EnergyCo

NSW GOVERNMENT

Electric and magnetic fields

New England Renewable Energy Zone

July 2024

EnergyCo is delivering the New England Renewable Energy Zone (REZ) to provide a clean, affordable and reliable power supply for energy consumers across NSW. The REZ will harness energy from solar, wind and storage projects and connect with households and businesses across the region and the state.

Uralla

Overview

Electric and magnetic fields (EMFs) occur naturally and are found wherever there is electricity. EMFs are essential to the electricity process and differ from electromagnetic radiation (EMR) associated with radio waves, microwaves, and X-rays. EMFs transfer energy along electric wires, while EMR radiates energy away from the source and can be detected at a distance.

According to leading health authorities, including the World Health Organisation (WHO) and the Australian Radiation Protection and Nuclear Safety Agency (APRANSA), EMFs from transmission infrastructure are not considered a risk to human health.

EnergyCo is following a careful avoidance approach in the planning and design of the New England REZ network infrastructure project which includes best practice engineering and risk minimisation, and guidance from Energy Networks Australia (ENA).

Further assessment of EMFs will be carried out to inform the project's Environmental Impact Statement (EIS).

Health and safety

Daily use of electricity exposes us to low-frequency EMFs, which are not considered a health risk. Transmission lines, household appliances, and electrical equipment operate at 50 Hertz, producing extremely low-frequency EMFs.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) monitors emerging research on the potential health effects of EMF exposure from powerlines and other electrical sources. ARPANSA publishes guidelines to ensure the safety of the community and electricity industry workers who work nearby to sources of EMFs.

Leading global health bodies continue to evaluate research on the health effects of EMF exposure. The World Health Organisation has advised current evidence does not confirm any health consequences from exposure to low-level electromagnetic fields. ARPANSA has also stated there is no established evidence that electric and magnetic fields from high voltage powerlines, substations, or transformers cause health effects. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) set the international standard for human exposure to magnetic fields at 2000 milligauss (mG) in 2010, a standard recommended by ARPANSA. Transmission lines of 330kV and 500kV generally emit 10-50mG at the edge of a high voltage transmission line easement and 20-200mG directly underneath, significantly below the international exposure limit.

Electric and magnetic fields

Electric fields exist naturally in the atmosphere due to electric currents, thunderstorms, and lightning, while static magnetic fields occur where magnetic materials experience a force, such as from the Earth's core.

Electric fields are invisible and form around areas and objects that produce an electric charge. They are present in any appliance plugged into a power source, whether switched on or in standby mode. The strength of electric fields depends on the appliance's voltage and the distance from the user.

These fields diminish quickly with distance, similar to how a fire's warmth decreases as you move away, and are blocked by most materials, including trees and buildings.

Magnetic fields are generated by the flow of electric current, measured in Amperes (Amps). The strength of magnetic fields depends on the amount of current flowing and decreases quickly with distance, but they are not easily blocked like electric fields.

The electric field strength of transmission lines varies with their operating voltage (measured in Volts), while the magnetic field strength depends on the current flowing through the line (measured in Amps).

Assessment of the REZ network infrastructure project

An assessment of EMFs from the REZ network infrastructure project will be included in the project's EIS, which is expected to be displayed for public exhibition in late 2025. This assessment will ensure EMFs from transmission infrastructure, including energy hubs and transmission lines, comply with ICNIRP and ARPANSA guidelines. It will model the impact of EMFs on surrounding properties, considering distances from buildings and local geographical conditions. This information will guide the route selection and design of the transmission line to ensure careful avoidance of buildings and compliance with standards.

The electromagnetic spectrum:

Low frequency → **High frequency**

Extremely low frequency (ELF) EMFs

Generally found to be harmless to humans.

Examples of ELF EMFs:

- household appliances
- electrical equipment
- electrical wiring
- transmission lines

Electromagnetic radiation (EMR)

Can lead to cellular and DNA damage if exposed for long periods of time.

Examples of EMR:

- sunlight
- X-rays
- radioactive waste

Electrical appliances and infrastructure and their range of mG:

Hairdryer
10-70mG

Laptop
2-20mG

Toaster
2-10mG

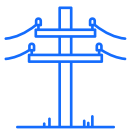
Fridge
2-5mG

Stove
2-30mG

Electric blanket
5-30mG

Kettle
2-10mG

Under a distribution line
2-20mG



At the edge of a high voltage transmission line easement
2-50mG

Directly under high voltage transmission line
10-200mG

Above underground cables
5-200mG

More information

Australian Radiation Protection and Nuclear Safety Agency

ARPANSA maintains continual oversight of emerging research into the potential health effects of EMFs from powerlines and other electrical sources to provide accurate and up-to-date advice.

arpansa.gov.au

1800 022 333

Energy Networks Australia

The electricity industry in Australia has an active management program for Electric and Magnetic Fields at power and ELF frequencies (50Hz) which has been in place for many years.

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World Health Organisation

In response to public and governmental concern, WHO established the International Electromagnetic Fields Project in 1996 to assess the scientific evidence of possible adverse health effects from electromagnetic fields.

who.int/health-topics/electromagnetic-fields

About EnergyCo

The Energy Corporation of NSW (EnergyCo) is a statutory authority responsible for leading the delivery of Renewable Energy Zones (REZs) as part of the NSW Government's Electricity Infrastructure Roadmap.

EnergyCo is working closely with communities, investors and industry to deliver the state's first five REZs.

For more information about EnergyCo, visit our website at **energyco.nsw.gov.au/about-energyco**.

Contact us

For more information, please visit our website or get in touch with our team.

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