C-WET

pavan

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A news bulletin from the Centre for Wind Energy Technology, Chennai

editorial . . .

The other day I was reading Dr.Gary Johnson's introduction to wind energy systems. It struck me that American efforts in wind turbine technology had so many first of its kind ideas from a not so distant past have been either forgotten or we refuse to take hints from those mind boggling attempts. We have to confess to our natural European bias in the field and perhaps do a bit of introspection. Johnson's compilation highlights the lessons learnt from an unparalleled effort. The experiments started with Mod 0 rated at a modest 100 kW up to Mod 2 rated at 2.5 MW. Three of Mod 2 machines were installed by 1981. The next giant step was to design Mod 5A and Mod 5B rated at 6.2 and 7.2 MW respectively. But due to a variety of reasons including lower costs of fossil fuels, 'cost plus' development with no eye on commercial deployment these developments came to a halt by mid eighties. However some of the practical hints that came out of such major efforts are to be recognized and used with profit in what we would like to do in future.

European parallels were also there with Growian rated at 3 MW and several multi-MW made their appearance in the pioneering seventies and eighties. Commercial attempts however centered on the famous Gedser windmill design and sizes. In recent the times there is a race to once again design multi-megawatt behemoths, engendered due to different reasons, this time in Europe. We have commercially available models up to 4.5 MW. Land availability being a serious issue, offshore requirements is one of the driving forces. Another main reason is the increased confidence levels from already made field experiences. Today there are analytical tools available for ensuring a safe design. It should, however, be recognized that any normal designer would not take big risks and remain conservative. Consequently, the products will be more material intensive and expensive. This inhibits any advantages that economies of scales have to offer unless far more carefully optimized and produced in large numbers. In a market place with so many opportunities, the number of models will naturally be increasing. As a result, the economies of scale would appear to be mirages one chases.

This race for bigger unit sizes is also finding its echo in India. Since European countries are gradually phasing out their small wind turbines and are coming up with megawatt turbines, we have entrepreneurs trying to address this in, what is to day, a sellers haven. The first are the proposals for introduction of Megawatt class machines in the range of 1 to 2/2.5 MW unit size. Attempts are also to reintroduce or continue with the good old 250 – 500 kW range. In some cases, the designs are also from a somewhat dated era. There is definitely a demand for smaller sizes too. The so-called indigenous development is also following suit. Seeing a soaring Sensex and 'now or never' kind of feeling in the market place in general, there are many serious attempts at new joint ventures and technology transfer arrangements. Investments in wind, once considered as dare devil attempts even by high-risk venture capital funds, is attracting very conservative financiers vying for a foothold in the field.

Therefore a prospective investor is presented with a baffling number of options. For these people who are in a tearing hurry to invest before that much dreaded March 31st there will be a need for sound advice. There are equally plausible arguments in favor of any given size or technology. The environment is therefore exhilarating associated with opportunities unlimited.

M.P.Ramesh, *Executive Director*

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editorial board

India wins World Wind Energy Award 2005

India has increased its wind power generating capacity four-fold since 2002, thanks to the proactive policies of its Minister for Non-conventional Energy Sources, Vilas Muttemwar, who recently received the World Wind Energy Association's 2005 award

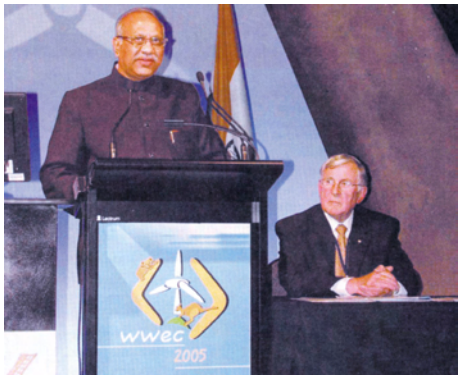
India is now among the top four wind energy generating nations in the world, an achievement that has been recognized by the World Wind Energy Association (WWEA). The global body recently awarded Indian Minister for Non-conventional Energy Sources Vilas Muttemwar and his ministry the World Wind Energy Award 2005 for Outstanding Achievements in Favourable Policies for Wind Energy. Grid-connected power-generation through wind energy in the country has now crossed 4,228 MW, making India the fourth largest wind power generating country in the world after Germany, Spain and the United States.

