

A photograph of two men standing on a grassy hill, looking out over a landscape. One man is pointing towards a large power line tower in the distance. The sky is blue with some clouds. The text "Power Lines and Your Health" is overlaid on the image.

# Power Lines and Your Health

**Answering Your Questions**



**The current. The future.**

SONI is the System Operator for Northern Ireland. This means we are responsible for a safe, secure and reliable supply of electricity – now and in the future.

We plan and operate the electricity transmission grid. This brings power from where it is generated to where it is needed – throughout Northern Ireland.

The grid supplies power to the distribution network. This supplies the electricity you use every day in your homes, businesses, schools, hospitals, and farms.

We plan new electricity infrastructure only when it is needed. SONI is regulated by the Northern Ireland Utility Regulator.

### Our safety promise

We obey all laws, and meet all applicable health and safety standards. We work for the benefit and safety of every citizen in Northern Ireland.

Electricity is a very safe way to provide energy to homes and businesses, and we use a lot of it in our daily lives.

This requires SONI to transmit large amounts of electricity.

The main safety risk this creates is accidental electrocution – and this is a very low risk.

To protect against this risk, we send this energy on wires carried by poles and pylons, or buried underground in cables.

However, some people worry about the electric and magnetic fields (EMFs) that are found near electricity lines and cables.

### What are EMFs?

When electric current flows, both electric and magnetic fields are produced. The EMFs from electricity are in the extremely low frequency end of the electro-magnetic spectrum. (See next page.) They occur in the home, in the workplace, or anywhere we use electricity.

However, people everywhere are exposed to EMFs wherever they live, not just from electricity lines. Natural sources of EMFs include the earth's geomagnetic field, and electric fields from storm clouds.

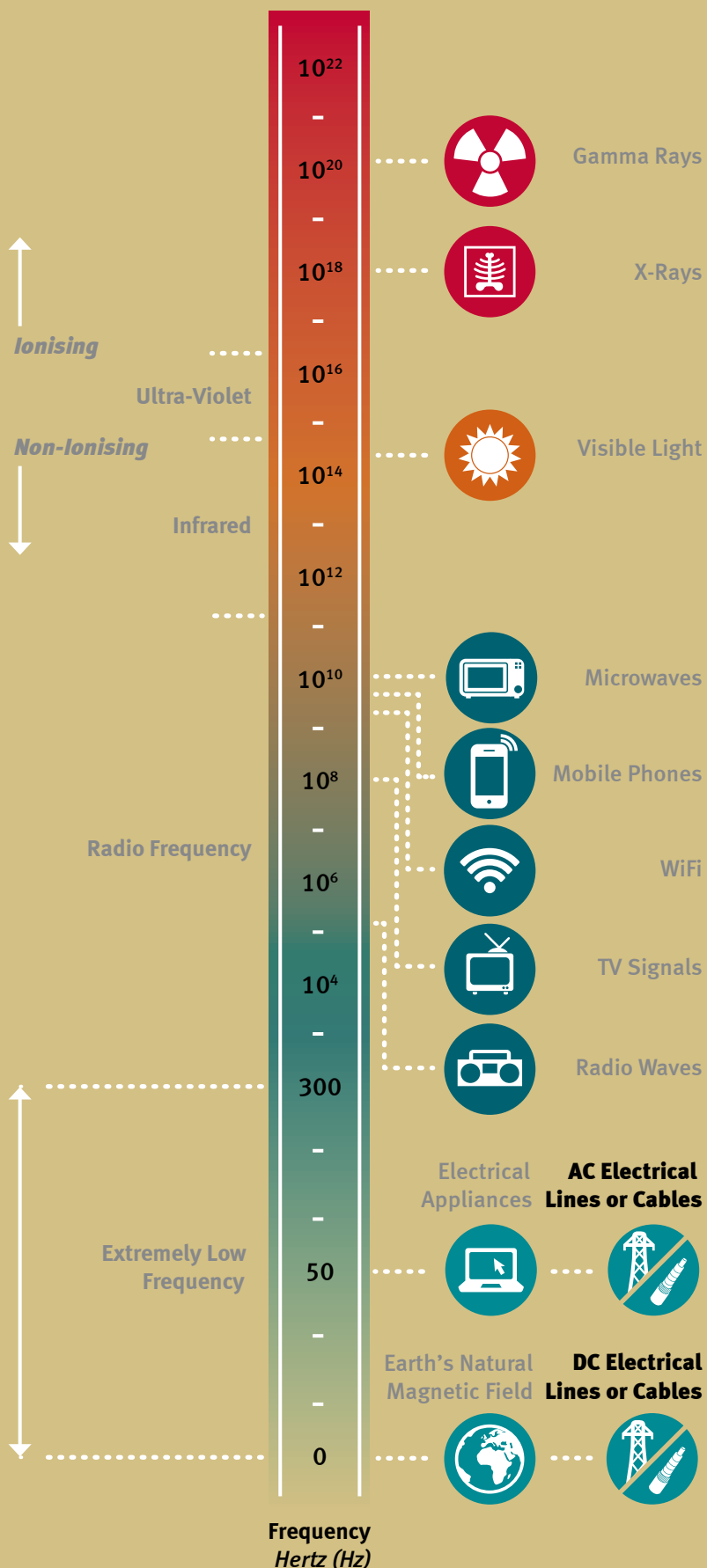
EMFs occur anywhere that electricity is generated, transmitted or used. Apart from power lines, this includes electrical appliances and wiring in our homes and businesses.

