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A news bulletin from Centre for Wind Energy Technology, Chennai

C-WET

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Editorial

In a recent meeting, V.Subramanian, Secretary, MNRE expressed dismay and surprise that most of the people involved in energy supply business fail to recognize the impressive presence of RE technologies on the electrical grids. 7 to 8 % in installed capacity terms after taking out hydro power is considerable. Yet, he lamented, almost every one chose to just ignore the presence of these admittedly intermittent sources of power and energy. This is just the tip of the iceberg. Some of the popular misconceptions regarding intermittency of renewable energy, more particularly wind energy are a result of hasty back of the cover calculations and pre-conceived notions. There is also a lack of appreciation and patience. It is perhaps because it is not convenient. Sustained research has lead to some of the important conclusions that may show the way to giving wind and other sources of infirm power their rightful place in the energy supply mix.

Developed economies work with extra-ordinary levels of guaranteed energy delivery. Introduction of the sources of intermittent power needs scholarly discourses on the spinning reserves and reliability questions. The Loss Of Load Probability (LOLP) of 4 to 5 % is considered detrimental to the quality of life and economies. With this scenario, the matching or over provision of supply systems with loads works with completely different algorithms. For example in an already 100 % self sustaining power system, if 20 % of power sources are replaced by intermittent sources, the drop in LOLP is calculated. This is estimated to be in the range of 10 to 15 %. With lower penetration levels this is even less. The sizing of 'spinning reserve' could be quite small as compared to what is apparent. However, our own situation is quite different. We have a peak shortage of about 12 % and on energy 10 % at the national level. At state level, this could be even worse. The issue of Maharastra - once a model state in terms of electricity supply is a case in point. We can blame it on Enron or who ever else. Fact remains that excessive faith in fossil fuels or nuclear energy can be quite detrimental. Admittedly, wind and other RE technologies are sources of intermittent power, but they are abundant.

I would strongly recommend to all stake holders an exhaustive study by UK Energy Research Center on the subject. Web pages of the UKREC has this downloadable 'The costs and impacts of intermittency' that is highly instructive. This discourse is perhaps the only study in public domain with wealth of information based on sound and solid research. The study is somewhat based on surplus systems rather than deficit systems that we operate. At penetration levels of 5 to 10 %, the capacity credit RE technologies attract is in the range of 20 to 30% by different estimates. The important point here is about the attempts to change the mindsets. There are sustained efforts to make planners who have the luxury of choosing any source of energy think of renewable energy technologies as serious options. We cannot brush

this issue aside by talking of per capita energy consumption. Nor can we imagine that coal and fissile material will some how be available in abundance if we looked carefully. It would be merely wishful thinking.

Time has now come to all of us to take a view that renewable energy technologies, not withstanding their inherent variability and intermittency, have to be worked into the system and capacity credit given. This must be taken very seriously in terms of policy support and technology development. Normally the big brother attitude of the run of the mill planning can only be addressed by holistic and sustained efforts. It is a slow and difficult process but there are no alternative and time is really running out.

M.P.Ramesh
Executive Director

News

Global Wind Energy Markets 2006 Another Record Year

"Strong growth figures in the U.S. prove that wind is now a mainstream option for new power generation."
- Randy Swisher, American Wind Energy Association (AWEA), president

Industry delivered 32% of annual market growth despite supply chain difficulties. Brussels,Belgium [RenewableEnergy Access.com]

The Global Wind Energy Council (GWEC) released its annual figures for 2006, which include wind energy developments in more than 70 countries around the world, showing that this year the installation of 15,197 megawatts (MW), brings the total installed wind energy capacity to 74,223 MW, up from 59,091 MW in 2005.

"The tremendous growth in 2006 shows that decision makers are starting to take seriously the benefits that wind energy development can bring. However, we must not forget that wind energy is a new technology that needs robust policy frameworks and political commitment to fulfill its full potential," said Arthouros Zervos, Chairman of GWEC.

