C-WET

pavan

Issue
July-September 2004

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

Address by Minister of State (Independent Charge), Non-conventional Energy Sources, Government of India, on the occasion of the release of the inaugural issue of the C-WET Newsletter, PAVAN, in Chennai on 28 July 2004

Captains of the industry, friends, ladies and gentlemen, it gives me great pleasure to be addressing you here in Chennai, known as the wind power capital in the country. This, I understand, is a hard won, enviable position, worth emulating by other states. It is natural that the manufacturing facilities have come up in a big way in and around Chennai. I have just visited some of the facilities today and am going to see more of them over the next few days.

I am impressed by what I have seen. The bustling manufacturing activities gives me the confidence that it is a healthy industry. I understand that last year alone the installations surpassed expectations and the industry is turning out bigger and more efficient wind turbines. In all this, the customer's confidence in the products is an asset and care should be taken to retain and nurture it. It should not be taken for granted. With the industry poised for a major growth, it is essential that we pay a lot of attention to the quality aspects, wind farm planning, timely execution and after sales service networks. This approach will take the field from strength to strength.

The Government of India has been providing not merely policy support to wind energy projects, but also facilitating the field in more than one way. To begin with, the national wind-monitoring programme that MNES has been running through C-WET has successfully identified and validated more than 211 locations where wind farming can be taken up. Many of these locations are today having wind farms in hundreds of MW of wind power equipment operating successfully. To help the would-be-developers and seasoned wind farming community, detailed master plans for many known windy areas have been prepared, which, I believe are proving to be very useful.

The Government has set up the Centre for Wind Energy Technology. The centre is equipped with world-class testing facilities and certification services here in Chennai. I am informed that the services are next to none in the world. The centre has taken up two testing and certification assignments this year.

The Government has been given the mission of supporting the wind industry in all its facets including research and development. Just to showcase the forward looking steps that MNES is taking, I am glad to be informing you that the ministry has recently sanctioned a project to set up five wind measuring systems of 120 m height in different parts of the country. When the industry is ready with their bigger and higher machines, hard data would already be available. I will not go into details except saying that there are many such initiatives that will help, assist, promote and develop this industry in its entirety.

Please take the advantage of such value additions to a field that has so much promise. I am sure that you will make this most successful renewable energy technology even more strong and I assure you that my ministry and its organizations will help you in realizing our common goals of making India a wind super power in the world in the years to come.

Thank you.

Vilas Muttemwar

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Issue 2, July-September 2004

editorial...

When the Hon'ble Minister of State (Independent Charge) Shri Vilas Babu Rao Muttemwar made his speech while releasing the inaugural issue of *Pavan* he gave the industry some of the most important down-to-earth truths of sustainability. In the rush to take the field to the next higher levels of productivity, he emphasized the need for a built-in quality consciousness. He was right about the healthy status of the industry. The advice provided by him made a lot of sense. Frequently the question of third party certification came up. For almost all products, a stamp of third party certification improves the image considerably. It has some built-in and unstated advantages that need to be understood. To let the product speak for itself takes time and many a time it may do so to the designer's disadvantage.

In the recent times the no-nonsense attitude of the industry makes me feel very good about the way it is shaping up. Serious work is going on at all levels and I find that every one involved is prepared and more than happy to go that extra mile to do better than ever before. Frequently, the questions about Capacity Utilization Factors (CUF) come up in almost all forums. Therefore we looked at the "historic" facts. When I say historic, we are looking at the past five to seven years, when the field re-started, in a manner of speaking. It was found that there have been, in reality, considerable improvements on almost all counts. One may attribute it to a maturing wind power industry or one may merely hand it to simple increased hub-heights or even to de-rating of the capacity. While there can be arguments that the way CUF is defined is itself not quite mathematically correct, this is the way EBs and every one else thinks about it. In any case, the fact remains that things have improved. We are able to handle bigger and better machines in a very good manner and this is important.

I am also happy to share with you that your C-WET has now been recommended for the ISO 9001-2000 certificate. Even as *Pavan* is going for publication, we are awaiting the issue of the certificate. Concerted efforts are on for international recognition of C-WET's testing and certification. Look out in the future issues of *Pavan* about the progress we make.

We would welcome readers' views, ideas, articles and letters to the editor. Please do make an effort and feel free to write to us on the content and presentation. We shall be happy to use them in our future issues. We would like to see this as an information pasteboard for all stakeholders.