Like other issues related to man-made technologies, extremely low-frequency EMFs have been measured, researched and closely monitored.

**The consensus from health and regulatory authorities is that extremely low frequency EMFs do not present a health risk.**

We know that some people have genuine concerns about EMFs and health. This leaflet aims to simply explain the facts about EMFs, based on current information from health and scientific agencies.

# Electromagnetic Spectrum



## Are EMFs the same as radiation?

No. The fields resulting from electricity are fundamentally different from x-ray and gamma ray radiation. Although they are all forms of electromagnetic energy, there are important and fundamental differences.

The term radiation usually refers to electromagnetic energy that falls at the ionising end of the spectrum. This kind of energy is capable of breaking bonds in molecules. This damages our basic biological building blocks – the DNA of our cells.

Only the high-frequency portion of the electromagnetic spectrum is ionising. This includes x-rays and gamma rays.

**EMFs from the electricity grid are non-ionising. This term means that they do not have enough energy to cause damage to human or animal cells in the same way ionising radiation does.**

Another source of non-ionising energy are EMFs from the earth itself. The non-ionising end of the spectrum also includes radio waves, TV signals, and visible light.

Some people fear that EMFs could cause cancer in the same way that ionising radiation does. However, the scientific consensus is that there is no credible way to explain how this could happen.



## Why do some people say EMFs are harmful?

The most common concern about EMFs from power lines is a fear that magnetic fields could be associated with childhood leukaemia.

This was first suggested in a 1979 epidemiological study. These kinds of studies look at patterns of disease in populations. While they cannot prove a cause of disease, they can suggest statistical associations that need further investigation.

Because of the 1979 study, power lines and childhood cancers have been comprehensively investigated. These investigations included more epidemiological research, as well as laboratory studies.

There have been mixed results from subsequent epidemiological studies. Some have reported associations with magnetic fields; others have not. Recent studies conducted in the UK, France, Denmark and the US have not established associations between a home near transmission lines and childhood leukaemia.

Crucially, laboratory studies have found no connection and no explanation of how power lines could have this effect.

**Based on this history and its own review of research, the World Health Organization states there is no evidence to conclude that exposure to low-level EMFs is harmful to human health.**

This issue has become emotive and controversial for some, as none of us can see EMFs or easily control our exposure to them.

There are campaigners who believe any possibility of risk – even unproven – needs action.



There are also some people with health problems that they believe are caused by power lines.