Despite constraints facing supply chains for wind turbines, the annual market for wind continued to increase at the rate of 32% following the 2005 record year, in which the market grew by 41%. In terms of economic value, the total value of new generating equipment installed in 2006 reaching Euro 18 billion, or US$23 billion.

The countries with the highest total installed capacity are Germany (20,621 MW), Spain (11,615 MW), the U.S. (11,603 MW), India (6,270 MW) and Denmark (3,136MW). Thirteen countries around the world can now be counted among those with over 1000 MW of wind capacity, with France and Canada reaching this threshold in 2006.

In terms of new installed capacity in 2006, the U.S. continued to lead with 2,454 MW, followed by Germany (2,233 MW), India (1,840 MW), Spain (1,587 MW), China (1,347 MW) and France (810 MW). This development shows that new players such as France and China are gaining ground.

"Strong growth figures in the U.S. prove that wind is now a mainstream option for new power generation," said Randy Swisher, President of the American Wind Energy Association (AWEA).

Source: www.renewableenergyaccess.com

C-WET at Work

DEVELOPMENT IN R&D UNIT

Parametrisation of flow distortion around wind turbine nacelle

C-WET, in association with SERC, Chennai has carried out wind tunnel experiments to map the mean velocities around the nacelle of a prototype wind turbine model. The velocity measurements were taken at a large number of grid points in as many as 16 planes fixed near the nacelle region of the wind turbine model. Upstream mean velocities were measured at various grid points corresponding to 6, 8 and 10 m/s wind velocities respectively.

Figure 1 Measurement frame near nacelle

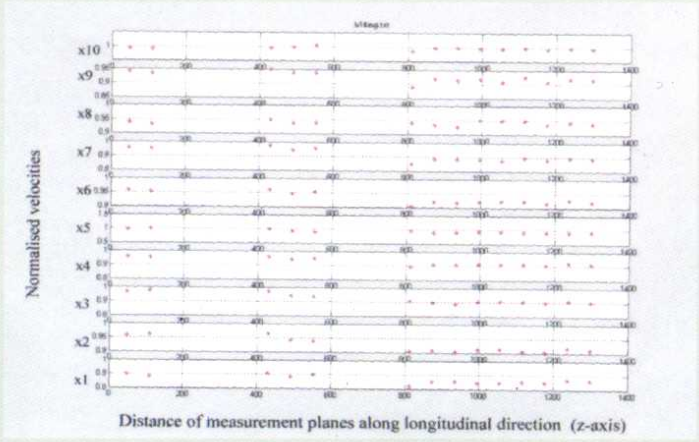


Figure 2 Normalized mean velocities at grid points of a plane

A suitable measurement frame as shown in figure 1 was moved to different planes for successive measurements. A multi-channel, high scan pressure measurement system with a sampling rate of 400 Hz per channel was used for the measurements and the mean velocity at any given point was deduced from the dynamic pressure (P) value. The mean velocities were found after normalizing the measurements corresponding to the three velocities. Figure 2 shows the normalized distribution of mean velocities at different grid points corresponding to a plane.

Solar Street Lights

As a step towards maximum utilization of renewable energy solar streetlights have been installed in C-WET campus. The system comprises an SPV module (monocrystalline silicon solar cells) and a battery of 12 V/ 75 Ah to power the lamps from dusk to dawn with storage autonomy of five days.

Figure 3:Solar streetlights in C-WET campus

MOVE ON IN WRA UNIT

Progress of Wind Atlas in India project

Ministry of New and Renewable Energy (MNRE) has sanctioned a project on " Preparation of Wind Atlas In India" in association with Riso National Laboratory, Denmark. The project duration is two years. Nine Scientists / Engineers from C-WET have been trained with Wind Atlas Analysis Software Programme (WAsP) by two experts from Riso National Laboratory, Denmark for analyzing and interpretation of data.

Wind Monitoring Stations under various programmes

Fourty two wind monitoring stations are under operation under the MNRE programme.

