibility of offshore wind resource assessment with a 120 m mast.

The Wind Resource Assessment (WRA) unit of C-WET has been flooded with projects of assessment, verification, validation, due-diligence studies and feasibility studies from Government, private and public sector undertakings. Several projects have been completed on time.

The Testing unit has signed up with major players like Suzlon, Kenersys for their MW machines to be assessed for power performance studies. One of the assessments included the blade strain gauge installation on Leitwind's 1350 kW wind turbine. C-WET's team accompanied a high level Bhutanese delegation to explain the wind farm development in India.

Five agreements have been signed by S&C unit of C-WET for certification of wind turbines. After deliberations by members of RLMM Committee, the unit has released the updated Revised List of Models and Manufacturers (RLMM) lists. A couple of draft BIS standards have been discussed at length by the scientists.

The ITCS unit has proposed two International Training Programmes triggered by Indian Technical and Economic Co-operation (ITEC) programme of Ministry of External Affairs with MNRE support.

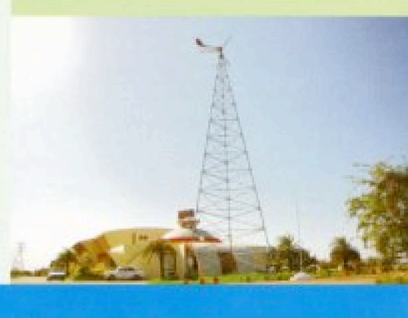
With research as one of the important goals, C-WET has sent out requests of proposal for research in wind energy. It is proposed to co-ordinate with various institutions, the research programmes to develop and to build up indigenous capability for the developments in wind energy sector in India. The areas of possible research were identified with the help of stake holders meeting in the presence of R&D Council.

At this moment, I would like to place on record the excellent work done by previous Executive Directors and the unstinted support from the Ministry towards achieving the goals of C-WET. We also look forward to your valuable feedback on this Newsletter PAVAN to carry on our work towards the fruitful experience of sharing on wind energy developments in India.

Dr. S. Gomathinayagam
Executive Director

Contents

Editorial Board



Developments in R&D UNIT

Development of Grid code for wind power generation in India

The R&D unit has recently initiated a project on "Development of Grid code for wind power generation in India" in association with Power Research & Development Consultancy Private Limited. The project is proposed to formulate the grid code for wind power considering the nature of generation and imparting reliable and secured operation of grid. The project aims in establishing the technical rules, requirements and performance that a wind power generator must comply with relative to their connection and operation with utility grid.

Offshore wind resource assessment

In order to explore the feasibility of setting up a demonstration offshore wind farm, the R&D unit in association with WRA unit is planning to carry out wind resource assessment in the southern tip of India particularly at Rameshwaram (Dhanuskodi), in a co-ordinated manner along with various organizations such as NTPC, ONGC, NIOT, NPCIL, IIT-Madras and IOCL. The input from such a study will act as a useful pointer in deciding the setting up of a demonstration offshore wind farm, which shall be the first of its kind in India.

C-WET/NTPC team exploring possibilities for 120 m Mast location at Dhanuskodi

Move on in WRA UNIT

During the period from January to March, 9 new Wind Monitoring stations in 5 states have been installed. Presently, 87 wind monitoring stations are operational in 19 states and one in Union Territory under various wind monitoring projects funded by the Ministry and Consultancy projects etc.

Verification of procedure of wind monitoring at Vavaniya, Rajkot District in Gujarat, Jaibhim, Nandurbar District in Maharashtra, Jambhore, Nandurbar District in Maharashtra, Nivali, Barwani District in Madhya Pradesh and Golbawadi, Barwani District in Madhya Pradesh, Kudre Konda, Shimoga District in Karnataka for M/s. Suzlon Energy Limited, Pune and Sripalvan, Satara District in Maharashtra for M/s. Vestas Wind Technology India Private Limited, Chennai has been successfully completed.

