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EDITORIAL

One of the important strategies adopted by the Ministry of New & Renewable Energy was to promote grid connected wind power projects through creation of a conducive environment for private sector investment. Accelerated depreciation under the Income Tax Rules has been a major driving force for wind sector. While this incentive has contributed significantly for the investment of private sector to wind energy, this inherently does not promote entry of independent power producers to wind energy sector due to lack of their appetite for accelerated depreciation. As an alternative to the accelerated depreciation of 80%, MNRE has introduced a generation based incentive (GBI) of Rs. 0.50 per kWh for a period of 10 years for new projects which have not availed the accelerated depreciation through a pilot scheme with a cap. of 49MW. This would promote efficiency by way of careful selection of site, detailed micro-siting exercises and efficient O&M of wind mills and avoid the possible negligence on the part of the investors on generation after availing the tax benefits. To the new entrants with modern wind turbines based on matured and reliable technologies, this would be a welcome incentive. GBI is the need of the hour to promote the wind energy industry to augment the capacity addition and manufacturing base to achieve the target of 10 GW by 2012. The expectation is that a good fraction of the components manufactured will be used for the unexploited capacity in India. Realising the importance of effective implementation, and to provide solution to a several queries on technical audit of existing wind farm performance, the Centre for Wind Energy Technology has initiated procedures in a systematic way with its expertise.

It is hoped the Clean Development Mechanism (CDM) and the carbon credit facility would enhance the annual capacity addition in India from the current 1.5 - 1.7 to 5 GW by 2012.

The Centre for Wind Energy Technology is geared to meet the secondary societal needs of the sound pollution of habitats with its R&D Unit completing a series of acoustic measurements at its Wind Turbine Testing Station (WTTS) at Kayathar on the wind turbine of 600kW capacity, as per the IEC 61400-11 class. The Wind atlas of India is in the final phase of validation at RISO Denmark. The testing unit with the accredited services continue to support the wind industry for continued design and performance enhancement. The S&C unit is continuously engaged to get the documentation from wind turbine developers for verification as per the certification scheme of TAPS 2000. The 6th National Training Programme on Wind Farm Development and Related Issues was inaugurated by Shri Mohan Verghese Chunkath, CMD of Tamil Nadu Energy Development Agency (TEDA) and was completed successfully with 62 participants. As a step towards initiating the activities on offshore wind farms, a high light of ocean wind energy map and necessity of ocean wind data collection has been included in this issue.

C-WET with a open mind invites the industry to support actively the HRD development in the country for achieving the nation's ambitious wind energy programme and to this effect any constructive suggestions from the readers of PAVAN is most welcome.

K.P. Sukumaran
Executive Director

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Editorial Board

Developments in R&D UNIT

Measurement of acoustic emissions of 600 kW Wind turbine

R&D unit has carried out measurement of acoustic emissions of the 600 kW wind turbine installed at Kayathar. The measurements were carried out as per the requirements of IEC 61400-11. The objective of noise impact assessment for a wind turbine is to ensure that the wind turbine is designed in such a way as to minimize any potential noise impact on the community, specifically at nearby residences. This is done by measuring the noise level from the wind turbine and ensuring that the level complies, with the acceptable wind farm noise limits.

Fig. 1 Noise level meter

Fig. 2 Wind Turbine noise level measured at WTTS, Kayathar

The scope of measurement was to determine apparent sound power level, third-octave band levels and tonality of sound emitted by the wind turbine under measurement for varying wind conditions.

Empanelment of small wind turbines

The unit has recently formulated a procedure for empanelment of aerogenerators by Ministry of New and Renewable Energy (MNRE) based on an evaluation of their performance. Models which do not have a test report from accredited national laboratories presently would be given provisional empanelment subject to satisfying the other technical requirements.

Move on in WRA UNIT

During the period of July to September, 11 new Wind Monitoring Stations in five states have been installed. Presently, eighty stations are operational in 16 States and one Union Territory under various Wind Monitoring Projects funded by the Ministry and Consultancy Projects etc.