Consultancy Projects

The unit has completed verifying the procedures for wind monitoring in eight different locations in the country for M/s. Enercon (India) Limited and M/s. Suzlon Energy Limited. The unit has also completed preliminary study for Wind Resource Assessment in Uttaranchal for M/s. Uttaranchal Renewable Energy Development Agency (UREDA). Site validation and production estimation for the proposed wind farms of M/s. Tata Power Company Limited, Mumbai and M/s. Chennai Petroleum Company Limited (CPCL) have been completed by the unit during the last four months.

STEPS FORWARD IN TESTING UNIT

The measurements for Suzlon 1500 kW wind turbine in Gujarat are ongoing since March 2007.

The measurements for Enercon 800 kW E53 and IWPL 250 kW Provisional Type Testing in Gujarat are expected to start during the second week of April 2007.

The instrumentation for Siva 250 kW wind turbine is ongoing at WTTS, Kayathar.

An agreement has been signed between C-WET and Suzlon to test their new variant of 350 kW wind turbine in Gujarat and the measurements are expected to start in the first week of July 2007.

MARCHING AHEAD IN S&C UNIT

The agreement for the Provisional Type Certification (PTC) of Enercon E53 / 800 kW wind turbine under Category II as per TAPS-2000 has been signed with M/s. Enercon (India) Limited.

The agreement has been signed for the PTC of Suzlon N3335 / 350 kW Wind turbine model with M/s Suzlon Energy Limited under Category-II as per TAPS-2000.

The agreement has been signed with M/s Southern Wind Farms Limited for the renewal of Provisional Type Certificate and the renewed provisional type certificate has been issued for the wind turbine model GWL 225 /225 kW to M/s Southern Wind Farms Limited.

Revised List of Models and Manufacturers (RLMM) has been issued on 02-01-2007.

Internal audits have been conducted as per ISO / IEC 17025 at Testing Unit / WTTS by S&C Unit.

S&C unit conducted internal audits as per ISO 9001:2000 at other units.

The certification projects, taken up as per TAPS-2000, are under progress.

The continual improvement and maintaining the Quality Management System are on going.

HIGHLIGHTS FROM ITCS UNIT

Upcoming International Training Course: Preparatory works for organising the Third international training program on "Wind Turbine Technology and Applications" is in progress.

Cyprus Delegation Visit: Five delegation from Cyprus has visited C-WET and the Executive Director, C-WET made presentation about the activities of C-WET and also about wind energy. The delegation has also been taken to the Vestas RRB Manufacturing unit and the wind farm established at Poonamallee, Chennai.

System development of Wind Turbine Registration and performance of data collection: An appropriate system should be developed for collection of data of wind turbine machines and performance, which will help us to have useful database. As a step towards implementation, we had organized internal meetings and also a meeting with State Nodal Agencies. As a result a web based software and database system has been developed for this purpose and we are in the process of implementing the same.

ARTICLES

Clean Development Mechanism (CDM) Opportunities in the Indian Wind Energy Sector

Background

The Clean Development Mechanism (CDM) is a global mechanism under the Kyoto Protocol that enables investors to receive credit toward their own greenhouse gas emission reduction obligations. Wind energy seems to be one of the most promising technologies to achieve the objective of mitigating the threat of Climate Change. Compared to all other forms of technologies wind energy seems to be the cleanest and the most effective in addressing the concerns related to Greenhouse Gas (GHG) emissions that lead to climate change. India, being one of the Non-Annex I countries (of the Kyoto Protocol), the investors in this sector can additionally benefit from the Clean Development Mechanism. Of course, it may not be news to the Indian investors today particularly those related to Wind energy technology; the reason being primarily because the technology suppliers currently operating in India have been quite proactive in generating awareness amongst its customers regarding the subject so that they are able to avail the benefits of Greenhouse Gas reduction.

India has been expected to capture 20 to 30 percent of the CDM market. Several favourable factors, viz, good technical database and a pro-active National CDM Authority have been already contributing towards India's pre-eminent position in the CDM Market. A quick view at the number of CDM projects that have already been registered by the CDM-Executive Board of the United Nations Framework Convention on Climate Change (UNFCCC) shows a decent 35 % of Indian projects as of 5th April 2007.