Projects on site validation and verification of 98 MW wind farm project at Vilaspur in Maharashtra for M/s. Tata Power Company Limited, Mumbai, Study Report on Wind Data Measured at three sites for M/s. Sarjan Realities Limited, Pune, Micrositing for wind farming of their proposed wind farm project at Chikkodi site in Belgaum District for M/s. Mysore Mercantile Co. Ltd, Bangalore, Site Assessment for Wind Monitoring for M/s. Belum Wind Infrastructure Pvt. Ltd, Hyderabad, consultancy services for estimating energy from (50 x 600kW) wind farm at Surajbari and (11x600 kW) wind farm at Harihar for M/s. MSPL Limited, Hospet, Site Assessment for Wind Monitoring for M/s. Rayalaseema Wind Energy Company Pvt. Ltd, Hyderabad, Production estimate of (5 x 1500 kW) wind farm at Kappatagudda & (3 x 1500 kW) wind farm at Elkurnahalli for M/s. Suzlon Energy Ltd, Pune, Consultancy services due-diligence for their proposed 50.4 MW wind farm project at Chavaneshwar, Satara District in Maharashtra & Gadag in Karnataka for M/s. Enercon (India) Limited, Mumbai have been taken up during this period.

The unit has completed 10 Projects on Verification of Procedure of Wind Monitoring at Akal (Jaisalmer District in Rajasthan), Sadawaghapur & Sadawaghapur Forest (Satara District in Maharashtra), Pohra (Jaisalmer district in Rajasthan), Mokal (Jaisalmer District in Rajasthan) Wandhia (Bhuj District in Gujarat), Gude Panchgani II (Sangli District in Maharashtra), Chakla (Nandurbar District in Maharashtra), Tuppadahalli-I (Chitradurga District in Karnataka) and Maliya (Rajkot District in Gujarat) for different wind farm entrepreneurs.

The unit has also completed the following projects and submitted reports during this period :

- Site Assessment for Wind Monitoring in Kadapa & Anantapur Districts in Andhra Pradesh & Karnataka for M/s. Advaita Wind Energy Ventures (P) Limited, Hyderabad;
- Wind Resource Assessment Study at Kombhalane, Ahmed District, Maharashtra for M/s. D. J. Malpani, Sangamner and
- Site Validation & Generation Estimate of proposed 49.5 MW Wind Farm project at Wandhia in Bhuj District, Gujarat for M/s. Vestas Wind Technology India Private Limited, Chennai.

Steps forward in TESTING UNIT

- An agreement has been signed between C-WET and M/s. Suzlon Energy Limited to test their new variant of 1250 kW wind turbine at Mettubavi near Coimbatore, Tamilnadu.
- An agreement has been signed between C-WET and M/s. Kenersys India Private Limited to test their 2000 kW wind turbine at WTTS, Kayathar.
- Rotor blade strain gauge installation work carried out for Leitner Shriram 1350 kW wind turbine at Chitradurga site in Karnataka.

Marching ahead in S&C UNIT

- Agreement has been signed with M/s. Elecon Engineering Company Limited for Provisional Type Certification of T600-48 / 600 kW wind turbine model under Category–I as per TAPS-2000 (amended).
- Agreement has been signed with M/s. Suzlon Energy Limited for Provisional Type Certification of Suzlon S66-1250 kW wind turbine model under Category–II as per TAPS-2000 (amended).
- Agreement has been signed for Provisional Type Certification of wind turbine model K82 / 2 MW with M/s. Kenersys India Private Limited & I-29/250/250 kW with M/s. India Wind Power Limited under Category–III as per TAPS-2000 (amended).
- Agreement has been signed with M/s. Southern Windfarms Limited for renewal of Provisional Type Certificate of GWL 225 wind turbine model as per TAPS-2000 (amended).
- The Unit Chief (i/c), S&C participated in "9th Meeting of Non-conventional Energy Sources Sectional Committee MED 04" held at BIS, New Delhi.
- S&C unit organized "Revised List of Models and Manufacturers of Wind Electric Generators / Wind Turbine Equipment (RLMM)" committee meeting (01/2009) to issue the updated list.
- The certification projects, taken up as per TAPS-2000 (amended) are under progress.
- The continual improvement and maintaining the Quality Management System are ongoing.