Verification of Procedure of Wind Monitoring at the following places are being carried out :

- Vedganga, Kolhapur District, Maharashtra for M/s. Enercon (India) Limited, Mumbai.
- Modurgudda, Hasan District, Karnataka and Jagaravalli, Hasan District, Karnataka for M/s. Sarjan Realities Limited, Pune.

The unit has completed three Verification of Procedure of Wind Monitoring at Bharmasagara (Chitradurga District, Karnataka), Anaburu (Chitradurga District, Karnataka) and Manavale (Kolhapur District, Maharashtra).

Wind monitoring study at Simhadri near Visakhapatnam for M/s. National Thermal Power Corporation Ltd., Visakhapatnam and at Radhapuram Village near Veppilangulam for M/s. Surana Industries Limited, Chennai have been started.

The following projects were also completed and the reports for the same have been submitted to the clients.

- Site Validation & Generation Estimate of Proposed 25 x 1650 kW Wind Farm at Satara District, Maharashtra for M/s. RS India Wind Power Energy Private Limited, New Delhi;

- Micrositing for Wind Farming at Bhimasamudra, Chitradurga District, Karnataka for M/s. Nuziveedu Seeds Limited, Secunderabad; and
- Technical Evaluation Report on Proposed Wind Farm Projects in Tamilnadu for M/s. Integral Coach Factory, Chennai.

Steps forward in TESTING UNIT

The measurements and the reporting for RRB 600 kW wind turbine of M/s. RRB Energy Ltd. at Valayapalayam, Tamil Nadu have been completed.

The re-instrumentation has been completed for Siva 250 kW wind turbine at WTTS, Kayathar and IWPL 250 kW wind turbine at Navadra, Gujarat and the measurements are expected to be completed in the windy season of 2008.

The instrumentation of Chettinadu 600 kW wind turbine of M/s. Chettinadu Energy Ltd. at Thirumangalakurichi, Tamil Nadu has been completed.

The instrumentation of CWEL 250 kW wind turbine of M/s. Chiranjjeevi Wind Energy Ltd. at Chithambalam, Tamil Nadu has been completed and the measurements are ongoing.

Marching ahead in S&C UNIT

Agreement has been signed with M/s. RRB Energy Limited (formerly M/s. Vestas RRB India Limited) for renewal of Provisional Type Certificate (PTC) of Pawan Shakthi – 600 kW wind turbine model as per TAPS – 2000 (amended). Renewed PTC has been issued upon successful completion of review of documentation.

The certification projects, taken up as per TAPS – 2000 (amended), are under progress.

Executive Director and Unit Chief (i/c), S&C participated in the Second Wind Turbine Sectional Committee (ET42) meeting held at BIS, New Delhi.

Highlights from ITCS UNIT

Information, Training and Commercial Services (ITCS) unit had successfully organized the Sixth National Training Course on "Wind Farm Development and Related Issues" on 25th & 26th September 2008 to address all aspects of Wind Power starting from Wind Resource Assessment to project implementation and Operations & Maintenance in a focused manner. The course was attended by 62 participants from academic institutes, industry, state nodal agencies, developers and consultants from various parts of the country. The training course was inaugurated by Shri. Mohan Verghese Chunkath, IAS, Chairman and Managing Director, Tamil Nadu Energy Development Agency (TEDA), Chennai.

The Chief Guest lighting lamp and declaring the course open

The course content for the training was a carefully thought out syllabus with specific subject experts giving lectures. The training course addressed the following aspects:

Wind Resources Assessment

- Design and layout of wind farms
- Wind turbine technology
- Grid integration of wind turbines
- Certification of wind turbines
- Testing of wind turbines
- O&M aspects of wind farms

Course participants in C-WET campus

Carbon Credit Opportunity for Wind Power in India

V.R. Ramesh, Emergent Ventures India Pvt. Ltd.

Indian wind power sector has grown stupendously over the last decade and installed capacity in the country stands at 8696 MW as on 31st March 2008 making it the 4th largest country for wind power development in the world. The growth of the sector has been catalyzed by number of promotional policies laid down by the Indian Government viz. tax holiday, accelerated depreciation and Generation based incentive. The pervasion of the renowned technology and world class EPC contractors providing turnkey solutions for the project developers has been a key factor as well.

