



Instrument Systems

collecting data, delivering solutions

Wind energy assessment made easier

A device constructed by NIWA Instrument Systems is proving its worth in assessing potential wind farm sites.

Instrument Systems has modified a Remtech 'SODAR' and mounted it on a trailer.



This self contained unit houses all of the control, communications, and power electronics. It is easy to set up and relocate, so can be used to quickly assess conditions at different positions within a proposed wind farm site. What's more, the analysis systems of the SODAR derive wind statistics and other information not readily available from conventional wind measurement technologies.

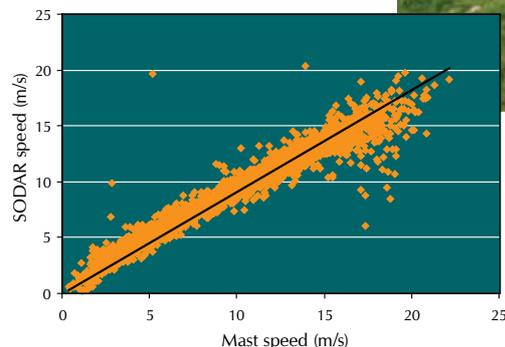
The alternative is to mount anemometers on a tall mast at heights that straddle a typical wind generator hub height of 80 metres. Such tall masts can be difficult and expensive to set up, and they collect data at the single point where the anemometer is mounted. Anemometers measure wind speed, so the data require interpretation to derive other important wind quantities.

Data as valid as a tall mast at a fraction of the cost

The upgraded SODAR has been deployed at a prospective wind farm site, near conventional tall towers. The data plot opposite shows an average 97% correlation between SODAR and mast-mounted measurements at one proposed turbine site. (A 100% correlation is impossible since the mast and SODAR trailer cannot be in precisely the same spot at the same time.)

How does SODAR work?

SODAR (Sonic Direction and Range) is like radar, but uses sound waves instead of radio waves. Pulses of sound are beamed upward from an array of acoustic aerials. Based on the Doppler shift and relative strength of the received echoes, the SODAR can provide information about wind speed and direction, turbulence, thermal structure, and mixing, at heights ranging from 15 to 5000 metres, for a region immediately above the trailer.



97% correlation between SODAR & mast-mounted measurements of wind speed.



Irrigation scheme automated

The Benmore irrigation scheme, in the McKenzie Basin, has been designed to supply water from the Ohau River for up to 8000 hectares of land between Twizel and Omarama. The civil engineering work for the scheme is nearing completion.

Instrument Systems and NIWA's Tekapo field team have built, installed, and commissioned a series of flow monitoring and control stations on the scheme, for the main contractors, Attewell Irrigation Ltd. The automation systems are designed to ensure that the scheme satisfies its operational consents and each property gets the required amount of water.

Since the late 1990s, Instrument Systems has developed and installed monitoring and control systems at 18 sites on irrigation schemes in Canterbury and South Canterbury. This represents a large proportion of irrigation scheme automation projects in the South Island.

After the civil unrest

During the recent political turmoil, the Solomon Islands hydrological monitoring programme, which has been running since 1965, was seriously disrupted by vandalism and lack of funds. Even the computers which held the data were stolen.

Now the situation is much calmer and there's renewed interest in water level monitoring for potential hydro power development because the Solomons relies heavily on imported diesel fuel which is both expensive and polluting.

Fortunately, people in the Solomons had been sending back-up datasets to NIWA, so we had a complete copy of their archive on our National Hydrometric Database in Christchurch. This year, UNESCO funding has enabled the Department of Geology, Mines & Water Resources to purchase a replacement package of hydrometric monitoring equipment, computers, and software from Instrument Systems. Instrument Systems has supplied equipment for which continuing support can be easily provided by NIWA staff and is suitable for operation in the local tropical conditions.



Autu Gilbert of the Solomon Islands Department of Geology, Mines & Water Resources measuring stream flow during a NIWA/SOPAC hydrological training course in Fiji. Such training, coupled with hands-on experience in the Solomons, has enabled the staff there to install the new equipment supplied by Instrument Systems. They have now reinstated an effective hydrometric monitoring programme.

Lake level monitoring upgraded

Reliability was a key requirement when Instrument Systems upgraded the NIWA water level monitoring system at the Lake Hawea gates.

The gates are at the head of the Hawea River which flows into the Clutha and on to Lake Dunstan and the Clyde hydro power station. Contact Energy uses the gates to control the amount of water stored in Lake Hawea.

Given the importance of water level monitoring at Hawea, two completely separate systems were installed at the gates, which effectively back up each other. Both systems enable a direct MODBUS connection to Contact's control systems and to NIWA's Alexandra branch office. One system operates via a radio link, the other via a cellular network. As a result of the upgrade, Contact Energy is now able to take data direct from dataloggers at the gate whenever they require, for use in their control systems.



Improving Singapore's water harvesting

Singapore's water supply is tight, so the country collects stormwater in concrete channels and stores it in reservoirs.

Instrument Systems recently had a hand in the Singapore Public Utilities Board's efforts to improve the efficiency of the water harvesting operation. The board engaged MWH to improve the monitoring of the stormwater systems, and the Australian firm, Greenspan, to install the required water level and flow monitoring systems. Greenspan contracted NIWA to supply the necessary telemetry systems, some instruments, and training. The new telemetered system will enable the board's water department to measure flood flows in real time, get early warning of changing flows, and make better informed decisions about how much water to put into which reservoir.



In November last year, NIWA trained staff from the Singapore Public Utilities Board in flow measuring techniques.

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