Highlights from ITCS UNIT

International training programme

ITCS unit initiated the process of organising two international training programmes under Indian Technical and Economic Co-operation (ITEC) programme of Ministry of External Affairs with MNRE support. The course details and other procedures are available @ http://itec.nic.in.

The unit is planning to setup a display facility explaining C-WET activities and wind turbine technologies in the Display Hall, which would provide complete information about C-WET at a single point and act as a introductory platform for the students, information seekers and general public visiting the campus.

Action initiated to purchase servers and LAN re-cabling along with required accessories / equipments to provide better IT facilities / services for safe and faster communication to manage the increased activities / staff members.

To participate in the race of awareness creation about wind energy, C-WET has sponsored a session of the Energy Day 2009 organized by the Department of Energy Science and Environment on 21st March 2009 at IIT Bombay.

NEWS

Principle Power & EDP to Develop Floating Offshore Wind

Principle Power Inc. has signed a Memorandum of Agreement with Energias de Portugal (EDP) for the phased development of a deep-water offshore wind power project sited of the coast of Portugal using the WindFloat.

"The development of floating foundations for wind turbines is a pre-requisite to the development of offshore wind farms worldwide, as areas in which the sea bed is less than 50-metre deep are scarce and fixed structures in deeper waters are economically not feasible."

– Antonio Mexia, CEO, EDP

Wind Float, originally developed by Marine Innovation & Technology and owned by Principle Power, is a patent pending floating foundation for offshore wind turbines. Principle Power said that the WindFloat dampens wave and turbine induced motion. This could allow wind turbines to be sited in areas there were previously considered inaccessible. These areas could have water depth exceeding 50 metres and heavier wind resources.

The terms of the MOA call for Principle Power and EDP to co-develop a three-phased offshore wind power project off the coast of Portugal. The first phase will include the fabrication and installation of a single WindFloat for technology demonstration purposes. Following the successful completion and assessment of the demonstration unit, the second and third phases will include a pre-commercial and commercial deployment respectively.

"Offshore wind is one of our key innovation priorities," said Antonio Mexia, CEO of EDP. "The development of floating foundations for wind turbines is a pre-requisite to the development of offshore wind farms worldwide, as areas in which the sea bed is less than 50-metre deep are scarce and fixed structures in deeper waters are economically not feasible. We believe the WindFloat may be the correct approach to deep-water offshore wind farms."

Source: RenewableEnergyWorld.com

Wind Turbine Noise

Shri K. Boopathi, Scientist, Research and Development Unit of C-WET

Wind energy development has been increasing drastically as energy demand and supply has a big gap. In the midst of other renewable energy sources (Biomass & Solar), wind energy is one of the most acceptable, significant and cleanest natural resource which neither pollutes the environment, nor emits harmful gases during the energy conversion process. Even though it has the said advantage, the wind turbine can pose some environmental problems. These problems are noise, vibration & visual impacts etc. These factors may have negative effect on people, pose a danger to flying birds and harm local soil condition. Besides ecological problems caused by the wind turbines the landscape view can be disrupted. Among these one of the serious problems for the widespread use of wind energy is the noise which can cause annoyance to the residents in the nearby locations. The noise produced by wind turbines has a thumping, pulsing character, especially at night, when it is more audible.

The noise observing location depends on the turbine construction, its operation and the following situational factors :

a) The distance between residential area and wind turbine

b) Operating conditions of the wind turbine

c) Wind turbine components

d) Characteristics of noise source, i.e. tonality and impulsive character etc.

Basics of Noise

Sound : Sound can be generated by various mechanism. It is produced due to rapid fluctuation of pressure in the air. These fluctuations are emitted from a source and travel as waves through the medium at the speed of sound. These fluctuating pressure is typically one hundred thousandth (10^{-5}) of the static atmospheric pressure for what would appear to us to be a "very loud noise" of 94 dB. 1 Pascal pressure is equal to 94 dB re 20 μp.