Wind, being renewable and clean form of power generation, contributes to the displacement of green house gases and assists in sustainable development of the rural environment. It makes the wind project promoters eligible for realizing an additional revenue stream through the sale of carbon credits.

Compliance Market & CDM

Clean Development Mechanism is one of the flexible mechanisms available under Kyoto Protocol wherein the industrialized Annex-I countries will invest in projects that reduce GHG emissions in developing countries and assist in sustainable development of the host country. India is one of the most favoured destinations for the development of CDM projects and it has got the maximum number of registered project (356 projects) with United Nations.

Wind power projects form a great proportion of CDM projects developed in India. Till date, there are about 208 projects corresponding to 4069 MW under CDM pipeline of which 54 projects have been already registered. The two critical aspects in developing any CDM project are to establish the baseline and demonstrate additionality. The baseline for power projects in India can be established from the publicly available "CO_2 Baseline Database for the Indian Power Sector" updated from time to time by Central Electricity Authority, the latest version being version 3.0 released on December 2007.

CDM as such doesn't reduce the global GHG emissions since the buyer of CERs is allowed to emit the same quantum of GHG at home. Hence, additionality holds the key in assuring the environmental benefit accrued due to CDM projects. Stringent steps are involved in the demonstration of the additionality and the latest guideline is laid down by "Tool for demonstration of Additionality Version-5".

As far as the wind projects are concerned, the uncertainty in generation subject to seasonal variation in the wind pattern in any particular site pose a major threat to the project promoters. The higher capital cost, lesser capacity utilization factor, power evacuation problem and few other regulatory barriers also strengthen the additionality arguments for a wind project.

Since several barriers to wind project are having financial implications, it has become imperative to carry out an investment analysis for the project activity. The various parameters driving the cost and benefits accrued to the project has to be accounted in a transparent and conservative manner in IRR analysis. The fiscal benefits and other incentives/subsidies applicable to the subject project activity are to be incorporated in the analysis taking into consideration the various aspects mentioned in the latest "Guidance on the Assessment of Investment Analysis (Version 2)". The other critical issue has been to establish the benchmark which represents the market returns/ anticipated returns for the prospective project developer in line with the aforesaid guidance.

With the very recent development in CDM guidelines, the project proponent has to demonstrate that the CDM benefit has been considered very seriously during the investment decision for the project activity. For the project activity with start date post 2nd August 2008, it has been mandated that intent to CDM activity be communicated by the promoter to host country DNA and/or UNFCCC secretariat within 6 months. For projects prior to 2nd August 2008, the promoter has to demonstrate that continuing and real actions were taken to secure CDM status for the project in parallel with its implementation. It could be noted here that the date on which funds are committed for the project activity like placing order for wind turbines will go down as the start date of CDM project and inaction for say a year may fail to demonstrate the seriousness of CDM consideration.

Voluntary Carbon Market

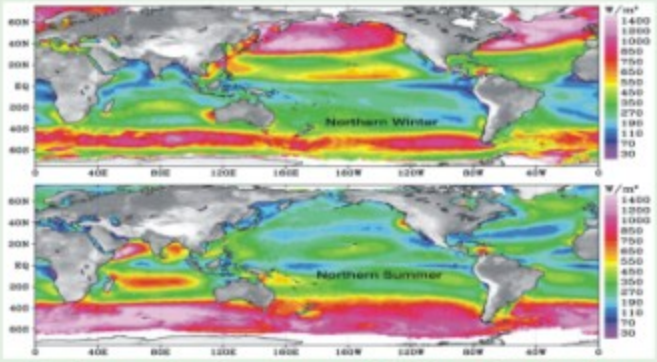
Voluntary Carbon Market, created by bigger corporate, individuals who are not mandated to reduce emissions and buy emission reduction voluntarily as part of Corporate Social Responsibility, has taken a leapfrog in the last couple of years. There have been a number of standards available like CCX, VCS, VER+ and Gold Standard to validate the voluntary emission reduction projects. Though the revenue realized under this mechanism is roughly one fourth of that available under compliance market, the steps involved are relatively simplified and also the gestation time in the process greatly reduced.