**However, anybody who lives in the modern world has widespread exposure to extremely low-frequency EMFs. This is the case whether or not they live near power lines.**

## Will EMFs be declared hazardous in future?

Those who have fears about EMFs worry that, in future, science will eventually discover they are hazardous.

They look at known carcinogens like tobacco and point out that it was once viewed as safe.

It is helpful to explore this comparison to provide further reassurance.

When there are concerns about a potential health hazard, scientists look for evidence across a variety of studies.

The link between cigarettes and lung cancer was first proposed in 1930s. This was when population studies first showed the clear parallel rise in cigarette consumption and lung cancer.

It took just 20 years to prove this cause and effect, using animal testing, cellular pathology and chemical analysis.

By the 1950s, the scientific case was proven. Over the following decade, health and government authorities started to act on this proof.

In comparison, electricity has been transmitted over lines since the start of the 1900s. Particularly in the UK and the USA, the high-voltage grid expanded hugely in the second half of that century.

There have been more than 100 years of power line use. There has also been over forty years of scientific research into low-level exposure to low frequency EMFs from all electrical sources, including power lines.

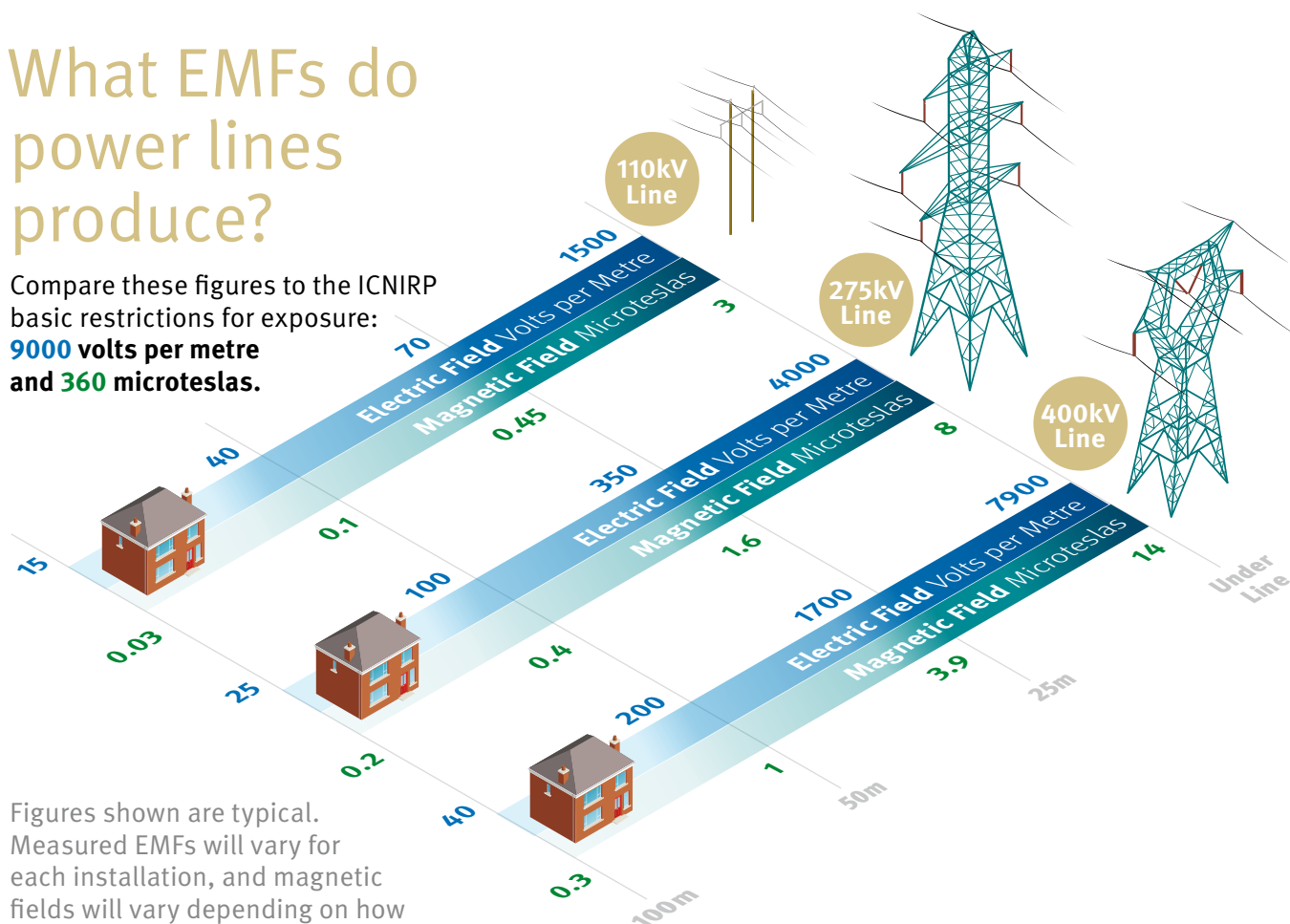
The WHO states: “Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals.”