The fluctuating frequency is between 20 Hz to 20000 Hz. Frequencies below 20 Hz are commonly called infrasound. Low frequency noise might be from about 10 Hz to about 200 Hz.

Noise: Noise is defined as any unwanted sound.

Sound Pressure

Amount of air pressure fluctuations created by a noise source is called as Sound pressure. We "hear" or perceive sound pressure as loudness. The pressure received at observer location is function of time. It has the unit of N/m^2. The pressure fluctuation above and below atmospheric level by a small amount and the time average is approximately zero. Hence, it is quantified by the square root of the square of the fluctuations, giving the root mean square (rms) value.

The sound pressure deviation (instantaneous acoustic pressure) p is

$$p = \frac{F}{A} \quad \text{---- (1)}$$

Where, F = force, A = area. The entire pressure p_{total} is ---- (2)

$$p_{total} = p_0 + p$$

Where, p_0 = local ambient pressure, p = sound pressure deviation

Sound Intensity: it is a measure of the rate of flow of sound energy per square metre (w/m^2)

Sound pressure level (L_p)

Sound pressure converted to the decibel scale is called sound pressure level (L_p). It is a logarithmic measure of the rms sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level.

$$Lp = 10 \, Log_{10} \left(\frac{P_{rms}^2}{P_{ref}^2} \right) = 20 \log_{10} \left(\frac{P_{rms}}{P_{ref}} \right) dB, \quad \text{---- (3)}$$

where p_{ref} is the reference sound pressure

and p_{rms} is the rms sound pressure being measured.

The commonly used reference sound pressure in air is p_{ref} = 20 μPa (rms), (2 x 10^{-5} Pa) which is usually considered the threshold of human hearing at a frequency of 1000 Hz.

Sound Power

The sound power is the sound energy transferred per second from the noise source to the air. It is measured in watts or sound intensity time of area.

$$W_{acoustic} = I \times A \quad \text{---- (4)}$$

Sound power level

Sound power level or acoustic power level is a logarithmic measure of the sound power in comparison to a specified reference level.

The sound power level SWL, L_W or L_{Pac} of a source is expressed in decibels (dB) and is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to a reference sound power. The sound power level of a signal with sound power

W is

$$L_w = 10 \log_{10}\left(\frac{W}{W_0}\right) \text{ dB}, \qquad \text{---- (5)}$$

where W_0 is the 0 dB SWL reference level:

$$W_0 = 10^{-12} \text{ W}$$

The sound power level is given the symbol L_w or SWL. This is not to be confused with dBW, which uses 1 W as a reference level. The reference sound power in air is normally taken to be 10^{-12} watt = 0 dB SWL.

The eardrum can detect sound if the incoming sound power is as weak as 1 pico watt (10^{-12} W). If the ear is exposed to a power of more than 1 W, contribute permanent hearing loss.

In the case of a free field sound source in air at ambient temperature, the sound power level is approximately related to sound pressure level (SPL) at distance r of the source by the equation

$$SWL = SPL + 10 \log_{10}\left(\frac{4\pi r^2}{S_0}\right) \qquad \text{---- (6)}$$

where $S_0 = 1\text{m}^2$.

Decibel

The decibel (dB) is a logarithmic unit of measurement that expresses the magnitude of a physical quantity (usually power or intensity) relative to a specified or implied reference level. Since it expresses a ratio of two quantities with the same unit, it is a dimensionless unit. A decibel is one tenth of a bel, a seldom-used unit. The decibel (dB) is used to measure sound level. The dB (A) scale is the most common measure used to quantify noise. It covers sound intensity over the entire audible scale and takes account of the sensitivity of the human ear to give an overall measure of "loudness".