Kyoto Protocol & CDM

A series of international negotiations had started during the late 1980's owing to the visible concerns raised by the various potential threats due to climate change bringing forth Climate Change as one of the major issues in the international political agenda. The United Nations Framework Convention on Climate Change (UNFCCC) was signed at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. The Convention established the Conference of Parties (COP) / Meeting of Parties (MOP) as its supreme body with the responsibility to oversee the progress towards the aim of the convention.

Subsequently, during COP 3 in Kyoto, Japan, a legally binding set of obligations for 38 industrialized countries and 11 countries in Central and Eastern Europe was created, to return their emissions of Greenhouse Gases (GHGs) to an average of approximately 5.2% below their 1990 levels over the commitment period 2008 - 2012. This is called the Kyoto Protocol to the Convention, which amidst a host of uncertainties finally came into force on 16 February, 2005. However, the implementation of the Kyoto Protocol has led to the development of several issues related to its functionality and how to achieve the targeted objectives mentioned in the protocol.

CDM is one of the three market-based flexibility mechanisms introduced by the Protocol, for the Annex I countries of the UNFCCC, to meet their respective emission targets and in turn achieve sustainable development. This is the only mechanism that involves the developing nations in contributing towards the achievement of sustainable development and also allows them an opportunity to enter the Global Carbon Market.

The market demand for GHG credits from CDM projects comes from Annex I countries' emission reduction commitments. These countries can meet those commitments by domestic as well as international emission mitigation activities, including the CDM. The CDM allows the Annex I countries to acquire Certified Emission Reductions (CERs) by undertaking GHG mitigation project activities in non-Annex I countries while contributing towards sustainable development in the host country. The Annex I countries can use CERs to contribute to compliance with "part" of their quantified emission limitation and reduction commitments (QELRCs) under the Article 3 of the Kyoto Protocol. The eligibility of the private parties in participating in CDM activities has been a prime factor in realizing the progress of the mechanism.

CDM Process: Baseline & Additionality

It has to be borne in mind that the CDM has the dual objectives of emission reduction and sustainable development. For achieving the same two of the most important considerations for a project to be successfully implemented as CDM are those of baseline and additionality.

It is of extreme importance for a project activity to be able to identify a credible and non-ambiguous baseline based on which the emission reductions of the project activity are to be calculated and over which the project should be able to justify that it is not business-as-usual scenario. It is the task of setting the datum against which the expected emissions reductions will be quantified as a part of emission reduction[1] certification process. Broadly defined, a project baseline is the collective set of economic, financial, regulatory, environmental and political circumstances, present and future within which a project will operate during its life. The quantity of credits from a project activity is determined by comparing project emissions to an estimate of what would have happened otherwise in the absence of the project activity.

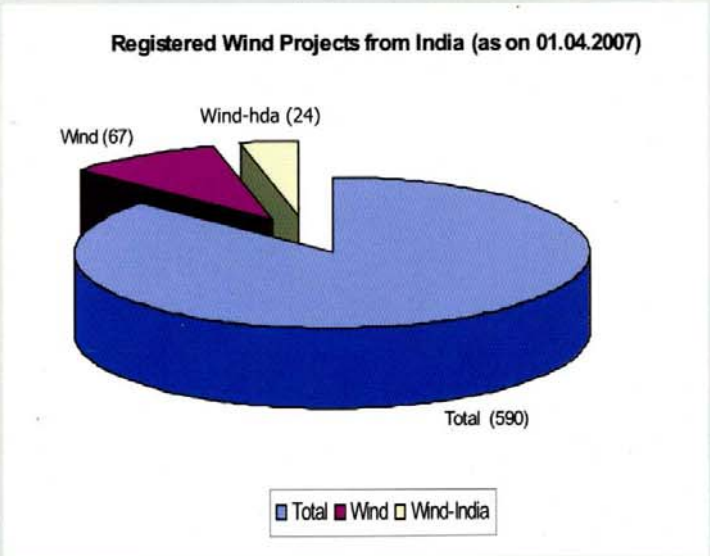
The entire CDM process is a very transparent and rigorous one which is of utmost importance in order to ensure the environmental integrity of the CDM as a whole. The Kyoto Protocol stresses that the GHG emission reductions must be real, measurable and long term in order to be credible[2]. The Kyoto Protocol also specifies that only those "reduction in emission that are additional to any that would occur in the absence of the certified project activity" would generate CERs[3]; i.e, only those reductions that are achieved over and above the base case emissions would be considered real or additional.

