

Evaluating the EMF environment for a healthy home

A good electrical (EMF) environment is one of the important factors in a healthy home. This article is a guide to what to look for when considering buying or renting a new home, buying an empty lot to build a house on, or evaluating the home you already live in. Links to additional information are provided at the end of this article.

Keywords: How to find a low EMF home, low EMF house, healthy house, EMF evaluation, electrical sensitivity

Introduction

There are many factors which make a home environmentally healthy, such as low levels of mold, heavy metals, pesticides, air pollution and noise. The electrical environment is another important factor, especially for people who are particularly sensitive to electromagnetic fields (EMF).

The electrical environment of a home can contain magnetic fields, electrical fields, dirty electricity, radio waves and other types of electromagnetic fields. These are all important to the health and well-being of humans and pets.

The importance of the various factors depends on the individual. A healthy person can accept higher levels of electromagnetic radiation than someone who is sensitized. Fetuses and children may also be more affected by EMF than adults.

Some people are more sensitive to specific frequencies, such as coming from cell phones and Wi-Fi, while others are more sensitive to the frequencies coming from power lines or dirty electricity or other types of radiation.

Everyday life involves risk. We choose to drive a car for the mobility and convenience it affords, and also accept the risk of a car accident. The individual will have to weigh the benefit against the risk. However, people who get severe symptoms from a house should probably not continue to live in it, unless the problems can be mitigated.

Getting ready to inspect a house

Bring a clipboard and blank pieces of paper when you inspect a house. Write down what you observe.

You can use a scoring system to help you compare houses you are considering. For each problem you find, give it a score from 1 (very minor) to 5 (unacceptable). Then add up the scores for an overall number. No place is perfect, especially in a populated area. Consider bringing this article along to help you remember what to look for.

Bring a flathead and a Phillips screwdriver and use them to open any panels you see. Take your time. Come back if you need to. Don't let a seller rush you.

You may need to bring a helper who can look into the attic, crawlspaces and other difficult areas for you. A building inspector can do this for you. A helper can also chat up the seller, so you are less distracted while looking around.

Consider buying some instruments to help you evaluate the radiation level. See the Resource section at the end for details.

Hiring inspection help

Hiring a home inspector can be helpful, especially one who has experience with healthy house evaluations. An inspector should at least be able to check for basic health issues, such as water damage (i.e. mold) and crumbling electrical insulation.

There may be EMF specialists available in your area. They should be able to measure the various types of EMF in the house and point out problems. The quality of such specialists can vary dramatically. EMF consulting is still a "wild West" situation, with some operators having little experience and little fundamental understanding. There is no certification that guarantees competency. Some charge a lot of money for trivial advice, a few are very good and only ask for gas money. One homeowner had three specialists look at her house; they found different problems and their advice varied as well. Be wary of consultants who also sell things, as they tend to be focused on the issues that their wares may help with, and little else.

Visit multiple times

It is best to look at a property multiple times, preferably at different times of the day and the week. Keep in mind that the job of a realtor or a rental agent is to sell or lease the house. They are not your allies and can be very adept at steering you away from trouble areas. Their presence is also a distraction that makes it harder to take the time and attention needed for a thorough inspection of the property.

Some realtors will allow you to do a second visit on your own. If you are interested in the property, try to arrange such a solo visit. At least visit the neighborhood and look at the neighbors without a realtor.

Checking the area

Drive around the general area and look for potential problems, such as:

- “tall” power lines
- substations
- power plants
- large wind turbines
- solar power plants
- industrial plant connected to a large power line
- police stations
- fire stations
- transmission towers (cell, radio, TV, etc.)
- military installations
- airports

There is no fixed “safe” distance from any of these problematic installations. The distance you’ll need depends on the situation and your level of sensitivity.

If the house is located in suburbia, there will be so many other smaller sources of EMF nearby that a single, larger source further away may make little difference. If you needlessly demand a great distance to all sources of EMF that you can see, your housing options will be much fewer.

Power lines create electrical and magnetic fields. The taller the towers, the stronger the electrical field. The more wires hanging from each tower, the stronger the magnetic field can be (wires connected together count as individual wires).