Wind Projects, having strong sustainability indicators, will be eligible for development under several voluntary standards available. Based on project specific parameters, a suitable standard could be taken up and carbon revenue realized in opposite time.

Conclusions

In the Indian power sector dominated by fossil fuel laden thermal plants, the power generated from wind power projects directly result in reduced GHG emissions. The wind project promoter can realize additional revenue through the sale of these emission reductions by prudent selection of the carbon market based on the prevailing market scenarios and effective development of the project under the chosen standard.

Ocean Wind Power Maps Reveal Possible Wind Energy Sources



This is a portion of an image of QuikScat data that shows wind power density over global oceans for winter (top panel) and summer (lower panel) in the Northern Hemisphere. Red and white colours indicate high energy are available while blue color reflects lower energy. Image courtesy: NASA/JPL.

Efforts to harness the energy potential of Earth's ocean winds could soon gain an important new tool: global satellite maps from NASA. Scientists have been creating maps using nearly a decade of data from NASA's QuikScat satellite that reveal ocean areas where winds could produce energy.

The new maps have many potential uses including planning the location of offshore wind farms to convert wind energy into electric energy. The research, published this week in Geophysical Research Letters, was funded by NASA's Earth Science Division, which works to advance the frontiers of scientific discovery about Earth, its climate and its future.

"Wind energy is environmentally friendly. After the initial energy investment to build and install wind turbines, you don't burn fossil fuels that emit carbon," said study lead author Tim Liu, a senior research scientist and QuikScat science team leader at NASA's Jet Propulsion Laboratory in Pasadena, Calif. "Like solar power, wind energy is green energy."

QuikScat, launched in 1999, tracks the speed, direction and power of winds near the ocean surface. Data from QuikScat, collected continuously by a specialized microwave radar instrument named SeaWinds, also are used to predict storms and enhance the accuracy of weather forecasts.

Wind energy has the potential to provide 10 to 15 percent of future world energy requirements, according to Paul Dimotakis, chief technologist at JPL. If ocean areas with high winds were tapped for wind energy, they could potentially harvest up to 500 to 800 watts of wind power per square metre, according to Liu's research. Dimotakis notes that while this is less than peak solar power, which is about 1000 watts per square metre on Earth's surface when the sky is clear and the sun is overhead at equatorial locations, the average solar power at Earth's mid-latitudes under clear-sky conditions is less than a third of that. Wind power can be converted to electricity more efficiently than solar power and at a lower cost per watt of electricity produced.

According to Liu, new technology has made floating wind farms in the open ocean possible. A number of wind farms are already in operation worldwide. Ocean wind farms have less environmental impact than onshore wind farms, whose noise tends to disturb sensitive wildlife in their immediate area. Also, winds are generally stronger over the ocean than on land because there is less friction over water to slow the winds down — there are no hills or mountains to block the wind's path.

Ideally, offshore wind farms should be located in areas where winds blow continuously at high speeds. The new research identifies such areas and offers explanations for the physical mechanisms that produce the high winds.

An example of one such high-wind mechanism is located off the coast of Northern California near Cape Mendocino. The protruding land mass of the cape deflects northerly winds along the California coast, creating a local wind jet that blows year-round. Similar jets are formed from westerly winds blowing around Tasmania, New Zealand and Tierra del Fuego in South America, among other locations. Areas with large-scale, high wind power potential also can be found in regions of the mid-latitudes of the Atlantic and Pacific oceans, where winter storms normally track.

The new QuikScat maps, which add to previous generations of QuikScat wind atlases, also will be beneficial to the shipping industry by highlighting areas of the ocean where high winds could be hazardous to ships, allowing them to steer clear of these areas.

Scientists use the QuikScat data to examine how ocean winds affect weather and climate, by driving ocean currents, mixing ocean waters and affecting the carbon, heat and water interaction between the ocean and the atmosphere. JPL manages QuikScat for NASA. For more information about QuikScat, visit: http://winds.jpl.nasa.gov.

