

# ELECTRIC AND MAGNETIC FIELDS

## FACT SHEET

Transgrid operates and maintains the high voltage electricity transmission network in NSW and the ACT, connecting generators to distributors and major end users to power almost four million homes and businesses.

Our core role is to provide safe, reliable and efficient transmission services across Transgrid's network.

Electric and magnetic fields are considered in the planning, design and location of all Transgrid's assets.

This fact sheet provides general information on electric and magnetic fields in relation to our network, and details on how you can find out more.

### **What are electric and magnetic fields?**

Electric and magnetic fields, commonly known as EMFs, are both naturally occurring and found wherever there is electricity. Natural occurrences include from lightning, solar activity and the earth itself. All living organisms produce EMFs. Wherever electricity is flowing or there is an electrical force, EMFs are produced.

The presence of EMFs is an essential part of the electricity process.

### **Electric fields**

An electric field occurs around any area where electric charges experience a force. The strength of this force is related to the voltage: the higher the force/voltage, the stronger the electric field. The level of electric fields is measured in thousands of volts per metre (kV/m).

Electric fields are strongest closest to the source but reduce quickly with distance. In addition, most materials act as a barrier to electric fields.

### **Magnetic fields**

A magnetic field occurs around any area where magnetic materials experience a force. Magnetic fields are produced by the flow of an electric current: the higher the current (measured in amps), the greater the magnetic field. The strength of magnetic fields is measured in milliGauss (mG).

Like electric fields, magnetic fields are highest closest to the source but also reduce quickly with distance.

Unlike electric fields, magnetic fields are only present when an electric current is flowing. As most materials will not act as a shield or barrier to magnetic fields, this is a reason why research into EMFs and health generally focuses on magnetic fields.

### **Magnetic field levels in the modern environment**

Electricity is widely used in modern life, which means magnetic fields are all around us and exist wherever electricity is used.

Below is a table showing some commonly used electrical appliances and electricity assets that we often see near where we live and work, and their associated range of magnetic field levels.

These levels are all well below the public exposure limit of 2,000 mG recommended by the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which released an international standard in 2010.



**Hairdryer**  
10-70 mG



**Laptop**  
2-20 mG



**Toaster**  
2-10 mG



**Fridge**  
2-5 mG



**Stove**  
2-30 mG



**Electric blanket**  
5-30 mG



**Kettle**  
2-10 mG



**Under a  
distribution line**  
2-20 mG



**Directly under high  
voltage transmission line**  
10-200 mG



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



**Above underground  
cables**  
5-200 mG

### EMF facts

EMFs are not the same as the electromagnetic radiation (EMR) associated with radio waves, microwaves, mobile phones and x-rays. EMFs cause energy to be transferred along electric wires whereas EMR causes energy to be radiated away from the source and can be detected at a great distance.

In terms of their physical nature or effects on the human body, EMFs bear no relationship to EMR such as x-rays or microwaves.

Magnetic fields within homes occur whenever electricity is being used, including electrical equipment and wiring. Most people will encounter a wide variety of EMF sources throughout their daily lives, whether at home, at work or in the general environment. The actual strength of the field at a given location depends upon the number and kinds of sources and their distance from the location of measurement.

The higher the voltage does not necessary mean the higher the magnetic field. For example, low voltage powerlines can have higher magnetic fields than high voltage transmission lines.

### Measuring magnetic fields

The measurement of magnetic fields can only be accurately undertaken using equipment that is specifically designed and calibrated.

Measurements carried out using devices such as mobile phones cannot be relied upon to produce accurate readings.

Guidance on the measurement of magnetic fields is available by contacting the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) or visiting its web site.

### Health research

Electricity has been in use in Australia for more than 100 years and considerable research has been carried out into the sector across a wide range of areas. Internationally, there have been almost 3,000 studies carried out in relation to EMFs, which has significantly enhanced our knowledge of this issue.

Leading health bodies such as the World Health Organisation, the US National Institute of Environmental and Health Sciences and the UK National Radiological Protection Board have evaluated the research to assess the likelihood of health effects associated with exposure to EMFs.

In Australia, ARPANSA has advised that:

“ *The scientific evidence does not establish that exposure to the electric and magnetic fields found around the home, the office or near powerlines causes health effects.*”

“ *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.*”

The World Health Organisation (WHO) has advised that:

“ *...current evidence does not confirm the existence of any health consequence from exposure to low level electromagnetic fields.*”

**Transgrid is guided by these health authorities and takes a precautionary approach to EMFs.**

## **Transgrid's policy**

Transgrid adopts a precautionary approach to the management of electric and magnetic fields by:

- taking electric and magnetic fields into account in the design and location of new facilities
- closely monitoring ongoing research and reviews by scientific panels and international policy developments
- regularly reviewing our policies and practices in light of the latest scientific information
- measuring field strengths in and around our own installations and other places where appropriate
- providing up-to-date information to interested people on request.

## 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 in order to provide accurate and up-to-date advice.

For more information visit [www.arpansa.gov.au](http://www.arpansa.gov.au)

### **World Health Organisation**

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

For more information visit [www.who.int](http://www.who.int)

### **Energy Networks Australia**

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

The Energy Networks Australia website provides some useful information on EMF-related issues.

For more information visit [www.energynetworks.com.au](http://www.energynetworks.com.au)