The annual award, given to people who have made significant contributions to the worldwide proliferation of wind energy, was presented to Muttemwar by the German-based WWEA, at the closing ceremony of the World Wind Energy Conference held in Melbourne on November 2-5.

Amin Mobarak, chairman of the Industry and Energy Committee of the Egyptian Parliament, received the first WWEA award in 2002. The World Wind Energy Award 2003 was given to wind turbine manufacturer Suzlon, and the award for 2004 went to German Minister for the Environment Jorgen Trittin. India, which overtook Denmark for this position in March 2005, has increased its capacity in this renewable energy sector four-fold — from 242 MW in 2002-2003 to 615.2 MW in 2003-2004 and 1,111.7 MW in 2004-2005. This year, 631.9 MW of generation capacity from wind energy has been set up till September 30.

Leading wind energy generating states in India include Tamil Nadu, Maharashtra, Karnataka, Rajasthan and Gujarat. Progress in promoting wind energy power generation is also marked by the setting up of Asia's largest wind farm at Satara in Maharashtra, with a power capacity of 750 MW.

In the last few years, India has made remarkable strides in the renewable energy sector, wind energy generation in particular. Besides several proactive measures aimed at building wind power generation capacity, a conducive



investment environment has been created in terms of concessional duties, easy loans and accelerated depreciation facilitated by the non-conventional energy sources ministry.

The ministry has prepared master plans for 97 potential sites aggregating generation of 15,062 MW of wind power potential in Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu and West Bengal. The master plans provide information on the availability of wind, land, grid availability and accessibility to the site, enabling project promoters and state nodal agencies to undertake proper planning and implementation of projects. These master plans have been provided to state nodal agencies and are available to project promoters, developers and consultants through the Centre for Wind Energy Technology (C-WET), an autonomous body under the ministry, at a nominal cost. Master plans for more such sites are under preparation.

Source: www.pib.nic.in

Work at C-WET

CURRENT ACTIVITIES

DEVELOPMENT IN R&D UNIT

Recently, R & D unit of C-WET has setup a mobile mini-pulsed Doppler SODAR (Scintec-MFAS). This SODAR measures the three dimensional wind vectors from 30-1000 m with a height and time resolutions of 10 m and ~1 min, respectively.

Sound Detection and Radar (SODAR) is an instrument that measures wind vectors in three directions along medional (North-South) Zonal (East-West) and vertical directions.

SODAR works on the principle of Doppler frequency shift that occurs when an acoustic pulse gets reflected from a moving target. The extent of frequency shift is a measure of the velocity with which the target is moving. The transmitter, receiver pairs deployed in a 2D way. The Scientec MFAs is a compact instrument that can measure wind velocities upto an elevation of 1000m providing that the atmospheric conditions are right. The sonic beams are electronically programmed to scan the wind speeds at any preset resolution. One complete scan requires about 6 seconds to traverse from 40m to 1000m. Therefore is feasible to obtain one complete profile in about 6 seconds. This is important because different instruments have different sampling frequencies while comparing the results.

The profile measurement in field has several practical uses apart from giving a snap shot of information of upper winds. The up wind portion of a known windy hill when scanned carefully will reveal if the high velocities an ridge lines is consequences of terrain induced acceleration or if it is merely the upper winds. Long-term measurements using SODAR can also be used to validate wind flow models. Besides these advantages SODAR are only instruments, which are able to give site-specific wind velocity data to great heights. Radio sounder gives upper air data but does not get fixed to a point on the ground. Radio sounder also gives single set of data per launch as against time averageble data obtainable using SODAR.

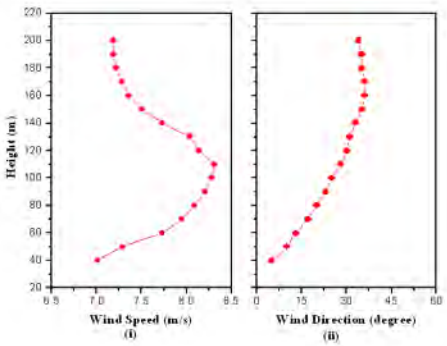


Figure 1. Height profile of (i) Wind speed and (ii) direction measured from SODAR

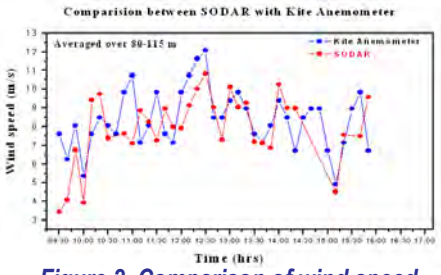


Figure 2. Comparison of wind speed measured from SODAR and Kite Anemometer

To get a rough validation kite anemometer data was obtained from heights up to 130m. This correlation seems to be reasonable.