Source : www.jpl.nasa.gov

Engineering Student Develops New Methods to Protect Wind Turbines from Damage

While working on his PhD, Jesus Lopez Taberna came up with two protection techniques so that wind generators continue to be operative after breaks in electricity supply.

Industrial engineer and member of INGEPER Research Team at the Public University of Navarre, Jesús López Taberna, wanted to provide a solution to the problems caused to wind turbines by sudden dips in voltage in a part of the electric grid.

Over the past few years, the growth and development of wind energy converters has been slowed by problems that have arisen from the increased numbers of these that are connected to the

electric grid. One of the most important problems is the manner in which the wind generators behave during these voltage dips.

A voltage dip is a sudden reduction in potential in the electric grid, followed by a rapid return to its normal value. This, at times, can be caused by lightening or by a tree falling on power cables. It can also be due to a large company consuming a lot of energy all at once. This drop in voltage happens in a matter of milliseconds. "We are aware of it because the lights begin to flicker or because they go off and on momentarily — but, for a machine, this can be an eternity," explained López. In fact, an interruption of half-a-second in a productive process can cause the whole process to block and it may have to be re-initiated.

Lopez said that in the normal operation of wind turbine, the flux in the stator rotates synchronously, i.e. at the grid frequency. As the rotor turns near this speed, the voltage induced by this flux is small. The sudden dips on the grid cause the appearance of a new flux in the stator, which has been named the "natural flux." This second flux, as opposed to the normal flux, is fixed to the stator, that is, it doesn't rotate. Therefore, its relative speed in respect to the rotor is much larger and it induces voltages in the rotor much greater that those corresponding to the normal operation.

Usually, the electronic converter connected to the rotor is not able to overcome to these voltages and the converter, as a consequence, loses the control of the currents. In this situation, there appear overcurrents that can damage, depending on the depth of the dip, the converter.

To date, one system has been in place to protect converters, however it's not an optimal solution.

"The current system of protection, known as Crowbar, has the advantage of being able to protect the machine but the disadvantage is that the machine coming to a halt," López said.

"For example, if a large company suddenly consumes a lot of current, the voltage drops. This causes the wind power units at El Perdon [in Navarre, Spain] to disconnect and cease producing electricity. As a result, the power dip is even more accentuated and, consequently, it is even more difficult to bring the voltage up to its normal operating value."

Taking into account that, in Spain, there are days that wind-powered energy can account for fully one-third of electricity production, the problem can prove to be a serious one.

Engineers are tackling the problem by trying to find a way that the generator will behave more like a conventional power plant and not disconnect during a voltage dip/power failure but rather help to bring up the grid voltage back.

Two new protection techniques patented

"Before looking for a solution, the problem has to be studied from a theoretical perspective, i.e. why does this machine behave as it does when there is a voltage dip? And why, if we do not install a protection system, the machine starts to burn out?"

The research produced a rotor model that was "sufficiently simple to be able to deal with without having to carry out simulations. A model in which we can see what role each parameter of the machine plays, how they interact, how the current drops if we increase the leak inductances, etc," said Lopez.

Once this model was developed, Lopez says that it was more or less easy to propose solutions. "The most important thing is that we have achieved solutions that enhance the behavior of the machine without any need to change anything, except the control. It's like changing the version of a text treatment program on the computer, without needing to change the PC. There are a number of computers inside a wind energy converter and one of these — that which controls the electrical machinery — is the one the control of which we have proposed to modify in order to enhance the behavior of the machine."

In his PhD thesis, López proposed two different systems of protection and both have been patented. The first, which only requires changing the control of the machine converter, has been transferred to a manufacturer for introduction into wind parks worldwide; the other requires changing elements inside the machine and continues to be developed for applications in new creation wind generators.

Readers with technical questions for Jesús López Taberna, can contact him via e-mail: jesus.lopez@unavarra.es.

Source : www.renewableenergyworld.com

Carbon Credits are Financing Renewable Energy Projects in India

When a firm in India invests in a renewable energy source to meet growing energy needs, it may be able to acquire carbon credits. These carbon credits are sold on international markets generating income for the owner of the credits. Carbon credits, which are issued to organizations based on their efforts to limit climate change, and renewable energy projects are intricately linked in India.

