Sources of electric and magnetic fields include:

- house wiring
- electrical appliances (toasters, ovens, hair dryers, washing machines etc)
- national electricity transmission and local distribution.

What determines the strength of electric and magnetic fields?

**Electric fields**

Electric field strength:

- is directly related to voltage
- reduces rapidly with distance from the source of the field
- can be screened effectively by objects (walls, trees, ground) - this means that within homes, electric fields from transmission lines are effectively blocked
- is measured in units of kilovolts per metre (kV/m).

**Magnetic fields**

Magnetic field strength:

- is directly related to current
- reduces rapidly with distance from the source of the field
- unlike electric fields, is not screened by objects
- is measured in terms of the magnetic flux density in microtesla (μT).

What are some typical strengths of electric and magnetic fields?

The typical field strengths shown below come from the measurement of fields from a range of sources by independent experts. While field strengths will usually be within the ranges of values shown, values outside the range are possible. More detail on typical field levels around Transpower’s transmission lines are also provided in this fact sheet for comparison.
The measurements associated with microwave ovens refer only to the low frequency electric and magnetic fields measured around microwave ovens, produced by components such as transformers and the turntable motor. They do not give any indication of possible microwave leakage.

**Has Transpower done any testing of electric and magnetic fields around its transmission lines?**

Besides undertaking predictive modelling and monitoring around its assets for operational and design purposes, Transpower, from time to time, receives calls from members of the public who wish to know if the field levels from nearby transmission lines are safe.
In many cases, Transpower pays for the measurements of field levels in and around dwellings on behalf of the residents. The measurements are undertaken by independent experts (as described in Fact Sheet 1) and a report provided that outlines the measurements taken and their relevance.

Results of more than 200 measurements around residences undertaken between January 2006 and December 2016 are summarised in the graphs below. The graphs represent measurements around each residence where access beneath the line was available. The access was either on the property or in publicly accessible areas close to the home, such as the roadside.

Even beneath Transpower’s transmission lines, the strength of measured magnetic fields is well below the Ministry of Health public exposure guideline of 200 µT and reduces rapidly with distance.

Magnetic field levels reflect the flow of electrical current on a line at the time of measurement. As previously identified, changes in the electrical load (i.e. current) on the transmission line, will be reflected in changes in the magnetic field strengths.

Electric field strength relates to a line’s voltage and is lowest beneath the lines of lower voltage. The measured field strengths are below the Ministry of Health public exposure guideline of 5kV/m, even beneath the line. Field strengths reduce rapidly with distance away from the line.
The maximum magnetic field measured in the period was less than 10% of the ICNIRP public exposure guideline. The maximum electric field measured in the period was 90% of the ICNIRP public exposure guideline.

This is one of five fact sheets produced by Transpower to provide the public with information about electric and magnetic fields. This fact sheet provides information on typical electric and magnetic field levels found in the environment including around transmission facilities. Other fact sheets that are available and provide more detailed information cover:

- Fact Sheet 1 on electric and magnetic fields and Transpower
- Fact Sheet 2 on the nature of electric and magnetic fields
- Fact Sheet 4 on electric and magnetic fields and the question of health effects
- Fact Sheet 5 on guidance on safe levels of electric and magnetic fields.

If you have further questions concerning EMF please call Transpower on 0508 526 369 or contact us through our website www.transpower.co.nz.