There are many types of antennas in use, such as for cell phones, wireless internet service, radio, television, police, military, aircraft, microwave links, etc. Most of them transmit in all directions from the tower, but some have directional antennas (usually round parabolic antennas or horizontal “sticks” with crossbars).

Some antennas are difficult to see. They can be concealed as trees or flag poles, or mounted on the top of roofs or inside church towers. Some areas have small low-powered transmitters on utility poles.

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The higher the antenna is above the terrain, the more powerful it usually is. If an antenna is on a hill, consider the height of the hill as part of the tower height.

The more “rods” or “pods” on a cell tower, the more powerful the radiation is likely to be.

It is generally cheaper and simpler to add more antennas to an existing tower, than build a new one. Consider future expansion of existing towers. Use www.antennasearch.com to locate most commercial transmitters in an area (USA only).

Police stations usually have transmitters to communicate with their police cars. These can be quite powerful, but may not be.

Large wind turbines and solar power plants have big inverters, which dump high-frequency dirty electricity onto the electrical lines and likely also on the ground currents. Some wind farms use wireless communication for their monitoring, though buried cables are very common.

The following table gives loose guidelines for reasonably safe distances, based on the EMF issues. People who are very sensitive may need to live in the open country and at yet greater distances.

	Suburbia	Open Country
Substation	½ mile (800 m)	1 mile (1600 m)
Tall power line	½ mile (800 m)	1–2 miles (1600–3800 m)
Small radio transmission tower	½ mile (800 km)	2 miles (3 km)
Large or tall radio transmission tower	2 miles (3 km)	5 miles (8 km)
Police station	¼ mile (400 m)	1 mile (1600 m)
Power plant	2 miles (3 km)	5 miles (8 km) (see below)
Large wind turbine	½ mile (800 km)	1 mile (1600 m) (see below)
Solar power plants	¼ mile (400 m)	1 mile (1600 m)

The safe distance to power plants and large wind turbines is probably larger than what is needed electrically. The air pollution from a power plant will reach further than the ground currents. Large wind turbines emit noise and infrasound, which can be bothersome at greater distances, as well.

The neighbors

Empty lots will not stay empty forever. Consider where a house can be built on an empty lot, and assume it will be. Some people have bought empty lots as buffer zones around their home.

Simply assume that all the neighbors have a wireless network and various wireless gadgets. If they do not now, they may later, or whoever lives there in the future may. Young children will demand all the wireless gadgets when they get older.

It has occasionally been possible to talk a neighbor into using a cable instead of wireless networking, but in many cases it generates ongoing resentment. Don't rely on the neighbors' cooperation.

Assume the electrical meters on the neighbors' houses are, or will be, smart meters. The two most common types are wireless and PLC.

Wireless meters tend to radiate the strongest out the front and less from the sides and back. They can typically be measured above the ambient din out to about 100 ft (30 m) from the front and can affect sensitive people further than that. A meter can be hidden by shrubbery or other obstacles. Walls, bushes and trees do not block the wireless signals, unless very dense.

PLC meters communicate by putting dirty electricity on the neighborhood grid. This can be a big problem for some sensitive people, and may be impossible to mitigate.

Look for antennas on the houses in the area. TV antennas pointing at the sky should be fine, as long as they are about 75 ft / 25 m away.

Some antennas are used for wireless internet service from a nearby tower. Those typically look like a vertical pizza box or a fully vertical dish antenna. These should not point towards your house.

A radio amateur ("ham") will often have rather large antennas that can be rod-like or long wires between poles. Do not live near a radio amateur.

There are innocuous antennas too, such as old analog TV antennas and modern pizza box TV antennas. Consider casually asking a neighbor what a strange-looking antenna is for.

If the next door neighbor has a solar electric system, that may be a concern, as the inverter and charger puts out strong dirty electricity. If you share a transformer with that house, the dirty electricity can travel into your house as well. The dirty electricity can radiate off the solar panels and the house wiring for shorter distances. Some very sensitive people are affected up to about 200 ft (70 m) from such a system.

Talk to the neighbors

Visit the neighborhood on a weekend afternoon or warm evening, when people might be outside and easy to start a conversation with. Walk around the neighborhood and just say “hi”.

You can learn important information from a casual conversation. Be aware that close neighbors will likely know the seller of the house and may wish to help with the sale by withholding information. It can be helpful to talk to people living a little further away.