As I write these lines the industry is rushing towards the second most important date September 30. I am, together with every one else, waiting to hear those record breaking numbers of MW once again.

M.P. Ramesh
Executive Director

ANNOUNCEMENTS

Farewell

Shri T. Nagesha Rao, General Manager (Finance and Administratoin), was given a warm farewell and relieved of his duty w.e.f 24 June 2004.

Shri K.J. Sundararajamoorthy, Officer on Special Duty, was given a warm farewell and relieved of his duty w.e.f 31 July 2004.

Welcome

Shri D. Lakshmanan, General Manager (Finance & Administration) has assumed his responsibility at C-WET w.e.f 2 July 2004.

Current activities in CWET…

…an update presented to the Hon'ble Shri Vilas Babu Rao Muttemwar, Minister of State (Independent Charge), Non-conventional Energy Sources, Government of India, on the occasion of the release of the inaugural issue of the C-WET Newsletter *Pavan* in Chennai on 28 July 2004

Developments in R&D Unit

New facilities added: *Data Acquisition System* has been added with features of 88 channels in which 64 single ended analog input channels, 16 differential analog input channels, 8 digital I/O channels, sampling frequency of 100 kHz, resolution of 16 bits. Signals of ac/dc voltage and current, frequency, accelerometer, thermister, RTD, Strain gauge/Bridge output, etc, can be connected, measured and recorded.

Modular Precision Sound Analyzer has been added with features of two input channels, inherent noise level of A-weighting 3.4 mV, C-weighting 3.0 mV, harmonic distortion of <-80 dB at 1 kHz, cross talk <-90 dB at 1 kHz, sampling frequency of 48 kHz and Noise, 20 kHz bandwidth, typically –118 dB.

Testing of Small Wind Turbines: *Small Wind Turbine:* The IEC WT 01 standard refers to SWTGS with swept area less than 40 m^2 and generating at a voltage below 1000V ac or 1500 V dc.

The Executive Director presenting an update of the C-WET activities to the Minister

Application of SWTGS: SWTs are used as stand-alone battery-charging systems or as hybrid in conjunction with solar photovoltaic systems to power small loads such as lighting and household appliances. They can be used in remote places not connected to the grid to meet the basic power requirements.

Classification of tests on wind turbine: The IEC WT 01 classifies the type testing as follows:

Type tests / Operational tests

- Power performance measurements
- Safety and function tests
- Load measurements
- Blade tests
- Other tests
  - Environmental testing of electronic assemblies
  - Electromagnetic compatibility testing

Type characteristic measurements

- Power quality tests
- Acoustic noise measurements

Component testing

Structural, mechanical and electrical component tests

Duration test for small wind turbines: For small wind turbines, a duration test may replace the load measurement and blade tests. The purpose of the test is to investigate

- structural integrity and material degradation (corrosion, cracks, deformations);
- quality of environmental protection of the wind turbine.

Tests as per IEC 61400-2

Component tests: The objective of component tests is to verify by a shop test the load carrying capability of critical components (blades, shafts, support structures, etc). The selection of test conditions, including the test loads, shall take account of the appropriate safety level.

Operational tests: These tests are performed to validate that the operational design parameters are not exceeded in the wind turbine. The key operational parameters are:

- Maximum rotor speed
- Maximum yaw rate
- Rated power

Dynamic tests: These tests are carried out to verify that no undesirable vibrations arise in the wind turbine within the operational wind speed range.

Tests applicable and to be carried out on small wind turbines

All tests mentioned above can be conducted on either big or small wind turbines. The following tests are applicable for small wind turbines as per IEC 61400-2:

- Operational tests
  - Power performance measurement (rated power test)
  - Yaw efficiency (maximum yaw rate)
- Duration tests (load & blade tests)
- Safety and function tests
- Component and dynamic tests

WRA Unit Moves On

Project for higher level wind resource assessment: The Ministry of Non Conventional Energy Sources (MNES) has sanctioned a project for carrying out "Wind Resource and Wind Shear Assessment" at the five selected windy locations with 120 m anemometry to C-WET during the current financial year. The mast used will be either tubular in nature or lattice. Measurements will be at five levels. Initially it is planned for two years data collection and thereafter it will be continued for a further period depending on the situation. The sites for this programme will be carefully selected as to represent the region's wind availability to a considerably larger area.

