

Ocean Wind 1

Overview of Electric and Magnetic Field Impacts

Where are Electric and magnetic fields (EMF)?

Electric and magnetic fields (EMF) are present whenever and wherever electricity is generated, transmitted and used. They are present in both the natural environment and due to human activity. Simply put, they are everywhere. Exposure to magnetic fields from electric power sources occurs during daily activities at home, and virtually everywhere we go; including work or school, businesses, hospitals or even a walk in the park.

Source: Electric Power Research Institute, EMF and your Health: [LINK](#)

What are Electric and Magnetic Fields?

EMF are made up of waves of electric and magnetic energy moving together through space. Electrical objects produce two types of fields – electric fields and magnetic fields. The term “field” is used to describe the way an object influences its surrounding area. A temperature field, for example, surrounds a warm object, such as a space heater. Electric and magnetic fields (EMF) surround any object that is generating, transmitting or using electricity, including appliances, wiring, office equipment, distribution lines and transmission lines. EMFs are invisible and they cannot be felt or heard.

- Electric fields are produced by the voltages applied to electrical objects, and
- Magnetic fields are produced by the flow of current through these objects.

Just like a temperature field, electric and magnetic field levels decrease quickly with distance. If you measure the temperature right next to a pot of boiling water, it is high. But, move one or two feet away from the pot and the temperature decreases. It is the same with EMF. Electric field levels are also affected by nearby objects, such as buildings and trees, which block the fields.

Should any precautions be taken to reduce exposure to EMF?

A great amount of research has been done on EMF and health. Based on this research, no health or scientific agency has concluded that these fields are the cause of any disease.

Since the research has not confirmed that EMF causes any illness, scientific organizations have not recommended taking drastic or costly measures to reduce exposures. For example, they have not recommended exposure limits in the range of EMF levels that we encounter from everyday sources because the benefits of exposure reduction are unclear.

What process has been taken to evaluate health risks?

Determining if EMF exposure is a risk to human health is a multistep process. First, scientists conduct three different types of studies: epidemiology studies in humans, animal studies, and studies on cells and tissues.

Results from these studies are published in the scientific literature for everyone to read. The way scientists make sense of this research, however, is to compile all of the hundreds of studies together and evaluate the strengths and weaknesses of each study. Then, all of the studies are evaluated together to arrive at a conclusion. This is referred to as a weight-of-evidence review. Scientific organizations assemble panels of experts to conduct weight-of-evidence reviews.

Each of the three study types can be thought of as a puzzle piece. When placed together, the information from all three study types gives us an understanding of possible health effects.

Epidemiology studies – Scientists collect data about human populations in their day-to-day environments to determine whether there are patterns between exposures and diseases. Most studies evaluating EMF look at whether people with disease have higher estimates of past exposure, compared to people without disease.

Animal studies – Scientists have exposed laboratory animals to magnetic field levels as high as 50,000mG and as long as their entire lifetime. These studies then compare the amount of disease they observe in exposed animals to the amount of disease they observe in animals that have not been exposed.

The strength of animal studies is that scientists are able to control all aspects of the animals' lives to minimize the potential effects of factors other than EMF.

Studies in cells and tissues – These studies involve exposure of isolated cells and tissues in the laboratory to EMF. Scientists then compare the characteristics of exposed and unexposed samples to look for differences that may indicate a disease process. These studies are limited because what happens in cells or tissue outside a human body may not be the same as what happens inside a body.

What are typical levels and exposures in daily life?