Figure 1 shows the typical height profile of (i) wind speed and (ii) direction averaged over 10 min.

Figure 2 shows the vector plots, which indicate the diurnal variability of wind speed and direction with height. The wind speed measured from SODAR was compared with the Kite Anemometer.

MOVE ON IN WRA UNIT

C-WET has installed three more stations with 25 m tall masts in Sikkim during October to December 2005 under the Wind Resource Assessment in Northeastern region of the country. The stations are Asanthang, Gnathang and Thangu. With the commissioning of these stations, a total of 22 stations have been established in the north eastern states of Assam, Arunachal Pradesh, Manipur, Mizoram, Tripura and Sikkim. Two more stations are to be established in the region of Assam and Arunachal Pradesh.

Under the Validation of Power Law Index in Plain/Complex Terrain for wind resource assessment during the year 2004-2005, a 50 m tall mast with three level instrumentation was commissioned at Khodal-two near Jaisalmer wind monitoring station in Rajasthan during December 2005.

Data collection from another thirty nine stations established under various programs like Wind resource assessment in Uncovered/ new areas, Power law Verification, and Measure-correlate-predict, is going on.

Micro Survey studies at three locations in Tamilnadu (Pushpathur, Muttom and Gangaikondan) have been completed for Tamilnadu Energy development Agency (TEDA), Chennai under a consultancy project.

STEPS FORWARD IN TESTING UNIT

The measurements reports for Provisional Type Testing of Pavan Shakthi 600kW wind turbine at Coimbatore has been released to the client in December 2005. The measurements on Enercon 800kW wind turbine at Bamnasa, Gujarat has been completed and the repors are being prepared. The provisional Type Testing of Suzlon 600kW is expected to start in the month of March 2006. The measurements of 1250kW Suzlon wind turbine and 250kW IWPL wind turbine are expected to start shortly. The unit will be audited by NABL shortly as per ISO 17025.

MARCHING AHEAD IN S&C UNIT

S&C Unit has signed an agreement with M/s. India Wind Power Limited for Provisional Type Certification of their wind turbine model I29/ 250 kW

An agreement has been signed for the renewal of Provisional Type certification of Suzlon N3335/3330 - 350/300 kW Wind turbines.

The works related to formation of working group- Wind energy, for the preparation of Indian standards are completed.

Internal audit on Quality Management System as per ISO 9001:2000 have been conducted at S&C unit. Audits have been conducted by S&C auditors in other units.

In order to stream line the process issue concerned of custom duty certificates by MNES, an online application and processing soft wave has been developed in association with National Informatics Centre (NIC), Chennai. This, when implemented will help the Ministry to easily process the applications for Concessional Customs Duty Certificate and keep track of processing electronically.

HIGHLIGHTS FORM ITCS UNIT

International Training Course: **On *"wind Turbine Technology and Applications"* at C-WET Chennai:** Preparatory works for organising a second international training program on "Wind Turbine Technology and Applications" during 22nd February – 3rd March 2006 is in progress.

The course content for the training is a carefully thought out syllabus with specific subject experts giving lectures and would go through case studies such that at the end of the day considerable useful knowledge transfer would be perceived. The training addresses the following aspects:

1. Wind Energy Evolution
2. Developments / breakthroughs
3. Government policies and supportive schemes & programme
4. Critical issues that India need to address
5. Legal frameworks
6. Improve levels of understanding among stakeholders
7. Determine ways and means of covering institutional barriers in a scientific manner
8. Design of carefully vetted wind farming projects
9. Improved performance of wind farms through the use of newly acquired knowledge
10. Key to global success
11. Investment techniques
12. Detailed description of success stories and focused cause studies
13. Integration of Wind Energy to grid
14. O & M aspects of wind farms

Additional tutorials and manufacturing facility visits would be organized during the course to give a complete picture of the know-how and how to go about setting up a coordinated wind energy programme at a national level.