The power law value generated under this programme will be compared with measured and extrapolated data available in that region. Another important point to be studied by the generated data is the effect of wind shear on turbine blades. The vertical variation of wind imparts unequal loading on a wind turbine as a whole that affects the life cycle of the machine.

Wind resource assessment in uncovered /new areas: Under the National Wind Resource Assessment Programme of MNES, 22 new stations have been planned for the year 2004-05. As the number of stations considered for the resource assessment so far were hardly any proportion to the area of the country, vast amount of areas were left out even among the considered states. Thus, to fill this gap as well as to take up monitoring in the new region, MNES initiated the programme in July2003. Under this programme, wind resource assessment in 12 states 50 m tall masts with instrumentation at 3 levels were planned. Two stations each were commissioned in Tamil Nadu, Kerala, Karnataka, Madhya Pradesh, Chattisgarh, Jharkhand, and Uttar Pradesh, three stations in Maharashtra, and one each in Rajasthan and Haryana. Installations in West Bengal and Goa are being done.

Strain gauging on the main shaft in preparation for provisional type testing

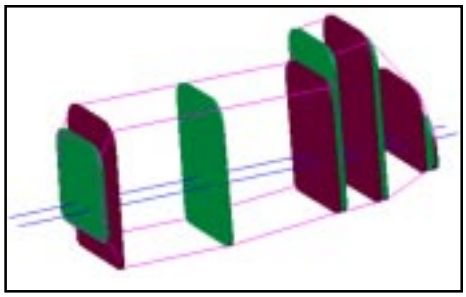
Coastal wind resource studies: C-WET has started coastal wind feasibility studies for assessing general coastal wind climatology and near-shore wind resources. Three wind-monitoring stations with 20-30 m tall anemometry masts were established along the coast of Kanya-kumari in Tamil Nadu and two in Kerala.

Steps Forward in Testing Unit

The Testing Unit has started to carry out field type testing with the ongoing projects of Enercon 600 kW and Vestas 600 kW at Coimbatore with advanced data acquisition systems as per Type Approval Provisional scheme (TAPS 2000).The Wind Turbine Test Station (WTTS) at Kayathar also provides the facilities for in-house calibration and check of instruments and data-acquisition equipment for the various projects.

The unit completed its ISO 9001: 2000 final audit successfully conducted by DNV, Chennai on 10 August 2004 and is being recommended for certification. The final audit was conducted on the documentation and implementation of field type testing of Enercon 600 kW WTG at Govindhapuram site near Coimbatore.

The Unit is heading towards accreditation by NABL (National Accreditation Board for Testing and Calibration Laboratories). This accreditation will be as per the ISO/IEC 17025 standard. Preparations in this regard are ongoing in the areas of documentation and implementation.



Isometric view of the sections of the Wind Turbine Nacelle

The Unit has started preparations for the construction of a 750 kW wind turbine nacelle model for a research project titled "Parameterisation of Flow Distortion around Wind Turbine Nacelle" which is to be conducted in the wind tunnel of SERC, Chennai. The results of this project will assist in installing the wind speed sensors in the area free of wakes due to the bluff body of the nacelle during site calibration in connection with power performance measurements as per IEC 61400-12.

S&C Unit Marching Ahead

- Type Certification of Wind Turbine in India is becoming more responsive to manufacturers' needs with the amended Type Approval Scheme – 2000 (TAPS-2000) approved by MNES. This provision allows the manufacturers to get their wind turbine tested on a site of the manufacturers under Category-II of TAPS-2000. The rider, however, is that the site should conform to IEC-61400-12 stipulations. C-CWET has now three Category-II certifications from the industry.
- C-WET achieved the ISO-9001 : 2000 certification from DNV.
- C-WET senior scientists, the executive director and unit chief, S&C, have participated in the international conference

on "World Renewable Energy Congress VIII and Expo" at Denver, Colorado, USA and presented their experiences on the Indian certification. The representation of C-WET at the conference and other laboratories has added new feathers to its cap in the international scenario in the field of wind energy.

- C-WET also gives preferences for promotion of Hindi. As a Zone-C organization, C-WET has been carrying out various tasks for the promotion. As a part of Hindi Pakhwada, "Hindi Day" was celebrated in C-WET and competitions in Hindi were held during the celebration.

Highlights from ITCS Unit

Academic: The R&D Council for C-WET took a decision to prepare a syllabus for the master's level courses in wind energy in view of a need for such a course in the universities and engineering colleges to provide adequately qualified manpower to the expanding industry.

