

Transmission lines and electric and magnetic fields

March 2024

Victoria's energy system is changing. We urgently need to change our power grid to carry energy from new renewable sources and batteries across the state to Victorian homes, businesses, hospitals, schools and other vital services.

The prospect of hosting new transmission infrastructure has raised concerns for some regional communities. This includes questions about how transmission towers and lines may affect health, farming and agricultural practices, and everyday life.

This factsheet aims to address these questions and explain the facts about transmission infrastructure and electric and magnetic fields.

What are electric and magnetic fields?

Electric and magnetic fields, also known as electromagnetic fields or EMFs, occur whenever electricity is flowing or there is an electrical force.

They can result from natural phenomena, like lightning or solar activity. They can also result from human activity, with powerlines, electrical wiring and common household appliances all producing extremely low frequency EMF.

The widespread use of electricity means that we are exposed to EMF in our homes, workplaces and environment everyday.

Do EMFs pose health risks?

Australia's health authorities and regulators have found there is no evidence that EMFs pose a risk to people who live or work near transmission lines.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the Australian Government's primary authority on radiation protection. ARPANSA aims to protect Australians from radiation exposure, ensure emergency preparedness and oversee appropriate regulation and enforcement activities.

ARPANSA advises: "There is no established evidence that the exposure to magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects."¹

Communities in Australia and around the world have been living with electrical appliances that emit EMFs for many decades. Significant research has been carried out internationally assessing the possibility of health effects from exposure to EMFs.

Based on available research, leading health authorities, including the World Health Organization (WHO), have found that current evidence does not confirm the existence of any health consequences from exposure to low level magnetic fields.²

EMFs under transmission lines decrease in magnitude very quickly with distance from the line. This means the EMF levels found at the edge of a transmission line easement are usually comparable to the levels found in the general household environment.

ARPANSA advises: "Generally, homes that are more than 50 m from a high voltage powerline are not expected to have higher than typical magnetic fields. For substations and transformers, the magnetic fields at distances of 5 m to 10 m away are generally indistinguishable from typical background levels in the home."¹

¹ ARPANSA, Electricity and health (n.d.).
More info: arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/electricity

² WHO, Radiation: electromagnetic fields (2016).
More info: who.int/news-room/questions-and-answers/item/radiation-electromagnetic-fields

Do EMFs affect livestock?

Studies into possible effects have found that EMFs do not have any observable impacts on the health and productivity of cows, sheep, pigs and horses – including their health, milk production, fertility, behaviour and carcass quality.³

Powerlink Queensland notes that in over 50 years of operating high voltage transmission lines in Queensland, it has seen no instances of EMF exposure causing detrimental effects to crops or livestock.⁴

³ National Grid, EMFs, agriculture and the environment (n.d.).
More info: emfs.info/effects/agriculture

⁴ AECOM, Chapter 21: Electric and Magnetic Field (2018).
More info: powerlink.com.au/brochures/electric-and-magnetic-fields

Can EMFs affect smart farming technologies?

Transmission lines generally do not interfere with GPS. There can be small effects directly adjacent to towers. Some specialist differential GPS systems may be affected during rain events, due to radio interference from the transmission line.

There are some possible impacts to smart farming technologies:

- Potential interference with soil sensors that are close to transmission towers.
- Potential interference with radio transmitters that are close to transmission lines, under some conditions, like rainfall.

- Potential temporary disruption to sensors or radio transmitters if a transmission line fault occurs. Based on typical transmission infrastructure operating in Victoria, this is unlikely.

Transmission Network Service Providers, who operate the network, will work with landholders to ensure that impacts to smart farming technologies are mitigated or minimised. If effects to smart farming cannot be overcome, compensation is an option to offset any loss of productivity.



Limiting exposure to EMFs

All transmission lines are designed so that EMF levels observed under the line, and at the edge of the easement, are minimised.

Landholders carrying out agricultural activities beneath or near transmission powerlines will experience levels of EMF well within the limits of current international health guidelines, but higher than they would experience in their homes.

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