



EMF: Electric and Magnetic Fields

EVERSOURCE

Your trusted source for energy information

EMF and Scientific Studies

For over 40 years, there has been a great deal of scientific research devoted to finding out more about electric and magnetic fields (EMF) and related health impacts. From the beginning, Eversource has been supportive of this research and monitoring the results.

We know our customers have questions, and we want to share the conclusions from reviews published by national and international health authorities and government agencies. The conclusions of academic researchers and public health authorities around the world are a significant resource to guide our understanding of EMF. We rely on these leading organizations for independent assessments of EMF research and guidance.

At Eversource, we're always working to keep you—and our environment—safe. We're committed to sharing and communicating information about EMF, so our customers, co-workers, family and friends are well-informed.



.....
“Extensive research has been conducted into possible health effects of exposure to many parts of the frequency spectrum.

All reviews conducted so far have indicated that exposures below the limits recommended in the International Commission on Non-Ionizing Radiation Protection (ICNIRP [1998]) EMF guidelines, covering the full frequency range from 0 - 300 GHz*, do not produce any known adverse health effect.”

—World Health Organization

Reference: World Health Organization, Electromagnetic Fields (EMF) Research, www.who.int/peh-emf/research/en/
.....

* Hertz (Hz) is a unit of frequency defined as one cycle per second. Alternating current (AC) electric power in the U.S. is supplied at a frequency of 60 Hz. One gigahertz (GHz) represents 1 billion cycles per second.

Answering Questions about EMF: Electric and Magnetic Fields

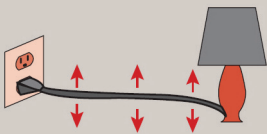
What are EMF?

EMF are invisible areas of energy produced by electrical power and natural sources. Electric fields are produced by voltage. If you have electricity in your home, the cord to your lamp or any other device you have plugged in has an electric field, even though you are not using it. Magnetic fields are produced by current flow, which is when the power lines, equipment, building wiring, and/or appliances are in use. If you turn on a lamp or any other device that uses electricity, you will produce a magnetic field from current flow. Both electric and magnetic fields diminish rapidly as a person moves away from the source of the field.

A Comparison of Electric and Magnetic Fields

Electric Fields

Produced by **voltage**

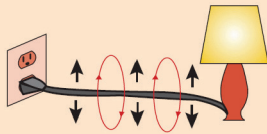


Lamp plugged in but turned off. Voltage produces an electric field.

- Measured in **volts per meter** (V/m) or in **kilovolts per meter** (kV/m)
- **Easily shielded** (weakened) by conducting objects such as trees and buildings
- Strength decreases rapidly with increased distance from the source

Magnetic Fields

Produced by **current**



Lamp plugged in and turned on. Current now produces a magnetic field also.

- Measured in **gauss** (G) or **tesla** (T)
- **Not easily shielded** (weakened) by most material
- Strength decreases rapidly with increased distance from the source

Graphic from National Institute of Environmental Health Sciences (NIEHS)
“EMF: Electric and Magnetic Fields Associated with the Use of Electric Power”

What are sources of EMF?

Sources of EMF include power lines and equipment, home wiring, and most appliances that use electric power to operate. Appliances and wiring within homes and workplaces are the primary sources of EMF indoors, while power lines are the primary source of EMF outdoors.

Typical Exposures of 60 Hz Magnetic Fields from Electric Appliances

Common Household Appliances	Magnetic Fields	
	at 1 Foot Distance	at Typical User Distance
AC Adapters	0 - 7.5	0 - 0.8
Bluetooth Headsets	0	0
Electric Toothbrush	0 - 4.8	3.6 - 742
Electric Leaf Blower	17.1 - 155	28.3 - 61.5
Vacuum Cleaner	0.6 - 23.3	0.1 - 23.1
Electric Stove	1 - 5	0 - 20
Wireless Routers	0	0 - 0.3
Gaming Consoles	0 - 0.5	0 - 0.6
Plasma Television	1.4 - 2.2	0 - 0.1
LCD Television	0 - 2.5	0 - 0.6

Source: NIEHS EMFRAPID Brochure (2002), EPRI Report 1021221—
“Magnetic Fields from Electrical Appliances and Devices” (2010)

Do EMF cause health impacts?