Accordingly, a syllabus committee was constituted with experts from academia and industry under the Chairmanship of Prof. Sujay Basu, Director, School of Energy Studies, Jadavpur University, Kolkata. This committee met thrice and finalized the syllabus for all of the subjects and electives for a two-year master's degree course. The prepared syllabus has been forwarded to MNES for consideration and approval and then the same would be duly forwarded to AICTE for implementation in some of the universities. This course will help the wind industry, utilities, and others to get proper qualified manpower.

Release of *Pavan* Inaugural Issue

Shri Vilas Muttemwar, Hon'ble Minister of State (Independent Charge) released the inaugural issue of the C-WET newsletter *PAVAN* during his visit to the Centre on 28 July 2004.

Shri A.M. Gokhale, Secretary, MNES inaugurated the conference

Mini conference: As a part of the project phasing out plan, C-WET organized a mini-conference on 15 April 2004 called "*Focus on Long-term Sustainability and Development*" along with RISO with the objective of exploring long-term sustainability of C-WET as well as wind energy sector as a whole in the Lecture Hall of C-WET, Chennai. The participants were manufacturers, end-users, consultants, O&M agencies and State Nodal Agencies. Shri A.M. Gokhale, Secretary, MNES, inaugurated the conference. Dr Per Lundsager and Dr. Peter Haugh Madsen, Technical Consultants from RISO presented the project accomplishments and future perspectives.

The recommendations of the mini-conference have been presented to the steering committee.

Networking facility: The proper Local Area Network (LAN) facility for C-WET new campus at Pallikaranai has been established to have the Internet connectivity to speed up information dissemination. An internet leased line connectivity of 128Kbps has been established. We are also in the process of hosting the Center's website on our own servers and own official email facility for the employees.

Lecture Hall facility: We have established a well-equipped modern Lecture Hall with sophisticated audio-visual systems with a capacity to accommodate 100 people.

Special lecture: On 25 August 2004 C-WET organized a special lecture on "*Some observed wind profiles in the atmospheric boundary layer over coastal and inland stations*" delivered by Dr S. Sivaramakrishnan, Scientist, Indian Institute of Tropical Meteorology, Pune. The lecture was organized in C-WET Lecture Hall.

National training: C-WET is organizing its first National Training Programme on "*Wind farm development and related issues*" on 14 and 15 October 2004 to address all aspects of wind power, starting from Wind Resource Assessment to project implementation and operations in a focused manner.

The idea is to bring out basic and advanced training and knowledge to industry, utilities, technical institutions and various central and state government implementing agencies. Moreover, the course will provide an invaluable platform for dialogue and open exchange of views and experiences.

The targeted participation is around 30 persons drawn from academic institutes, industry, SNAs, developers and consultants. An information brochure regarding the same can be obtained from the office and download from the website.

Slowly but surely Asia switches on to green power

Reuters, Singapore

Rising oil prices and pollution are fueling interest in green power in Asia but experts see no prospect of a rapid switch from the region's growing dependence on oil, coal and gas.

The problem is the high cost of renewable energy projects such as solar, wind, geothermal and biofuels, lack of government incentives and vested interests who believe green power is not viable or a threat to their wallets.

"We have to work very hard to convince governments that this is something they should focus on," said Samuel Tumiwa, renewable energy specialist at the Asian Development Bank (ADB).

"You have factions in governments that want renewables and others that don't. There are a lot of vested interests be they old power companies or oil companies." Environmental groups such as Greenpeace and lending agencies such as the ADB say renewable energy is crucial for Asia's economic future.

Renewables would help trim dependency on oil, minimise exposure to oil price spikes and cut pollution in a region that is home to more than half of the world's population.

U.S. crude oil prices have averaged $38.67 a barrel so far in 2004, up more than $10 from the average for the previous five years. U.S. benchmark crude hit a record $49.40 last month.

The International Energy Agency, the world's energy watchdog, predicts Asia, particularly China and India, will need to make trillions of dollars of energy investment by 2030, much of it to build power stations to connect more people to national grids. Transport is also booming. Analysts say renewable energy can help meet some of these energy demands but most governments need to change the way they think and pass laws that level the playing field for green power. Already there are signs of change.

S&P promotes wind power as energy source

New York, NY, September 21 (UPI)

Credit rater Standard & Poor (S&P) has said that wind energy could be a viable alternative to oil amid higher petroleum prices.