It is very important for the project developer to address the additionality issue in a very transparent and systematic fashion. It has been observed that some of the Indian wind projects for CDM had faced rough weather owing to the concerns related to a convincing additionality argument for the same.

CDM and Indian Wind Energy

India is one of the leading countries in wind power generation and currently stands at a global 4th with a gross estimated potential of 45,000 MW and a technical potential of 13,000 MW[4]. Already 24 wind projects of varying capacities from India alone have been registered with the UNFCCC amongst a total of around 67 registered projects globally. A number of wind projects are still in pipeline in various stages of the CDM process cycle. India has been proactive in promoting CDM projects and the Renewable Energy sector is dominant in terms of number of projects which have received Host country Approval from the DNA[5].

CDM has been successful to a large extent in the context of Indian wind projects. The technology providers have harnessed the opportunity to provide carbon finance to potential project developers.



[1] *Emission reductions refers to reductions, avoidance and sequestration of emissions as applicable.*
[2] *Article 12.5 (b)*
[3] *Article 12.5 (c)*
[4] *http://mnes.nic.in*
[5] *Designated National Authority, Ministry of Environment and Forests (MoEF)*

It has been noticed that the investors in the wind sector in India over a period of time have become more aware than the ones in the other sectors of CDM applicability. Consequently, almost all new and upcoming wind projects are being developed as CDM projects. Certain incentives are available for wind energy projects in India include tax concessions such as 80 percent accelerated depreciation, tax holidays, customs and excise duties relief, liberalized foreign investment procedures etc. As already mentioned, considering all these benefits wind projects in India are being increasingly looked upon as self-viable, and hence questions on the additionality of some of these projects have already been raised.

Benefits from CDM

The CDM revenue has its attractiveness in that it is additional to the normal stream of income from the project activity and does not affect the later in any way. This diversification of the revenue streams helps in minimizing the risks associated with the project itself. This income stream from selling the creditable emission reductions from emission reduction projects have beneficial effect on the project's financial structure. In the Indian context the ballpark CDM revenue from a wind electric generator (WEG) helps the promoter to at least meet with his annual operation and maintenance costs. However, the revenue is directly related to the actual annual power generation from the WEG.

Conclusion

There has been considerable debate on the additionality arguments of certain wind projects. This had also led to some amount of skepticism among the investor community with respect to the success of the projects. The time consumed for the completion of the registration of the project activity with the CDM-Executive Board (CDM-EB) is another point of concern for the investors.

However, CDM has certainly proved to be of tremendous encouragement towards the growth of renewable energy in India. Wind energy of course has stood out as one of the most potential sectors in the country. Moreover, the initiative taken up by the technology suppliers of the WEGs have gone a long way in building capacity of the investors in terms of the possibilities of availing the benefits through the trading of CDM-CERs. The promoters also feel that this new opportunity has helped them in mitigating their risk of investment at least to some extent.

Santonu Kashyap and N. R. Ravishunkar
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News

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ASES Report: Renewable Energy Can Curb Global Warming by 2030

Sierra Club adopts new report as their "energy roadmap."

The results of these studies show that renewable energy has the potential to provide approximately 40% of the U.S. electric energy need projected for 2030 by the Energy Information Administration (EIA). After we reduce the EIA electricity projection by taking advantage of energy efficiency measures, renewables could provide about 50% of the remaining 2030 U.S. electric need.