A carbon credit represents the removal of one ton of carbon-dioxide or its green-house gas (GHG) equivalent from the environment. Firms in the European Union and the OECD member countries are buying carbon credits — called CER (Certified Emission Reductions) — from firms in India. CER are registered and issued by the Executive Board of the Clean Development Mechanism (CDM) of United Nations Framework Convention on Climate Change. CER are used to meet a part of the obligations in the EU and OECD countries to reduce GHG emissions; obligations that were agreed upon in the Kyoto Protocol and are now mandated by National Governments.

The World Bank estimates that in 2006, approximately US $5 billion worth of CER were sold. The European Climate Exchange added CER Futures for trading in March 2008, followed by CER Options in May 2008. The CER for December 2008 delivery was trading at about US $30 (EU €21) on September 1 on the European Climate Exchange.

Carbon Credits Can Finance Renewable Energy Development

Financing of renewable energy projects via carbon credits is a relatively new activity in India. It requires simple and innovative models that are easy to implement, manage and finance. Renewable energy firms like C-TRADE are working to help develop renewable energy projects through carbon financing. The company's president, Prabhu Dayal, explains: "We have developed Biogas projects to help local organizations and farm owners where the potential funding from CDM carbon credits will be used to recover our cost for design, development, construction and operation."

C-TRADE develops renewable energy projects in developing countries and finances them partly by having the rights to the carbon credits that the project will generate. Its biogas renewable energy projects turn waste manure from farms into electricity that the farmers use. The projects are completed on a Build-Operate-Transfer (BOT) basis, transferring the asset to the farmer at the end of the agreement period. C-Trade finances the entire operation. "The farmer does not have to invest anything. They give C-TRADE rights to carbon credits," says Dayal.

Because many of the renewable energy projects in India tend to be on the smaller scale, innovative business models have made aggregation of investments possible in these projects. Developers of these projects are starting to use the growing market for carbon credits to finance a part of their project costs.

The Wind Market and Carbon Credit Financing

In recent years, the wind energy market has grown significantly and much of this growth can be attributed to supportive governmental policies and innovations in management and financing. A 6.5-megawatt (MW) Wind Energy Project in the state of Madhya Pradesh was issued 10,413 CER for offsetting green house gas emissions over a 13-month period. With 5 wind turbines, the wind farm is owned by a consortium of 5 companies but operated and maintained by the supplier.

Wind turbines in another 9.6-MW project being developed by a hotel firm are also operated and maintained by their supplier. This project is expected to generate 15,245 CER annually for 10 years. At the CER price of US $30, the project could generate about US $457,000 annually, which is equivalent to about US $47 worth of CER per KW of installed capacity.

In India, an additional 70,000 MW of electricity generation capacity is expected to be built between 2007 and 2012 and about 21% of this addition is expected to come from renewable sources. Small Hydro potential in India is estimated to be 15,000 MW and as of March 2008 about 2,000 MW projects have already been installed. Small hydro-electric projects of various sizes are taking advantage of carbon credit financing.

The mountainous state of Uttarakhand has an active list of hydro-electric projects of various sizes under development and at the proposal stage. Many potential project sites have been identified in the state for development of hydro-electric projects. These includes a large number of run-of-river projects ranging from 0.4 MW to 230 MW, and also a few large projects (between 25 and 100 MW) based on water storage. The four small hydro projects for which project design documents have been prepared for CDM are expected to generate 160,000 carbon credits valued at US $1.6 million per year [Note: This is based on a CER priced at US $10, not the current price of US $30 — the value at current CER price will be three times this amount].

Other CDM Benefits

In the past, sugar mills in India have been able to generate energy for their use from bagasse (sugarcane pulp). However, the mills were unable to supply the surplus power to the grid, and had little incentive to use efficient technologies. Some of the CDM projects are changing this. One bagasse-based renewable energy project at a sugar factory in India is expected to offset 42,446 tons of carbon-dioxide annually for ten years. This 9-MW biomass renewable project was issued 33,434 CER between May 2006 and March 2007. It supplies electricity to the state electricity grid, replacing the need to build more fossil-fuel based power plants.