"Wind power remains often more expensive than traditional energy sources ... although it is becoming increasingly price competitive," said S&P credit analyst Jan Willem Plantagie.

The New York rating agency pointed out that while wind power makes up only a small fraction of global energy production, it is becoming increasingly popular in Europe, where 70 percent of global wind power is found.

But S&P said that India and other countries that are prone to energy shortages have also come to recognize the competitive advantage that wind power could deliver, compared to the more capital-intensive requirements of conventional energy sources.

USAID invests $400,000 in South Asia

Colombo, September 3

The United States Agency for International Development (USAID) has awarded grants, totalling more than $400,000 in small but strategic grants to energy research and outreach organizations from India, Bangladesh, Bhutan, Nepal and Sri Lanka to nurture a regional energy market.

Abundant energy resources characterise South Asia; but, more than half of its households do not have access to commercial energy. The USAID grants will meet the increasing energy demands in the region by boosting regional energy cooperation and trade.

The USAID grants will support 18 initiatives in South Asia. Areas of activity include alternative energy systems (hydropower, small wind systems and biomass), efficiencies in rural electricity networks, electricity pricing, state-of-the-art energy management, and water and energy conservation.

Results of these efforts, such as energy efficiency standards, labelling initiatives and experiences from successful rural electrification programmes, will be shared with institutions and professionals across the region. In addition, grant funds will support four training institutions in South Asia.

In India, USAID has partnered with the Administrative Staff College of India. Partner institutions in other South Asian countries include the Bangladesh University of Engineering and Technology, the Sri Lanka Energy Managers Association, and the School of Environmental Management and Sustainable Development, Nepal.

Winrock International, Winrock International India, and the Institute of International Education will implement this as part of USAID's South Asia Regional Initiative (SARI) for Energy Cooperation and Development.

Advantage wind power

Wind is one of the cleaner, renewable energy sources that can meet a significant portion of energy demand both in the direct, grid-connected modes as well as stand-alone and remote 'niche' applications such as water pumping, desalination, and telecommunications, in developing countries like India.

It is estimated that wind power in many countries is already competitive with fossil power (capital cost Rs 40 million/ MW) when external/social costs are also accounted for. International organizations estimate that wind power will become competitive in a short time frame (2005-2010) with both fossil and nuclear in a narrow economic sense, without taking into account its competitive advance in external or social costs.

Two perspectives inform the economics of grid-connected wind power: first, of public authorities or energy planners, developing assignments of different energy sources; second, of private or utility investors, to whom inflation, interest rates, the taxation system, amortization period, etc, are important. In the former, the focus is on Rs/kWh. Such calculations do not include factors determined by society or governments, such as inflation or taxation. Consequently, the economics of wind energy differs greatly from country to country. In the latter, the focus is on cash flow in each project, on payback time, and present value of the investment.

The generation cost for wind energy is determined by the following parameters: total investment cost, which comprises cost of wind turbines, project preparation costs, and cost of the infrastructure; operation and maintenance cost; average wind speed at the particular site; availability; technical lifetime; amortization period; and real interest rate.

Wind energy status in India

By the end of March 1999, over 1,025 MW of grid-connected wind farms were operational, the installed annual capacity additions during 1994-95 and 1995-1996 being about 200-250 MW.

The total power generation from wind projects has now reached 3.7 billion units. This includes about 52 MW of demonstration projects installed by the government during the late 1980s and early 1990s, supported by multilateral and bilateral funding agencies, particularly DANIDA (Danish International Development Cooperation Agency).

Of the current installed capacity, over 970 MW has been funded through private sector investments. Funds from the World Bank and the Global Environmental Facility, with co-financing from DANIDA, have been used (through the Indian Renewable Energy Development Agency) to provide credit for about 250 MW.

However, after a period of explosive growth that pushed India's wind energy utilization up to the world's third highest, investment fell sharply from mid-1996 to the end of 1998. The possible reasons were:

- Lowering of tax-credit benefits due to levying of MAT (Minimum Alternate Tax) and reduction of corporate income tax by the Central Government in 1995-96 and 1996-97, respectively;
- Withdrawal of third-party sales in some states;
- Miscalculation by wind energy promoters, who had based their calculations on a 20 percent capacity factor, whereas actual figures in most cases were found to be much lower;
- Also, as the investment mechanism in wind energy projects was tailored to tax benefits, the current economic slowdown may have caused the downfall, too.