There has been a very significant amount of historic exposure, and a very lengthy period of on-going and rigorous investigation.

**Yet, there is no conclusive proof that EMFs from power lines are hazardous, nor to explain how they could cause harm.**

# What EMFs do power lines produce?

Compare these figures to the ICNIRP basic restrictions for exposure: **9000 volts per metre** and **360 microteslas**.



Figures shown are typical. Measured EMFs will vary for each installation, and magnetic fields will vary depending on how much power is carried on the line.

## Why are there recommendations on exposure to EMFs?

We can't easily avoid EMFs, as western society has become dependent on technologies that produce them.

But too much of anything can affect human health. This applies to every aspect of our lives; from the food we eat, to how sedentary we are. It also applies to EMFs: at high levels of exposure there are harmful effects.

Because of this, health and regulatory authorities recommend exposure limits for extremely low-frequency EMFs.

**However, forty years of research has found no hazardous effects from long-term exposure to low levels of EMFs.**

This includes the small amounts of extremely low frequency EMFs produced by electricity.

This occurs in home appliances and domestic wiring as well as overhead lines, underground cables, and substations.

## What are the recommendations on exposure to EMFs?

SONI operates the transmission grid to stringent safety recommendations. National and international agencies make these recommendations. They do this independently of any grid operator.

Several of these recommendations come from the International Commission for Non-Ionizing Radiation Protection (ICNIRP).

This is an independent body, funded by public health authorities around the world.

ICNIRP has investigated the safety of EMFs for decades, and provides guidance on safe levels of exposure.

## We design the electricity network to make sure that public exposure to EMFs complies with ICNIRP guidelines.

The diagram on this page shows the levels of EMFs measured near power lines at various distances.

As you can see, levels of EMFs near electricity infrastructure drop considerably as you move away from the lines.

The levels of the electric field depend upon the line voltage, while the magnetic field depends on how much power is being transmitted.

The figures shown are based on the overhead line structures we use operating at typical line loads.





## Want to know more?

This leaflet is SONI's summary on this topic. If you want to investigate further, here are some useful links to information on EMFs from national and international agencies.

**International Commission  
on Non-Ionizing Radiation  
Protection: EMFs**

[http://bit.ly/ICNIRP\\_LF](http://bit.ly/ICNIRP_LF)

**International Commission  
on Non-Ionizing Radiation  
Protection: Power Lines**

[http://bit.ly/ICNIRP\\_Lines](http://bit.ly/ICNIRP_Lines)

**World Health Organization**

[http://bit.ly/WHO\\_EMF](http://bit.ly/WHO_EMF)

**European Commission**

[http://bit.ly/EC\\_FAQ\\_EMF](http://bit.ly/EC_FAQ_EMF)

**Public Health England**

[http://bit.ly/UK\\_EMF](http://bit.ly/UK_EMF)

**US National Institute of  
Environmental Health Services**

[http://bit.ly/NIEHS\\_EMF](http://bit.ly/NIEHS_EMF)



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