A WIND TURBINE NOISE MEASUREMENT AND CONTROL SYSTEM ("NMACS")

SYSTEM SPECIFICATION

The Need

Wind Energy Projects ("WEPs") exist in all states of Australia. At this time (September 2011) some 2000 turbines mostly of capacities of 1.5 to 2.5 MW are in operation. In order to meet its nominated 2020 renewable energy target, the Federal Government is largely reliant on the wind industry adding another 9000 MW of renewable energy capacity by the 2020 date which might be satisfied by around another 4000 turbines.

Projects have mostly been located by the presence of strong winds and the proximity and access of power grids. Locations have not been sensitive to the presence of farmers and other householders. Nor can this be expected to change substantially.

Despite much denial, it is a fact that many neighbours of WEPs are suffering serious health problems that are linked to noise emissions by turbines and that this will be worsened by the increasing use of larger turbines.

The noise forecasts prepared by those consultants favoured by the industry omit infrasound as do the planning guidelines and or regulations for WEPs. Complaints by sufferers are largely ignored and relevant bureaucracies have not been keen to find any fault with an industry so favoured by Government.

The Purpose

The purpose of this document is to set out a specification for a practical and relatively low cost noise measurement and control system that will allow residents adjacent to WEPs to live in their homes in a healthy and essentially uninterrupted environment.

The Waubra Foundation has therefore prepared this specification for:

- ***planning, public health and environment protection authorities*** which, by requiring that a NMACS system be installed in existing and new WEPs, can be ***certain that no damaging health problems will be caused to families*** living in the vicinity of a WEP;

- ***local groups*** who have a legitimate need that the health and well being of their families be guaranteed, now know that there is a workable NMACS to effect these objectives; and can confidently insist that planning and other relevant authorities require installation of such a system;
- ***developers and operators*** of wind energy projects have a practicable and affordable means of ensuring that their projects will no longer pose unacceptable threats to their neighbours;
- ***businesses or organisations*** that may be interested in proposing one or more technical solutions that could quite quickly be trialed and deployed on existing and new WEPs.

The System

The system is to be constituted in three parts:

1. to be set up inside homes, work buildings, schools, or places of assembly adjacent to wind turbines; this part encompasses the ***sound measuring, recording and transmitting equipment (the "SMRT Unit").*** This unit must be portable so that it may be set up in and around the building in which it is housed. Multiple SMRT units will be required for a particular wind project;
2. the second unit is a ***data receiving, recording and control unit (the "DRRC" unit)*** which will be located in an urban office environment operated by an independent body, for example by an existing or new unit of an Environment Protection Authority tasked with supervision and oversight of noise emissions from WEPs. A duplicate unit will be installed in the WEP operations control room located on site;
3. the third unit, the feedback control unit ***(the "FC Unit")*** which may, (subject to final detailed design) be part of the second unit, will interface with the WEP's standard turbine shutdown system to control noise emissions to acceptable levels.

The SMRT Unit

The SMRT unit is required to continuously measure sound levels in dB inside and outside buildings across frequencies from 0.5 to 20,000 hertz; (note: system designer to advise if there are cost or design benefits if bottom limit is higher, say 2 to 4 hertz).

The SMRT unit is to display, on demand or continuously, the measured sound levels across the whole of the desired frequencies spectrum on a suitable onsite desktop screen and to provide for onsite storage of say twelve months of data.

The SMRT unit is to have the facility to transmit the measured data to multiple remote display and recording computers, one computer, the "DRRC unit" being in the independent entity's measurement and oversight room; another, the FC unit being in the operating or control room of the project operator.

The DRRC Unit

The DRRC unit is to accept, display on demand and store, the noise data from multiple (up to say 50) remote SMRT units.

This unit will have the capability of storing maximum acceptable noise levels ("MANLs") across the frequency spectrum for each location where a SMRT unit is installed.

The DRRC unit must be competent to continuously compare incoming data from the linked SMRTs with the predetermined MANLs for each linked SMRT site (note the MANLs may be different for each SMRT site) and must be capable of having the MANLs altered, but only through a security device or password.

Should the DRRT unit determine that the MANL for a particular (or multiple sites) has been breached, then it must "flag" the SMRT(s) where this has happened, and also the FC unit (where, in addition to the visual flag, the operator may decide to have an audible alarm activated).

Additionally the DRRT unit shall be connected, through the FC unit to the operator's standard turbine shutdown or feathering mechanism. If the recorded noise level exceeds the MANL, the FC unit then the shuts down (or

feathers) one or more previously selected turbines adjacent to the building where the measured sound has exceeded the MANL.

The FC Unit

The FC unit also needs to have the capability, once the measured noise level falls below the MANL, to restart the shutdown turbine(s) manually whilst ensuring the MANL is not breached. Provision for this to be effected automatically should also be considered by the system designer.

Critical Elements

If the SMRT unit suffers a breakdown, then it is necessary to be able to manage the situation that may arise if noise levels become excessive during the offline period. The system designer is requested to consider the above situation and how to treat similar problems arising if the DRRT is offline.

Robust Hardware

Given the likely locations of SMRT units they need to be of robust construction.

Application

The noise control system is to be designed so that it may be fitted to existing WEPs and built in to new WEPs.