Self- explanatory Video film on C-WET: C-WET is the only institute of its kind in the developing countries and a technical focal point to accelerate wind energy development in our country. The awareness creation and information dissemination of the activities & role of the Center as well as local & global developments in the wind energy sector are essential need of the day. Now, C-WET completed it is fifth year and contributed immensely towards the development of wind energy sector in the country.

It is proposed to prepare a self-explanatory video film on C-WET, which would help in explaining C-WET activities.

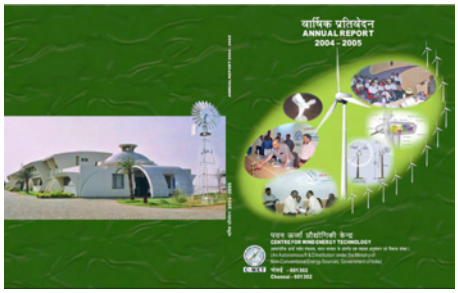
Being a new field such tools for disseminating information will go a long way in informing general public and experts about the capabilities and knowledge available in the country

Preparatory works for making Self- explanatory Video film on C-WET is in progress. The shooting has been completed and the first cut has been received form the filmmaker. Now, we are in the process of reviewing and finalizing.

Website: The existing C-WET Website has been redesigned with new feature to make more informative and attractive in bilingual. Now, we are in the process of purchasing Firewall for strengthen the E-Security and then the redesigned website would be hosted in own server and then the website can be @ www.cwet.res.in.

Online Public Access Catalogue (OPAC): C-WET Library is being strengthened by adding books and periodicals allied to Wind Energy in particular and renewable energy in general. To maintain the Library resources and offer the services effectively, the C-WET Library has been computerized by using Library Automation software. Now, C-WET staff can easily identify the availability & status of the library resources (books and periodicals) through **Online Public Access Catalogue @ http://library/cwet.**

C-WET Annual Report 2004-2005: Annual Report 2004-2005 has been prepared, printed and submitted to MNES.



TYPE CERTIFICATION OF WIND TURBINES AS PER TAPS-2000 – An Overview

1.0 INTRODUCTION:

Type Certification is obtained by wind turbine manufacturers for their wind turbine (WT) models, to demonstrate that wind turbine models are meeting the specified standards. Most of the countries with the active wind energy programmes have their National type certification / approval schemes along with testing facilities for Type certification / Approval of wind turbines models. The scope for the certification is well defined in type certification schemes. The present trend is moving towards harmonization of requirements for certification. International (IEC) Standards have been released on certification system requirements.

2.0. FACILITY FOR TYPE TESTING AND TYPE CERTIFICATION

Though India has witnessed a rapid development in wind power generation during the last two decades, testing and certification facilities were not available in the country. Presently, the Indian WT manufacturers, with a few exceptions, are supplying Wind Turbines of the types provided by their principals, which are certified by the certification bodies in abroad. However, these type certificates are issued based on the European site conditions and approval schemes/technical criteria of the country in which they are carried out. In addition, the WTs installed in India undergo major/minor changes to suit the Indian conditions. All the major stakeholders expressed the need for establishing the testing facilities and certification system in the country. Based on the above, Ministry of Non-conventional Energy Sources (MNES) has established Testing and Standards and Certification (S&C) units as a part of Centre For Wind Energy Technology (C-WET). S&C unit has prepared a Type Certification scheme viz., "Type Approval - Provisional Scheme (TAPS-2000)", the Indian Certification Scheme for wind turbines, which has been approved and issued by MNES.

3.0 TYPE CERTIFICATION

The purpose of the type certification is to confirm that the wind turbine type is designed, documented and manufactured in conformity with design assumptions, specific standards and other technical requirements. Type certificate pertains to a specific model and all turbines manufactured under a given type certificate are expected to be compliant with the standards. In case of any modifications

the manufacturer is expected to refer the matter to the certification body for re-verification and approvals, failing which the certificate will loose its validity.

3.1 The Type Certification process can be broadly divided in to the following elements:

- ***Evaluation of***
  - Design documentation
  - Type Test reports
  - Manufacturing system documentation
  - Type characteristic measurements (optional)
  - Foundation design evaluation (optional)
- ***Preparation of Final Evaluation Report***

  (if satisfactory in all respects)
- ***Issue of Type Certificate, valid for a specified period***
- ***Renewal of Type Certificate***

4.0.TYPE APPROVAL – PROVISIONAL SCHEME (TAPS-2000)

S&C unit of C-WET, the Type Certification body, is the implementation agency of TAPS-2000. Testing unit carries out testing / measurements, as per the requirements of TAPS-2000.