In the past few years, a large number of renewable energy projects have benefited from carbon financing, meeting the energy security needs, and preventing the release of green house gases into the atmosphere. Still, many dispersed and disaggregated renewable energy activities have not yet been able to tap markets for carbon credits. With the development of the carbon credit market and new approaches to renewable energy businesses and policy this may change in the future.

Anupam Tyagi is a RenewableEnergyWorld.com Indian Correspondent based in Ghaziabad, India.

Source: www.renewableenergyworld.com

Software Predicts Electricity Output for Wind

There's a storm brewing, the wind speed is picking up and you're asking yourself: Just how much electricity will a particular wind park produce in the next five days? How much electricity will all the wind parks located in particular region, or even country, produce in the next few days for the national grid? Will the wind keep on blowing? And whereabouts exactly?

Thanks to a new system developed by a German university spin-off, it's now possible to obtain an accurate forecast of the energy output from wind parks for up to ten days in advance.

The Previento system, developed at Oldenburg University in Northern Germany in co-operation with researchers from Denmark's Riso National Laboratory, can predict not only how

much electricity a specific wind park in Germany will produce but also the total amount of electricity the 20,000 or so wind parks dotted around the country will generate in the coming days and with a high level of accuracy.

Armed with these predictions, Germany's grid operators can now calculate the amount of additional electricity they will need from fossil-fuel plants to compensate for troughs in wind output — and so ensure the expected power demand is covered reliably.

"The German electricity industry has been able to plan today how much electricity it will need tomorrow as well as how that electricity will be produced. That is what our system helps them to do," Dr. Matthias Lange from energy & meteo systems, the Oldenburg spin-off, said.

"Accurate predictions about wind power allow grid operators to save millions of euros through efficient scheduling," he added.

A system that can predict how much electricity is going to be available from wind power for the national grid has become so important in Germany because wind's share of the country's electricity generation is growing all the time, and reshaping the electricity industry.

Wind power accounted for 7.2 percent of Germany's total electricity consumption at the end of 2007 with 22,200 megawatts (MW) of installed capacity.

According to the German Wind Energy Association (BWE), installed capacity is set to double by 2020 with 45,000 MW installed on land and 10,000 MW offshore.

In fact, the BWE estimates that every fourth kilowatt hour of electricity will be coming from wind power within 12 years.

"The amount of wind power used today in Germany is so big that all the other types of power plants have to adapt themselves around the wind power output and increase or decrease their contribution depending on what wind does," said Lange.

Because Previento can give plenty of warning about big deviations and sudden peaks and troughs in wind power output, it also plays a big role in the regional energy spot markets. The amount of wind power entering the grid impacts electricity prices: the more wind power available, the lower the electricity price becomes, Lange explained. This is because less conventional energy has to be purchased by energy providers for the next few days to cover the expected demand.

The predictions are more accurate, the shorter the timeframe — but predictions for up to 10 days in advance are available, Lange said. The prediction error of the system is within 5 percent in 70 percent of the cases in Germany.

So what makes Previento's predictions so accurate?

According to Lange, the key is that the system was developed inside Oldenburg's physics department — and atmospheric physics as well as the shape of local terrain strongly influences the amount of electricity a wind park will produce.

The system calculates the amount of wind available at any particular location using a variety of weather models available from multiple weather services. The German Weather Services, for example, supplies information on wind speed, wind direction, pressure and a vertical temperature profile for rectangular grids with a resolution of 7 kilometres.

Previento processes this data and combines it with data about the features of local terrain of a wind park, such as the amount of wooded area or the bodies of water around a wind park to form an accurate estimation of the electricity output at any given time.

The system is proving a global hit with interest in it coming from Spain, Scandinavia, America, Canada and Ireland.

The system was developed in 2001 by the energy meteorology research group at the Carl von Ossietzky Universität Oldenburg and ForWind, the center for wind energy research based in Oldenburg. The energy & meteo spin-off company was founded in 2004, and is a pioneer in the new discipline of energy meteorology which puts weather forecasts at the service of renewable energy.

Source : www.renewableenergyworld.com

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