Table 1 – Typical Magnetic Fields from Appliances (at 1 foot away and at the distance from the appliance during typical use)

	Appliance	Appliance	Appliance	Appliance
Magnetic Field (mG)	AC Adapter	Baby Monitor	Dimmer Switch	Compact Fluorescent Bulb
At 1 foot	0 – .75	0 – 2	0 – 0.8	0 – 0.1
At User Distance	0 – 0.8	0 – 1.5	0 – 0.8	0 – 0.6
	Portable Heater	Electric Stove	Hairdryer	Gaming Console
At 1 foot	1 – 40	1 – 5	0 – 70	0 – 0.5
At User Distance	5 – 150	0 – 20	0 – 700	0 – 0.6
	Laptop Computer	Digital Clock	Microwave	Plasma LCD TV
At 1 foot	0	0 – 8	1 – 200	1.4 – 2.2 0 – 2.5
At User Distance	0 – 0.1	0 – 8	0 – 300	0 – 0.1 0 – 0.6

Source: Electric Power Research Institute, EMF and your Health: LINK

How will EMF from offshore wind projects impact marine life?

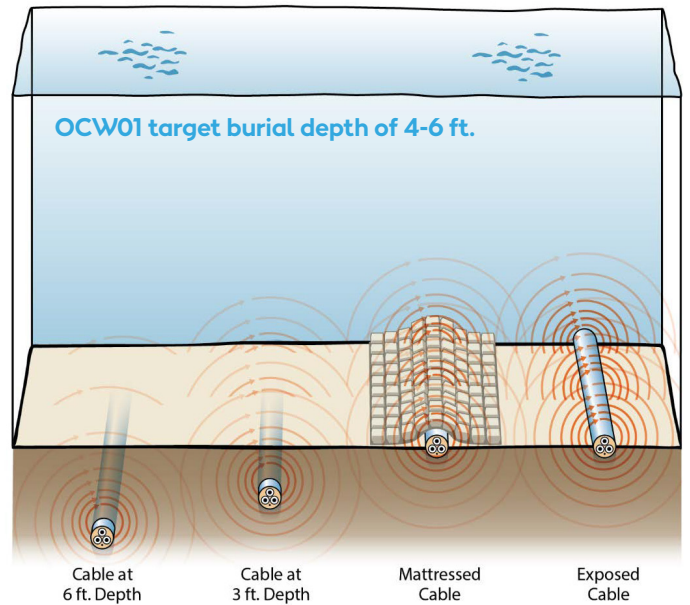
A 2019 study by the Bureau of Ocean Management on the potential EMF effects on fish species of commercial and recreational importance in southern New England determined the operation of offshore wind energy projects is not expected to negatively affect commercial and recreational fishes, including American eel, Atlantic salmon, skates, and bony fish, like blue fish, striped bass and pelagic sharks, within the southern New England area.

Specifically, the study concluded AC undersea power cables associated with offshore wind energy projects within the southern New England area will generate weak EMF at frequencies outside the known range of detection by electro-sensitive and magneto-sensitive fishes.

What organizations are good resources on EMF?

Scientific agencies that are paying close attention to the possible health effects of EMF exposure:

1. WHO: The World Health Organization
2. NIEHS: National Institute of Environmental Health Sciences
3. IARC: International Agency for Research on Cancer
4. HPA: Health Protection Agency of Great Britain
5. HCN: Health Council of the Netherlands



EMF decay with distance from four undersea power cable placement scenarios.

Source: United States Bureau of Ocean Energy Management, Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England: LINK

Where can I find more information on EMF?

Bureau of Ocean Energy Management Evaluation of Potential EMF Effects on Fish Species of Commercial or Recreational Fishing Importance in Southern New England August 2019 is available at: https://espis.boem.gov/final%20reports/BOEM_2019-049.pdf

A fact sheet that describes the main findings of the WHO report is available at: www.who.int/mediacentre/factsheets/fs322/en/index.html

The NIEHS 2002 report on EMF is available at: www.niehs.nih.gov/health/docs/emf-02.pdf

The National Cancer Institute provides information on risk factors for cancer and how this disease can be prevented at: www.cancer.gov/cancertopics/wyntk/overview/page4

The National Cancer Institute also provides a discussion of the research on magnetic fields at: www.cancer.gov/cancertopics/factsheet/Risk/magnetic-fields