FACT SHEET

Electric & Magnetic Fields (EMFs)

2022

Electric and Magnetic Fields from Underground Transmission Cabling

Transpower is aware that electric and magnetic fields associated with its transmission network can raise concerns with the public.

The safety of the public and our staff is fundamental to our business and our works are designed to comply with the international guidelines recommended by the NZ Ministry of Health.

Where are electric and magnetic fields found?

Electric and magnetic fields (EMFs) are present wherever there is electricity – including in the home, office and worksite.

For example, EMFs are found near all electrical wiring in your street and in your home, and are associated with electric tools and most electrical appliances.

EMFs are also associated with the transmission of electricity and transmission cables. Although electric and magnetic fields are commonplace in modern life, we are aware that electricity transmission as a source of EMF is the focus of much of the public concern.

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What standard does Transpower apply to provide safe designs?

In managing electric and magnetic fields, Transpower follows the guidelines set by the experts.

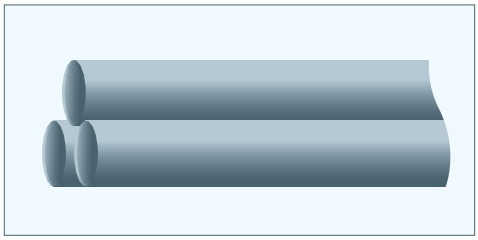
Transpower designs assets to meet the guidelines set by the International Commission on Non-ionizing Radiation Protection (ICNIRP), which is part of the World Health Organisation. These guidelines have been endorsed in New Zealand by the Ministry of Health. They are also identified as the appropriate basis for public health protection by Policy 9 of the National Policy Statement on Electricity Transmission under the Resource Management Act.

What about EMFs from underground cables?

As with an overhead transmission line, the amount of electric power transmitted on an underground cable at any given time is determined by its voltage and current.

Electric fields are determined by the voltage. In the case of an underground cable, electric fields are screened by the cable sheath so would be eliminated above it.

Magnetic fields are determined by the current, which changes in strength over time as the demand for electricity fluctuates. The fields are strongest close to the cables and rapidly reduce further away from them. As such, the predicted worst case field levels for an underground cable would only be experienced directly above the cable during maximum current flow.



Magnetic fields from underground cables can be reduced through burying at a greater depth and/or by 'phase' cancellation using a triangular (trefoil) configuration as shown on the right.

The chart below shows predicted magnetic fields at different distances for a typical underground 220 kV transmission cable buried at 1.5m depth and laid in trefoil configuration.

Voltage	Current (max)	Where used	Magnetic fields as a % of International Guideline (worst case)			
			Above	5 m	10 m	30 m
220 kV	630 MVA	Pakuranga to Penrose cable	<20	<5	<1.4	<0.2

In comparison to the figures above, a hair dryer can have a magnetic field anywhere between 2 and 13% of the Guideline and a kitchen microwave between 3 and 47%.

Magnetic field strength reduces rapidly with distance from the source – as an approximation, doubling the distance will quarter the effect. In addition for the great majority of locations and time, field levels will be well below the worst case prediction presented above, and will tend to reflect usage. For example, electricity usage varies significantly over a typical day, with morning and evening peaks and also seasonally with winter peaks typically greater than summer peaks. These variations will be reflected in the magnetic field strength.

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As identified above, the cables are designed so that they will always be compliant with the international guideline, even under worst case operating conditions. The international consensus is that the guideline provides for the protection of public health with regard to magnetic fields.

Further Information

Over the years a lot has been written on the subject of electric and magnetic fields and concern has been expressed about the potential for health effects. Transpower's understanding of electric and magnetic fields and the potential health effects is further described in a series of fact sheets. In addition Transpower has documented it's commitment to the management of electric and magnetic fields.

Both our fact sheets and our commitment are available from www.transpower.co.nz

In New Zealand, the Ministry of Health provides scientific advice on EMFs.

The Ministry of Health reviews research undertaken here in New Zealand and overseas to determine whether or not there are potential health effects from exposure to EMFs. They have developed an information booklet called Electric Magnetic Fields and your Health. This booklet and further information is available from www.health.govt.nz/publication/electric-and-magnetic-fields-and-your-health