A reason for using the decibel is that the ear is capable of detecting a very large range of sound pressures. The ratio of the sound pressure that causes permanent damage from short exposure to the limit that (undamaged) ears can hear is above a million. Because the power in a sound wave is proportional to the square of the pressure, the ratio of the maximum power to the minimum power is above one (short scale) trillion. To deal with such a range, logarithmic units are useful: the log of a trillion is 12, so this ratio represents a difference of 120 dB. Since the human ear is not equally sensitive to all the frequencies of sound within the entire spectrum, noise levels at maximum human sensitivity-for example, the higher harmonics of middle A (between 2 and 4 kHz) are factored more heavily into sound descriptions using a process called frequency weighting.

Logarithms are useful for compressing a wide range of quantities into a smaller range.

For ex. $\log_{10} 10 = 1$
$\log_{10} 100 = 2$
$\log_{10} 1000 = 3$

And the ratio of 1000:1 is compressed into ratio of 3:1

Noise level

Even though the intensity can be measured directly, we measure only sound pressure. The reason is that the measuring instruments, such as microphones employ a diaphragm which, deflecting under the fluctuating force of the sound wave and converts its deflection to an electrical signal. Pressure = force / unit area, and is the sound pressure which applies a force to the diaphragm. The noise level at different source is as shown in the Table 1.

Table 1. Noise level of different source

Source/Activity Indicative noise level dB (A)	indicative noise level dB (A)
Threshold of pain 140	140
Jet aircraft at 250 m	105
Pneumatic drill at 7 m	95
City traffic	90
Truck at 30 mph at 100 m	65
Busy general office	60
Car at 40 mph at 100 m	55
Wind farm at 350 m	35 – 45
Quiet bedroom	20
Rural night-time background	20 – 40
Threshold of hearing	0

Sources of Noise from Wind Turbines

There are two potential noise sources from the wind power plant; one is mechanical and other from aerodynamic noise.

Mechanical Noise

The Mechanical noise is emitted from the wind turbine due to relative rotation of drive train components like gearbox, generator, yaw motors, cooling fans, hydraulic pumps and other accessories. The noise from these components frequently contains more or less prominent tones, whose amplitude and also frequency fluctuates slightly in rhythm with the blade passing frequency of the rotor. Occasionally low levels of mechanical noise also arise from pitch control motors. All mechanical noise sources are contained within the wind turbine nacelle. Several techniques are used to mitigate this noise source. These include special gears, belt drives, mounting of vibrating components on vibration isolating mounts and the use of acoustic isolation to dampen noise.

Aerodynamic Rotor Noise

When wind turbine rotor blade moves in a flow field or interact with air stream a pressure distribution is established around the blade. While the blades are interacting with the air stream the aerodynamic noise generated along with a number of complex phenomenon occurs around the blade, each contributing the noise emission from the wind turbine generator system.

The rotor noise from a well designed wind turbine would have broad band type with some amount of low frequency or even tonal component, a characteristic amplitude modulated pattern in rhythm with the blade passing frequency, providing a typical "swishing" sound. At larger distances from the turbine the amplitude modulation decreases and the sound gains a more stationary character. Some observations indicate that the modulation can be strong, even at rather large distances, in a stable atmosphere which can occur at night time when the wind is not too strong. Aerodynamic noise is generally affected by some of the factors viz. shape of the blade tip, tip speed ratio, pitch setting, trailing edge thickness, blades' surface finish and twist distribution.

Noise Measurement

The standard way of measuring noise is by using sound level meter or equivalent equipment. The level meter will have analog meter, filters, weighting network, amplifier & microphone. The microphone output is amplified and passed to electrical filters and the digital signal is indicated in an indicating meter. The weighting network and electrical filters are more important as it indicates sound and frequency.

The following filters are being used in the sound level meter :

A weighting	-	on all meters
C weighting	-	on most meters
Z weighting	-	on many meters
Octave filters	-	on some meters
Third octave filters	-	on some meters
Narrow band filters	-	on few meters

The 'A' weighting is used for low levels; 'C' weighting is intended for high level noise.