Ongoing projects/ programmes

According to initial estimates, India had a wind power potential of 20,000 MW. This was then scaled up to 35 000 MW at 30 m hub height and 45,000 MW at 50 m hub height. Subsequently, a national programme was initiated towards the end of the Sixth Five-year Plan in 1983-84 to tap this potential by adopting a market-oriented strategy. This resulted in successful commercial development of wind power technology and substantial additions to power generation in the country. In 1998, the Worldwatch Institute recognized India as a "Wind Super Power."

In 1998, the Government of India set up the Centre for Wind Energy Technology (C-WET) as an autonomous body in Chennai, Tamil Nadu. A wind turbine test station, with technical and financial support from DANIDA, is also coming up at Kayathar.

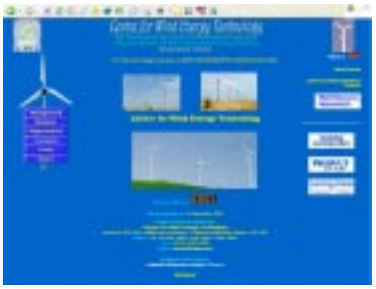
Wind power manufacturing industry

The wind power generation programme initiated in 1985-86 by MNES, attracted a large number of international and Indian suppliers to collaborate for a variety of services, including manufacturing and assembling of turbines in India. In recent years there has been a surge in such collaborations and joint ventures. The progress of phased indigenization by the leading manufacturers up to 250 kW capacity has been good, and nearly 80 percent indigenization has been achieved.

C-WET WEBSITE

Centre for Wind Energy Technology (C-WET)
http://www.cwet.tn.nic.in

With a **MISSION** to sustain wind energy development and to help India achieve self-reliance in the power sector, supplementing the core conventional resources, MNES has been planning and developing basic infrastructures and establishing institutions for research and development. The C-WET was established in achieving some of the broad goals of these.



C-WET offers services and seeks to find total solutions across the entire spectrum of wind energy sector. C-WET will support the wind industry in developing know-how and know-why and offer services to other countries.

Related Links

Governmental Institutions

http://mnes.nic.in/
http://www.iredaltd.com/
http://www.ens.dk/sw1212.asp
http://www.ens.dk/graphics/publikationer/energipolitik_uk/e21uk/index.htm
http://www.ens.dk/graphics/Publikationer/Forsyning_UK/Wind_Power99.pdf

Wind Energy Associations

http://www.inwea.org/
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http://www.wind-energie.de/
http://www.tuulivoimayhdistys.fi/index_en.htm
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For more information on related websites:
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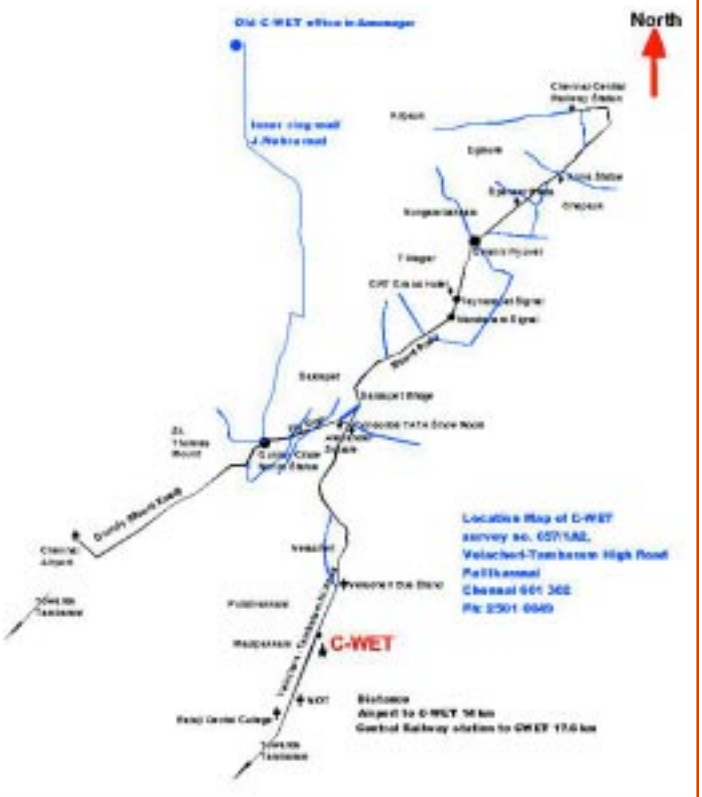
C-WET has shifted



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