Continued concern about the potential health effects of EMF exposure primarily relates to magnetic fields. National and international scientific review panels have concluded that the current, substantial body of scientific research on EMF does not support a conclusion that EMF affects human health. We rely on the consensus

(continued)

of scientific and health authorities, including the World Health Organization, when developing EMF-related policies and procedures. When designing new transmission lines, Eversource uses practical, no-cost or low-cost engineering design approaches for reducing magnetic field levels. Design practices include conductor (wire) positioning and the proximity of adjacent power lines—all of which must be consistent with other environmental, safety and engineering criteria. These practices are consistent with recommendations by the World Health Organization and regulatory bodies. We continue to follow recently published scientific studies and reviews, and adhere to best management practices for EMF.

Can power lines be placed underground to reduce magnetic fields?

Placing transmission or distribution lines underground does not necessarily shield or reduce magnetic fields.

What can Eversource do to help property owners find out more about where EMF may be in their homes?

Eversource has company personnel trained to measure EMF. Property owners who would like us to take EMF readings should contact Eversource at 877-993-6377 or EMFquestions@eversource.com. These in-home measurements are at no cost to our customers. At the request of electricians and homebuilders, we can also provide information on home electrical wiring and service grounding practices that can reduce magnetic field levels.

“A number of national and international organizations have formulated guidelines establishing limits for occupational and residential EMF exposure. The exposure limits for EMF fields developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)— a non-governmental organization formally recognized by the World Health Organization (WHO)—were developed following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences. The main conclusion from the WHO reviews is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health.”

—World Health Organization

Reference: World Health Organization’s Electromagnetic Fields (EMF) Standards and Guidelines : www.who.int/peh-emf/standards/en/

60 Hz EMF Exposure Guidelines		
Organization, recommended limit	Magnetic fields	Electric fields
ICNIRP, reference level	2,000 mG	4.2 kV/m
International Committee on Electromagnetic Safety (ICES), Maximum Permissible Exposure	9,040 mG	5 kV/m 10 kV/m*

* in right of way



Where can I find more information about EMF?

The World Health Organization's EMF Fact Sheet—

www.who.int/mediacentre/factsheets/fs322/en/index.html

The World Health Organization's "What is the International EMF Project?"—

www.who.int/peh-emf/project/EMF_Project/en/

The International Commission on Non-Ionizing Radiation Protection

(ICNIRP), a non-governmental organization formally recognized by the World Health Organization — "EMF Standards & Guidelines"—

www.who.int/peh-emf/standards/en/

Summary of ICNIRP limits for public exposure—

www.icnirp.org/en/frequencies/low-frequency/index.html

Electric Power Research Institute (EPRI)—www.epri.com

National Institute of Environmental Health Sciences (NIEHS)—

www.niehs.nih.gov

International Agency for Research on Cancer (IARC)—www.iarc.fr

Connecticut Siting Council's Best Management Practices—

www.ct.gov/csc/lib/csc/emf_bmp/emf_bmp_12-14-07.pdf

National Cancer Institute—www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet

European Commission's Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR)—"Opinion on Potential Health Effects of Exposure to EMF"—ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)—

"Electricity and Health"—www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/electricity

Health Canada—www.hc-sc.gc.ca/hl-vs/iyh-vsv/enviro/magnet-eng.php

Whom can I contact at Eversource for more information?

For more information about EMF, call 877-993-6377
or send an email to **EMFquestions@eversource.com**.

.....
"The scientific evidence does not establish that exposure to the electric and magnetic fields found around the home, the office or near power lines causes health effects."

— Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), October 2015
.....

EVERSOURCE