TAPS – 2000 aims to promote procedures and requirements for the establishment of uniform codes, standards and technical criteria for design, manufacturing and operation of wind turbines. TAPS–2000 comprises of principles, procedures, requirements and the technical criteria for certification of Wind Turbines (WTs) in India, addressed to applicants and others involved in the scheme. TAPS–2000 is formulated in line with National and International rules, codes and standards relevant for certification of WTs. TAPS–2000 is applicable only to the grid connected, horizontal axis WT of the rotor swept area greater than 40 m^2.

4.1 As per TAPS-2000, Provisional Type Certification (PTC) is carried out according to three categories viz., Category-I, Category-II and Category-III. The outline of these three categories is mentioned below:

Category- I: PTC for WT already possessing type certificate or approval.

Category- II: PTC for WT already possessing type certificate or approval, with minor modifications/changes, including provisional type testing/measurements.

Category- III: PTC for new or significantly modified WT including provisional type testing/measurements at the test site of C-WET.

The documentation requirements under each category are detailed in TAPS-2000.

4.2 External Conditions

WTs are subjected to environmental and electrical conditions, which may affect their loading, durability and operation. In order to ensure the appropriate level of safety and reliability, the conditions of environmental, electrical, operational and soil parameters must be considered in the design and also explicitly stated in the design documentation. This design documentation must be submitted by the manufacturer/ supplier to the Type Certification body. The WT, subjected to PTC for installation in India, should be designed using representative environmental and other design conditions. Especially, the grid conditions and extreme wind climate are different compared to European conditions. As per TAPS-2000, the design should comply with the requirements specified in IEC 61400 – 1 and modifications on external conditions to IEC 61400 – 1, to incorporate the Indian conditions, as given in TAPS-2000. The requirements on external conditions are applicable for all the three categories of Provisional Type Certification.

4.3 Provisional Type Certificate

The Type Certification Body, Standards and Certification (S&C) unit of C-WET, will issue a Provisional Type certificate for a WT model, based on satisfactory evaluation for completeness and correctness of the evaluation reports. The type certificate is valid for a specified period, as mentioned in the certificate.

5.0 CONCLUSIONS

Type certification of wind turbines provides confidence on the product, to various stakeholders. In order to ensure the quality of the WTs used in a wind farm project, availability of a type certificate is often included as a part of evaluation criterion by the developers, financial institutions and insurance companies. The type certification of WTs helps the industry to develop the reliable WTs.

A. Senthil Kumar,
Unit Chief (I/c), Standards & Certification Unit, C-WET

Renewable Energy

ENCOURAGE WIND ENERGY COMPANIES: MINISTER

BLAMING the recent ruckus created by Shiv Sena over the windmills project in Satara district, Union Minister for Non-Conventional Energy Vilas Muttemwar said Maharashtra's loss was Rajasthan's gain as actress Aishwarya Rai and 'Little Genius' Sachin Tendulkar had invested money in the desert state. Muttemwar, after attending a conference of solar manufacturers from all over the country, said the state government should take steps to encourage wind energy companies. ''The country has the potential to generate about 45,000 MW through wind energy. Maharashtra will miss out on it if it fails to woo developers,'' Muttemwar, an MP from Nagpur, said.

Currently, wind energy generates only 2,800 MW of power. He also said up to 5,000 MW of electricity could be saved if alternative energy sources like solar, bio-mass and micro-hydro projects were put up on a large scale.

''Pune's mayor has promised to offer 5 per cent rebate on property tax in case a society accepts a water and electricity conservation package,'' he said, adding Rs 1.5 lakh each would be given to district committees for creating public awareness on renewable energy.

Later, ministry secretary N Gokhale clarified that mayor Dipti Choudhary had given this assurance during a meeting called by the Centre in September this year. However, Muttemwar was unhappy to note that the state governments were not extending help to implement renewable energy programmes. ''Only 225 districts in the country have responded to the ministry's call for forming an advisory committee that will implement renewable energy projects,,'' he added.

