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Wind Farming, Electromagnetic Radiation & Interference

What Is Electromagnetic Radiation?

Electromagnetic radiation (EMR) is a wavelike pattern of electric and magnetic energy moving together. Types of EMR include X-rays, ultraviolet, visible light, infrared and radio waves. As a natural phenomenon, EMR is emitted by natural sources like the Sun, the Earth and the ionosphere.

Radio frequency (RF) EMR is commonly used for a wide variety of communications applications from the broadcast of television and radio, through to radars and mobile phones. It is important that wind farms do not impact the quality of this communication.

Is EMR Safe?

Whilst higher frequency EMR [eg X-rays] can be damaging to human health, only long-term exposure to very high levels of radio frequency (RF) EMR will heat or burn biological tissue. The levels of EMR that members of the general public are normally exposed to are far below these dangerous levels.

What About Electromagnetic Fields?

Electromagnetic Fields (EMF) emanate from any wire carrying electricity and Australians are routinely exposed to these fields in their everyday lives. The electromagnetic fields produced by the generation and export of electricity from a wind farm, do not pose a threat to public health. Typically, electrical cabling between wind turbines is buried in the ground, effectively eliminating any EMF. Grid connection is usually made at no more than 132kV, similar to the voltages used by utilities in existing distribution networks.

What Do Wind Farms Have To Do With EMR?

From a wind resource perspective, high and exposed sites are attractive. So it is not unusual for any of a range of telecommunications installations; radio and television masts, mobile phone base stations or emergency service radio masts, to be located nearby.

Care must be taken to ensure that wind turbines do not passively interfere with these facilities by directly obstructing, reflecting or refracting the RF EMR signals from these facilities. There is also potential for a wind turbine to actively interfere by producing its own low energy RF signal.

What Is EMR Interference?

Unwanted radio and background noise can impair effective telecommunications which rely on a strong signal to noise ratio. An appropriate transmitting antenna can dramatically improve this signal to noise ratio. A transmitting antenna can also increase the signal strength in a particular direction (ie toward a receiver). The directionality of a receiving antenna can also be enhanced, thus reducing the amount of unwanted noise.

How Are Wind Farm EMR Issues Managed?

The impact of wind turbine generators on electromagnetic waves is relatively minor and a means of mitigation, avoidance or remedy can be found for all potential impacts. Any interference can be minimised or eliminated through a combination of appropriate turbine siting and special technical solutions.



Point to Point Communications: Careful siting and directional antennae can eliminate any impact on point to point links.

Mobile Radio Services: Interference can be overcome by moving the mobile unit a short distance away as per normal practice for avoiding any other structure. Any interference to mobile radio services is usually negligible and limited to mobile communications within the wind farm site itself.

Television: Interference to television signals in the wind farm area can be caused by either the reflection or obstruction of the signal by the turbine blades. With glass reinforced plastic blades, modern wind turbine generators will cause minimal television interference. It cannot however, be completely discounted for houses within a few kilometres of turbines. If interference does become apparent after construction, the possible mitigation techniques include :

- the installation of a better quality antenna or more directional antenna,
- directing the antenna toward an alternative broadcast transmitter,
- installation of an amplifier,
- relocation of the antennae to achieve better signal to noise ratio,
- installation of a terrestrial, digital set top box for digital TV,
- installation of satellite or cable TV, or
- if a wide area is affected then the construction of a new repeater station may be considered.



Active interference is minimised or completely avoided by ensuring that all equipment complies with relevant electromagnetic compatibility standards, as all wind farm equipment does.

In the unlikely event that a problem arises over time at a particular site, the wind farm operator will usually be able to rectify it using one of the aforementioned solutions.

The Australian Communications Authority web site provides details of a variety of television signal interference patterns and ways to overcome these problems - www.aca.gov.au/radcomm/publications/better_tv_radio/index.