Don't bring up your sensitivities. Instead, casually tell them you like the area and ask whether they know about any new development underway that could depress the property value in the future. That is a common concern, and most people agree that cell towers, power lines, factories and wind farms are unsightly.

Ask the neighbor if internet services are available, and if there is more than one vendor. This should reveal if wireless services are available, and a possible hazard. Some areas do not have wired internet service, which you may want to have.

The electrical service to the house

Look at how electricity gets to the house. Underground wires are generally the best. A single cable hanging from poles is second best. Separated wires on poles are the worst.

In some older neighborhoods, underground cables can create excessive ground currents. This is only a problem where the utility installed buried cables with an uninsulated neutral wire, which later corroded. This practice was common in the United States in the 1970s, and has probably not been done since about the mid-

1990s. The common practice today is a fully insulated cable in a buried plastic conduit.

It is probably not possible to see if there are these uninsulated cables in the ground, but a building inspector may know. If in doubt, measure the ground currents with a gaussmeter (see later).

Locate the transformer serving the house. It is best if the house has its own transformer, as that reduces dirty electricity coming from the neighbors.

It is best if the electrical meter is mounted on a garage or a pedestal in the yard, instead of on the house. If it is a wireless meter, the front of the meter puts out the strongest signal and should not point at your house.

If the electrical meter is on the opposite side of the house from the transformer, then there are probably ground currents running under the house (between the ground rods).

If there is a well, it is best if it is on the same side of the house as the transformer and electrical meter, to avoid ground currents under the house.

Open up the breaker panel on the house. Does it look tidy, or does it look like it has been modified by someone later on? Unprofessional modifications can cause a lot of wiring errors which may produce strong EMF inside the house. Wiring errors can be difficult to locate and correct.

A small house will need at least a dozen breakers, a large house may need two dozen. Fewer breakers means fewer circuits, and more current in each circuit travelling greater distances. With more breakers, it is also practical to disconnect some parts of the house, if needed. So the more breakers, the better.

Gas and water

Utilities are beginning to upgrade or replace their meters with wireless devices to read the usage automatically. If the meters on the house are not wireless yet, they may be in a few years.

Metal gas and water lines can carry stray currents, which can create elevated magnetic fields in the house. This can usually be blocked by inserting a piece of plastic pipe, called a dielectric coupler.

The electrical system inside the house

If it is an old house (before about 1960), make sure to ask the building inspector to check whether there is knob-and-tube wiring inside the walls. Such old wiring produces high magnetic fields and must be replaced.

If it is an older house, unscrew faceplates on outlets and especially ceiling lights. Look to see whether the insulation on the electrical wires is crumbling. Also look at the wires in the attic and any crawlspace, if possible. Rodents may have chewed on the wire insulation.

Check that all wall outlets have three prongs, i.e. there is a ground available. The electrical field is lower when there is a ground wire.

See if the house has been added on to later. Such additions have a higher likelihood that wiring errors can cause high EMF from the wires. Additional electrical panels in a house often indicate additions, unless the house is very large.

The communication systems

Does the house have a telephone landline? Some houses do not. If not, can one be installed? Some neighborhoods do not have landline service at all.

Locate the telephone box on the outside wall of the house. It is best if it is not on the bedroom wall, especially if it will be used for internet access (DSL/ADSL).

If internet access is needed for a computer, check that it is available by landline (coax, DSL/ADSL, FiOS). Wireless internet services from satellite, WiFi, etc., are much more difficult to install safely.

If any kind of satellite television, satellite radio or wireless internet service must be used in the house, much thought must be put into the installation to minimize microwave exposures. The antenna should be installed in the yard, away from the house and not pointing towards it. Any equipment and cables associated with such systems must be placed/routed away from the bedroom and only be on when actually used (use a power strip to turn off). Additional steps may be needed, which will require expert advice. Even then, it may still be harmful to very sensitive people.

Solar system

It is becoming common to have solar panels on the roof to generate electricity. Such systems use an inverter and other electronics which generate EMF and powerful high-frequency transients (dirty electricity).

Old-style DC-only off-grid solar systems are often fine, but such systems are now rare.

Solar systems for space heating or to heat water may be fine, depending on the location of the pumps and electronics. Some of these systems operate without electricity.