A-weighted decibels

The sensitivity of the human ear to sound depends on the frequency or pitch of the sound. People hear some frequencies better than others. If a person hears two sounds of the same sound pressure but different frequencies, one sound may appear louder than the other. This occurs because people hear high frequency noise much better than low frequency noise. Noise measurement readings can be adjusted to correspond to this peculiarity of human hearing. An A-weighting filter which is built into the instrument de-emphasizes low frequencies or pitches. Decibels measured using this filter are A-weighted and are called dB(A). Legislation on workplace noise normally gives exposure limits in dB(A).

Measurement Procedure

The noise emission from the wind turbines shall be measured as per IEC 61400 -11 for acoustic noise measurement techniques. The standard describes measurement procedure and analysis.

Test Conduct

The acoustic noise test consists of two types of noise measurements: turbine and background. Turbine noise measurements are taken when the turbine is operating, and background noise measurements are taken when the turbine is stopped. Wind speed, wind direction, humidity, temperature, pressure and power shall be logged into the data logger and average over 1 min periods.

Conclusion

Noise is an environmental pollution. The continuous low frequency noise may affect human health. The wind turbine noise emission should be within the specified sound pressure level 45 – 55 dB (A) and the sound power level should be 94 dB(A) – 105 dB(A).

Recommendation

To reduce the noise emission from a wind turbine, a preliminary noise survey shall be conducted at the site and noise analysis should be carried out based on the operating characteristics of the specific wind turbine and terrain.

References

1. *IEC 61400-11, 2002 accoustic noise measurement techniques.*
2. *Introductory course notes - Wind Turbine Noise 2009 Conference.*
3. *Wind Turbine Noise, Wagner, Bareib.*

NEWS

Indian wind energy Slowdown

A significant number of energy sector projects are being withdrawn worldwide due to financial crisis and fall in demand. India and its wind energy industry are no exception.

An example is the Hyderabad based Lanco group. Its subsidiary, Lanco Infratech Ltd, has shelved its plan to set up wind turbine manufacturing facilities due to the current economic slowdown.

The company has abandoned its plans even as it had tied up technology and vendors for the venture. It has re-deployed the around 40 company executives earmarked for the project.

According to the information available on the company's website, Lanco had undertaken wind-turbine manufacturing and project development activities in India, Europe and the Americas and had plans to launch its 2MW wind turbine in April 2009.

A significant number of energy sector projects are being abandoned due to the global financial meltdown and a fall in demand for such projects.

The Indian wind turbine market has players such as Suzlon Energy Ltd, Danish manufacturer Vestas Wind Systems A/S.US Company GE Energy, German manufacturer Enercon GmbH and Spain's Gamesa SA.Had Lanco gone ahead with this venture, it would have been the second Indian Company to set up wind turbine manufacturing facility in the country after Suzlon.

The company had plans to launch its 2MW wind turbine in April. Lanco's wind turbine manufacturing facility was to have installed capacity of 500 units of 2MW turbines a year with an investment of Rs. 500 crore at a facility close to Mangalore in Karnataka, according to company Chairman Lagadapati Madhusudhan Rao.

Lanco Infratech has an installed electricity generation capacity of 524 MW and is involved in projects that would have installed capacity to produce another 7,880MW. The company also has a wind power generation capacity of 13 MW at two separate locations in Karnataka and Tamilnadu. Lanco Infratech registered a net profit of Rs. 484.5 crore in 2007-08 on revenues of Rs. 3,241.1 crore.

Of India's total installed capacity of 147,000MW, wind-based power accounts for only 8,696 MW, and most projects have a plant load factor, or efficiency, of only 10-15%. Some power sector analysts say the low efficiency is because the developers are interested in claiming deprecation benefits, not generating power. India, however, has a wind energy potential of 45,000MW and Ministry of New and Renewable Energy hopes to increase wind power capacity to around 18,000MW by 2012.

A Delhi-based power sector analyst said: "The wind power generation industry is going through a slowdown worldwide. Indian companies are finding it increasingly difficult to raise resources amid such a demand slowdown."

