

# Understanding electric and magnetic fields

When it comes to power lines, the intensity of a magnetic field is strongest directly under the line and drops dramatically with distance.

A magnetic field exists anywhere electric current is flowing. When a lamp is turned on, electric current begins to flow, and a magnetic field is generated. An electric field also exists when current is flowing.

Electric fields are measured in volts per meter; magnetic fields are measured in milligauss. The strength and intensity of electric and magnetic fields quickly decrease as you move away from their source.

## Magnetic fields and power lines

Many variables affect the strength of a magnetic field around an electric power line: the amount of electric current flowing through the wires, distance from the power line, and the configuration or arrangement of the wires. When it comes to power lines, the intensity of a magnetic field is strongest directly under the line and drops dramatically with distance.

compatible with transmission facilities. Planting guidelines near lower-voltage distribution lines operated by your local distribution utility may be vastly different from those recommended by ATC. Be sure to contact Wisconsin's One Call at 811 or 1-800-242-8511 before digging. A locating service will mark your property for underground utilities at no cost to you.



## Everyday sources of magnetic fields

Any wire or device conducting electricity is surrounded by a magnetic field. The Earth itself is a source of magnetic fields, which causes a compass needle to point north.

## Household magnetic field levels

(at typical working distance)

 <b>Coffee maker</b> .2 to 3 mG	 <b>Television</b> < 0.1 to 1.5 mG	 <b>Toaster</b> 10 to 60 mG
 <b>Computer tablet</b> .1 to .2 mG	 <b>Vacuum cleaner</b> 230 to 1300 mG	 <b>Hair dryer</b> 3 to 1400 mG

Sources: Gauger, Jr., *Household Appliance Magnetic Field Survey*. IEEE transactions on power apparatus and systems. PA-104.

	Voltage	Under wires	Edge of right-of-way	100 feet away
	69,000 volts	20-25 mG	5-10 mG	.5-12 mG
	138,000 volts	35-40 mG	15-20 mG	.5-12 mG
	345,000 volts	85-100 mG	50-60 mG	.5-15 mG

Power lines produce magnetic fields of varying intensity, measured in units called milligauss (mG).

American Transmission Co. owns, operates, builds and maintains high-voltage power lines safely and reliably.



## Does burying power lines reduce EMF?

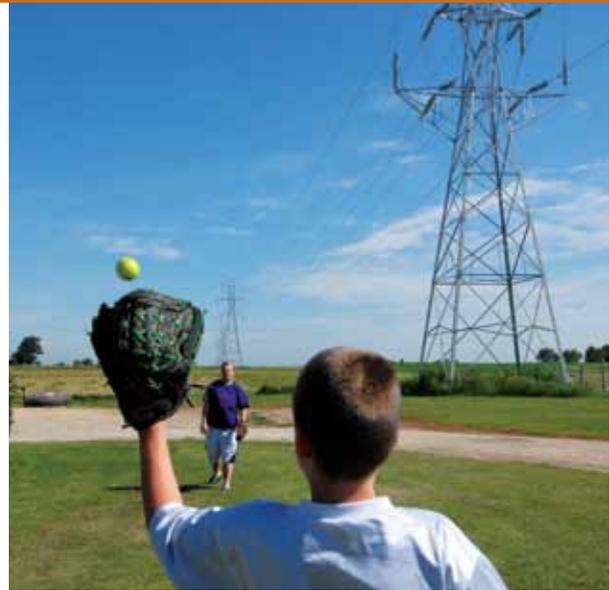
Placing power lines underground does not eliminate magnetic fields. In fact, the intensity of a magnetic field from an underground line sometimes can be stronger than those for overhead lines because overhead lines are positioned farther away from ground level.

## Scientific research

Most of the discussion and research during the past 30 years about the possible health risks of electric and magnetic fields has focused on magnetic fields. The scientific findings remain inconclusive – a direct link between magnetic fields and a higher risk of negative health effects has not been firmly established. The electric industry has monitored scientific research into possible health effects of electric and magnetic fields and funded more than \$100 million in research. The vast majority of findings have produced weak or inconsistent associations between electric and magnetic fields and a higher risk for negative health effects.

The scientific community has generally characterized the findings, taken as a whole, to show no consistent association between magnetic fields and a risk of adverse health effects.

We continue to support research through programs including those conducted by the Electric Power Research Institute, the World Health Organization and others, and are committed to sharing any additional research findings.



## Additional resources

**Electric Power Research Institute** <http://emf.epri.com>

### National Cancer Institute

Visit [www.cancer.gov](http://www.cancer.gov) and type “EMF” in the search tool.

### The National Institute of Environmental Health Sciences – National Institutes of Health

Visit [www.niehs.nih.gov](http://www.niehs.nih.gov) and type “EMF” in the search tool.

### National Research Council

*“Possible Health Effects of Exposure to Residential Electric and Magnetic Fields”*

Visit [www.nap.edu](http://www.nap.edu) and type “electric and magnetic fields” in the search tool to download a free PDF of this book.

**World Health Organization** [www.who.int/peh-emf/en](http://www.who.int/peh-emf/en)

## Glossary

### Electric and magnetic fields (EMF):

Two interrelated fields produced by an electrical device or appliance (such as a computer or hair dryer) or an electric conductor (such as a power line).

### Electric current:

The flow of an electric charge, which exists when something is operating electrically – a hair dryer in use, a lamp turned on, etc.

### Electric field:

The field that exists around any electric charge or any object containing an electric charge. An electric field is related to the voltage, not the flow of electricity. A device that is plugged in but turned off will still have an electric field.

### Volt:

Unit of measure for the capacity of an electric line. ATC power lines are between 69,000 volts (69 kilovolts) and 345,000 volts (345 kilovolts).

### Magnetic field:

The field that exists around anything carrying power in or using an electric current or flow of electricity.

### Milligauss (mG):

Unit of measure for the intensity of a magnetic field.

### Transmission lines:

Higher voltage power lines that carry electricity long distances to where it is distributed (by local electric companies) to communities, businesses and homes.



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