The bedroom

The bedroom is the most important part of the house. It must be as safe as possible to allow for a restful and rejuvenating sleep, as that is usually the time that we are the most sensitive.

Keep in mind that EMF is not blocked by walls, so check what is on the other side of them, as well as above and below the bedroom.

No appliances or electronics should be adjacent to the bedroom, unless they are turned off during sleep. This includes:

- breaker panel / fuse box
- electric / gas / water meter
- television
- computer
- electric water heater
- furnace
- electric space heater
- refrigerator
- stove
- air conditioner
- washing machine
- pumps
- any other electrical device

Do not rely on any built-in “off” switch. Many do not fully turn off the equipment. Instead, use a power strip with a real mechanical switch.

If possible, check how the electricity comes from the breaker panel to the appliances. Does the wiring go through the bedroom or other places you will spend a lot of time? Wires usually go the shortest route, either above the room or below it.

It may be possible to re-route the wires, so they do not run through the bedroom. Another possibility is to place them in steel conduit.

No breaker panel should be on the bedroom wall (outside or inside).

Metal roofs and walls

Metal roofs and siding are common in housing for people with MCS, as these materials are chemically safe, do not grow mold, need no upkeep, and are affordable. Many people who are highly electrically sensitive do very well in metal houses, but some do not.

Metal surfaces reflect EMF. This means that a metal house will tend to shield radio waves from the outside, especially if the doors and windows are also shielded. It also means that EMF generated inside the house will tend to bounce back from the walls.

People who are very electrically sensitive tend to be more affected by computers, televisions and other electronics when inside a metal house.

If the house is not wired correctly, stray currents can travel on the metal structures of the house (metal studs, metal siding, metal roof), which can create elevated electrical and magnetic fields.

There are other possible effects, which are not all well understood, and which seem highly individual.

Many people who are severely electrically sensitive do well in metal houses, as long as they are built correctly and the EMF levels are low. A few people are profoundly affected by metals, even when there are no EMFs present.

Measuring the house

It can be helpful to measure the EMF levels inside and outside a house. You can hire a specialist to do it, or you can do it yourself.

There are many kinds of EMF, and it will take several instruments to cover most of them. The most important types can be measured with three or four

instruments. Be careful focusing on only one type of EMF, as others may be just as important.

Some people are more sensitive to specific types of EMF than others. Just because the instruments show low readings doesn't guarantee that the house is safe for a specific person. The instruments may not measure what the person is most sensitive to, or the person may be more sensitive than a low-cost instrument. This happens regularly.

We have provided detailed instructions on how to measure a house in a separate article. The link is in the Resource section at the end of this article.

Test the house by sleeping in it

People who are hypersensitive should consider sleeping in a house before buying it. It is during sleep that we are the most sensitive. A house that feels fine in the daytime may be intolerable at night.

If possible, stay in the house for a week. Some symptoms take days to develop.

Trying out a house is common in the MCS/EHS market, but unusual for the mainstream. If a trial cannot be arranged, consider sleeping on the porch, in a tent or a car next to the house, to be sure you do well in that area.

If you have trouble sleeping during a test, try to turn off as many breakers as possible. If that works, the problems can usually be fixed.

If the area is so polluted with EMF or fumes that you cannot be outside, then it's best not to move there.

Parting words

Choosing where to live is a big decision, and involves other important issues, such as distance to family and support.

Some people are so sensitive that they cannot live in a city. Many city-dwelling EIs have come to that conclusion and moved away. Some wish that they could move back, others have found that life in the country can be quite pleasant, even if Whole Foods is a hundred miles away.

In the end, remember that if you can't live in a house, you can't live in it.

Resources

The website www.eiwellspring.org has several articles with more information on EMF measuring techniques, mitigation of EMF problems, etc.

For instructions on how to measure EMF, we suggest:

- *How to measure the EMF in a house*
www.eiwellspring.org/ehs/HowToMeasureHouseEMF.htm
- *How to measure EMF*
www.eiwellspring.org/HowToMeasureEMF.htm

The book *Tracing EMFs in Building Wiring and Grounding*, by Karl Riley is an excellent how-to manual for finding and correcting stray currents and ground currents. It is written for electricians and requires basic understanding of wiring practice.