Source: www.windenergynews.com

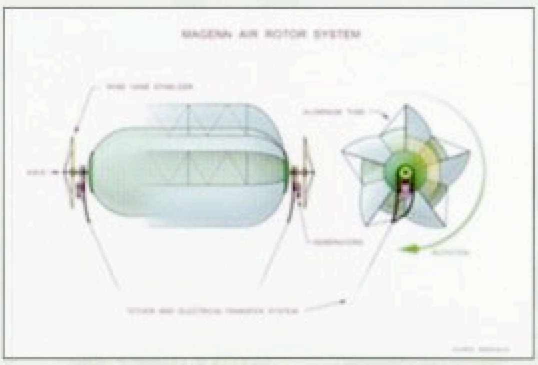
Marine Applications of Magenn Air Rotor System (MARS)

The Magenn Air Rotor System (MARS) is a new generation of cost effective wind turbine to produce electricity from wind power anywhere. Conventional wind turbines require wind speeds between 3 metres/sec. and 28 metres/sec. and are generally installed in coast line.

As MARS can operate between 1 metre/sec. and in excess of 28 metres/sec, they can be installed anywhere. The only restriction is that MARS units may not operate in controlled airspace or within five miles of the boundary of any airport.

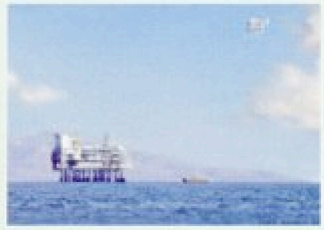
MARS has marine applications also to power up: island nations, offshore drilling stations, and barge mounted power stations.

Some of the interesting features of MARS are:



- a product of Magenn Power Inc. and commercial applications of 10 kW to 25 kW MARS units are expected to be in 2009-10.
- is a lighter-than-air tethered wind turbine that rotates about a horizontal axis in response to wind, generating electrical energy.
- this electrical energy is transferred down the tether for consumption, or to a set of batteries or the power grid.
- helium sustains the Magenn Air Rotor System, which ascends to an altitude as selected by the operator for the best winds.
- its rotation also generates the "Magnus" effect. This aerodynamic phenomenon provides additional lift to stabilize the MARS unit at a controlled and restricted location, at preset altitude without downward drift on its tether.
- is equipped with at least two deflate systems (Rapid Deflation Device) to bring the unit slowly and safely to the ground automatically if it escapes from its moorings.
- if the MARS unit "cut down" system does not function properly, it will immediately notify the nearest ATC facility of the location, time of escape and the estimated flight path of the balloon.
- is equipped with a radar reflective material that will present an echo to surface radar operating in the 200 MHz to 2700 MHz frequency range.
- units that operate over 150 feet will have a lighting system including individual lights that are placed every 50 feet on its tether. The lights will flash once per second.

The Advantages of MARS over Conventional Wind Turbines are :



- low cost electricity – under 15 cents per kWh.
- bird and bat friendly.
- lower noise.
- wide range of wind speeds: from 1 metre/second.
- higher altitudes – from 200 to 1,000 feet above ground level operations are possible without expensive towers or cranes to carry out maintenance.
- fewer limits on placement location – coast line placement is not necessary.
- ability to install closer to the power grid thus minimizing transmission line costs and transmission line loses.
- efficiency of 40 to 50 percent: will deliver time-averaged output much closer to its rated capacity than the capacity factor typical with conventional designs.
- being portable, are suitable for emergency deployment including disaster relief situations.
- ideal for off grid applications or where power is not reliable.

Initial MARS target markets include :

- Developing nations and island nations where infrastructure is limited or non-existent.
- Disaster management: rapid deployment (to include airdrop) in disaster areas to provide emergency power to medical equipment, water pumps, and relief efforts (ex. Katrina, Tsunami).
- Off grid for cottages and remote uses such as cell towers and exploration equipment.
- Military applications.