Source : http://cities.expressindia.com

Empowering India

BAJAJ ALLIANZ AND THE ENERGY SECTOR

The Energy Sector of a nation is the backbone of it's economy. In India this sector comprises Petrochemical, Thermal, Hydroelectric, Nuclear and of late, emphasis is also being laid on non-conventional energy sources - Solar, Wind and Tidal.

In a rapidly developing country like India, the demand for energy has seen a steady increase especially, over the last decade. To sustain the projected growth of the Indian economy, the country needs to meet its rising power demands within the shortest time frame.

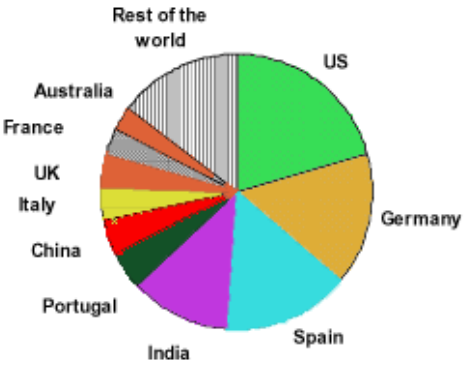
Since India's independence, generation, transmission and distribution of power were almost wholly the preserve of the central and state governments.

The distancing of the government, from the functioning of the sector after giving broad directions via the National Electricity Policy and the National Tariff Policy, has created tremendous investment opportunities in the private sector. Growing regulatory pressures, continued global competition, increased business interruption exposures, are some of the major challenges facing the energy market.In the Petrochemical Sector, process plant operators have increased the periods between major maintenance shutdowns, replacing them with inspections and minor routine maintenance.

Refineries that operated in the past with three to four years between shutdowns now average five to six years. Though this helps in the short term, over a longer period of time, it increases the chances of loss and it's impact due to undetected problems. Losses in the industry have increased nearly 200% in the past 10 years giving impetus to the role and business of Insurance companies.

Source: www.projectsmonitor.com

Top 10 new installed capacity
(Jan.-Dec. 2005)



UPCOMING EVENTS

March 2006 Austria World Sustainable Energy Days March 1-3rd, Wels. Contact:Christine Ohlinger, Tel:+43732772014861, Fax: +43-732-7720-14383 Email : christine.oehlinger@esv.or.at

March 2006 USA Windustry's Community Wind Energy 2006 expanding the know-how, March 7-8. The Lowa Events Center, Des Moines, Lowa. Contact: Cole Mcvey, Tel: +1 612 870 346, Email : cole@windustry.org

March 2006 China China (Shanghai) International Wind Power & Photovoltaic Generating Equipments Exhibition March 10 – 12, Shangai, Contact: Ms.Qiu Tel: +86-21-68641371 Ext: 804, Email : 1608@yahoo.com.cn

March 2006 Ireland IWEC Conference, Mar. 30-31, Corrib Great Southern Hotel, Gateway. Contact: Ann Curneen. Tel:00353(0)719646072, Email : office@iwea.com

Top 10 cumulative installed capacity
(Dec. 2005)

S.No	Total capacity	MW	%
1.	Germany	18,428	31.0
2.	Spain	10,027	16.9
3.	US	9,149	15.4
4.	India	4,430	7.5
5.	Denmark	3,122	5.3
6.	Italy	1,717	2.9
7.	UK	1,353	2.3
8.	China	1,260	2.1
9.	Japan	1,231	2.1
10.	NL	1,219	2.1
	Top 10 – Total	**51,936**	**87.5**
	Rest of the world	**7,368**	**12.5**
	World total	**59,322**	**100**

S.No	New capacity	MW	%
1.	US	2,431	20.7
2.	Germany	1,808	15.4
3.	Spain	1,764	15.0
4.	India	1,430	12.2
5.	Portugal	500	4.2
6.	China	498	4.2
7.	Italy	452	3.8
8.	UK	446	3.8
9.	France	367	3.1
10.	Australia	328	2.8
	Total top	**10 10,024**	**85.2**
	Rest of the world	**1,745**	**14.8**
	World total	**11,769**	**100.0**

Published by :

CENTRE FOR WIND ENERGY TECHNOLOGY (C-WET)

An autonomous R&D institution established by the Ministry of Non-conventional Energy Sources (MNES), Government of India to serve as a technical focal point of excellence to foster the development of wind energy in the country

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