American Solar Energy Society (ASES) unveiled its 200-page landmark report, "Tackling Climate Change in the U.S.: Potential Carbon Emissions Reductions from Energy Efficiency and Renewable Energy by 2030." The report illustrates how concentrating solar power (CSP), photovoltaics (PV), wind power, biomass, biofuels, and geothermal power, combined with energy efficiency measures, can displace approximately 1.2 billion tons of carbon emissions annually by the year 2030 -- the magnitude of reduction that scientists believe is necessary to prevent the most dangerous consequences of climate change.

In the Executive Summary, editor Charles F. Kutscher, Ph.D, P.E. Wrote:

For SOLAR 2006, its 35th Annual National Solar Energy Conference last July, The American Solar Energy Society (ASES) chose to address global warming, the most pressing challenge of our time. Under the theme "Renewable Energy: Key to Climate Recovery", Climate experts James Hansen of the National Aeronautics and Space Administration (NASA), Warren Washington of The National Center

for Atmospheric Research (NCAR), Robert Socolow of Princeton University, and Marty Hoffert of New York University (NYU) described the magnitude of the global warming crisis and what is needed to address it.

A key feature of the conference was a special track of nine invited presentations by experts in energy efficiency and renewable energy that detailed the potential for these technologies -- in an aggressive but achievable climate-driven scenario -- to address the needed U.S. carbon emissions reductions by the years 2015 and 2030. These presentations covered energy efficiency in buildings, industry and transportation, as well as the following renewable technologies: concentrating solar power, photovoltaics, wind, biomass, biofuels, and geothermal. Since the conference, these studies were subjected to additional review and were revised for publication in this special ASES report.

According to Hansen, NASA's top climate scientist, we need to limit the additional average world temperature rise due to greenhouse gases to 1 degree C above the year-2000 level. If we fail, we risk entering an unprecedented warming era that would have disastrous consequences, including rising sea levels and large-scale extinction of species. Limiting temperature rise means limiting the carbon dioxide (CO2) level in the atmosphere to 450 to 500 parts per million (ppm).

What does this mean for the United States? Estimates are that industrialized nations must reduce emissions about 60% to 80% below today's values by mid-century. The U.S. reductions that would be needed by 2030 to be on the right path. Accounting for expected economic growth and associated increases in carbon emissions in a business-as-usual (BAU) case, in 2030 we must be displacing between 1,100 and 1,300 million metric tons of carbon per year (MtC/yr).

The SOLAR 2006 exercise looked at energy efficiency and renewable energy technologies to determine the potential carbon reduction for each. The authors of the renewable technology papers were asked to describe the resource, discuss current and expected future costs, and develop supply and carbon-reduction curves for the years 2015 and 2030.

The studies focused on the use of renewable energy in the electricity and transportation sectors, as these together are responsible for nearly three-quarters of U.S. carbon emissions from fossil fuels. Goals for renewables are often stated in terms of a percentage of national energy.

The results of these studies show that renewable energy has the potential to provide approximately 40% of the U.S. electric energy need projected for 2030 by the Energy Information Administration (EIA). After we reduce the EIA electricity projection by taking advantage of energy efficiency measures, renewables could provide about 50% of the remaining 2030 U.S. electric need.

There are uncertainties associated with the values estimated in the papers, and, because these were primarily individual technology studies, there is uncertainty associated with combining them. The results strongly suggest, however, that energy efficiency and renewable energy technologies have the potential to provide most, if not all, of the U.S. carbon emissions reductions that will be needed to help limit the atmospheric concentration of carbon dioxide to 450 to 500 ppm.

We hope this work will convince policymakers to seriously consider the contributions of energy efficiency and renewable technologies for addressing global warming. Because global warming is an environmental crisis of enormous magnitude, we cannot afford to wait any longer to drastically reduce carbon emissions. Energy efficiency and renewable technologies can begin to be deployed on a large scale today to tackle this critical challenge.

Source: www.renewableenergyaccess.com

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