Source: www.magenn.com

RECRUITMENT / PROMOTION / RETIREMENT

Pavan Editorial Board welcomes the new Executive Director

Dr. S. Gomathinayagam has taken charge as Executive Director of C-WET on 22nd January 2009 – a profile :

Dr. S. Gomathinayagam, a graduate (Civil Engineering) of Regional Engineering College, Tiruchirapalli of the Madras University, obtained his M.S. and Ph.D. degrees from the IIT-M by way of research in the area of Wind Effects on Structures. After serving as a Project Associate at IIT-M for about one and a half years, and with a brief stint at Best & Crompton design office, he joined Structural Engineering Research Centre, Madras in 1983 as Scientist and has risen to the position of Deputy Director and Project Leader of Field Experiments in Wind Engineering. After serving 25 years in solving various multidisciplinary industrial, consultancy and software development problems at Structural Engineering Research Centre, Madras he has joined as Executive Director in Centre for Wind Energy Technology in January 2009. During 1989-90, he visited T.H.Darmstadt, Germany as a DAAD Scholar and worked in the field of non-linear transient analysis of RCC structures and toured France, Switzerland and Austria. He has also visited the University of Notre Dame, Colorado State University, and Texas Tech University, USA under the UNDP Fellowship Programme for wind engineering research. He also visited Monash University, Melbourne, Australia under AUSAID fellowship. He shares as a Scientist involved for CSIR-Technology Prize for Engineering Software Development in 1999, and is one of the members of the team which has won the CSIR Technology Shield for centre of excellence in wind engineering in 2000 and the "A.S.Arya – UOR Disaster Prevention Award" in the year 2001, for their contribution towards cyclone disaster mitigation. He has published over eighty (80) interdisciplinary technical papers in refereed national / international journals / conferences / seminars. He has over hundred technical reports to his credit based on the research and consultancy in the areas of power, wind energy, space, railways and Indian Navy involving instrumentation experimental analysis, design and testing and software development. He is a Life Member and Chartered Engineer of Institution of Engineers (India) and life member of Computer Society of India, Instrument Society of India, Indian Society for Wind Engineering and India Meteorological Society. He has guided several ME, MTech, MSc. and MCA projects. He served/serves in various awards/selection/promotion/Academic/ Professional Committees including Wind Energy Committee of Bureau of Indian Standards. Now at C-WET as Executive Director has to do technology management and co-ordination of research, analysis, design, certification and performance testing, consultancy and human resource development related to Wind Power development in India.

New Recruitment

Name	Cadre
R. Sasikumar	Scientist 'B'
N. Rajkumar	Scientist 'B'
R. Vinod Kumar	Technician
R. Naveen Muthu	Technician

Promotion

Name	Cadre	
	From	To
Rajesh Katyal	Scientist 'D'	Scientist 'E'
P. Kanagavel	Scientist 'B'	Scientist 'C'
K. Boopathi	Scientist 'B'	Scientist 'C'

EVENTS

GLOBAL ENERGY 2009

Global Energy 2009, an international expo focused on solar, wind, hydro energy & LED is scheduled to be held from 11 - 14 December 2009 at Gayathri Vihar, Palace Grounds, Bangalore. The exhibition is organized by M/s. Space Craff, Bangalore. For more information: # 145, 5th Main, Chamarajpet, Bangalore - 560 018, INDIA, Ph : +91 - 80 - 2660 2962 , Fax : +91 - 80 - 2660 9753, e-mail info@global-energy2009.com Website: www.global-energy2009.com.

C-WET
Published by :
CENTRE FOR WIND ENERGY TECHNOLOGY (C-WET)
An autonomous R&D institution established by the Ministry of New and Renewable Energy (MNRE), Government of India to serve as a technical focal point of excellence to foster the development of wind energy in the country.
Velachery - Tambaram Main Road, Pallikaranai, Chennai - 600 100
Phone : +91-44-2246 3982, 2246 3983, 2246 3984. Fax : +91-44-2246 3980
E-mail : info@cwet.res.in Web : www.cwet.tn.nic.in

If you would like to continue receiving the PAVAN Newsletter, kindly send a request for registration to the address mentioned above (or) kindly send back the duly filled in feedback form.