Buying an 'EMF safe' Property

This article is separated into 6 sections, each of which can be individually downloaded. It is a 'work in progress' incorporating new information whenever time permits.

Section 6

EMFs inside buildings (including flats and caravans)

1. Introduction; The need for more housing and potential EMF effects; Powerfrequency EMF exposure sources; Radiofrequency EMF exposure sources; how microwaves reflect off building surfaces and into buildings; impact on property value; location maps; in the face of uncertainty, measure and take action if necessary; references

2. Powerlines and pylons; when are powerlines 'needed'?; an easement; a wayleave; references; equipment for measuring powerfrequency electric and magnetic fields; summary of safety points to do with powerlines; powerlines worksheet (2 sides)

3. Substations and transformers; junction boxes; net currents; stray currents; references; equipment for measuring powerfrequency electric and magnetic fields; summary of safety points to do with substations and transformers; substations and transformers worksheet (2 sides)

4. Electrified railways; overhead lines; third rail; diesel; references; summary of points to do with railway lines; equipment for measuring electric and magnetic fields; meters for measuring microwave radiation; electrified railways worksheet (1 side)

5. Mobile Phone base stations or masts; what base stations may look like, including hidden ones; effect on house prices; distance from the source where the microwave radiation meets the ground; drums; TETRA antennas; amateur radio operator's equipment; equipment for measuring microwave radiation; summary of safety points to do with mobile phone base stations; Mobile Phone Base Stations worksheet (2 sides)

6. EMFs inside buildings (including flats and caravans); wiring; electrical appliances; caravans; summary of safety points to do with your home, school, office, etc.; equipment for measuring electric and magnetic fields; equipment for measuring microwave radiation; EMFs inside buildings worksheet (2 sides)

EMFs inside buildings (including flats and caravans)

In the UK the average typical background level of magnetic fields is about 0.04 microtesla; about one-third of our background exposure at home to levels of electromagnetic fields higher than 0.3 microtesla comes from house wiring and electrical equipment and appliances. Electricians only have to adhere to IEE regulations, which do not consider the need to wire properties to ensure low levels of EMFs are experienced by the occupants, so the property can be wired perfectly legally and still produce an unhealthy EMF environment for those who are susceptible. Some forms of electric heating can also result in high fields. We heard of one house in which the way the heating was wired resulted in magnetic field levels of over 2 microtesla.

For information about the detection of 'stray' and 'net' currents, which can produce high magnetic fields in homes, see Section 3, Substations and Transformers.

Some office buildings and blocks of flats contain a substation. This can give off high powerfrequency EMFs in the floor immediately above or below and, to a lesser extent, to the side of the substation. This is covered in more detail in Section 3. Substations and Transformers.

Wiring

Old ways of putting wires into metal conduit resulted in very low fields. When wires in plastic coatings began to be available, conduits were used less as they were more expensive. "Ring" circuits, as used in the UK, always give rise to higher magnetic fields than simple "radial" or "tree and branch" wiring, systems which are favoured in other countries.

We anticipate that the dominant system in the UK will change over the next few years to the radial, or 'tree and branch' system which is more common in Europe. This will make some of the high EMFs generated by faulty ring mains less common.

For more details on house wiring for low EMFs, see the article "Your low EMF Home 1. House Wiring".

First floor rooms may have high fields on the floor, where young children may play, from downstairs lighting circuits. It is a good idea to check the levels, using one of the meters described on page 5, if your child is going to spend much time like this.

In multiple occupancy buildings, such as flats, apartments or maisonettes, the lower floors can have wires to upper floors running past their rooms, which can result in high fields in the lower flats. Upper floors may have high fields due to lighting circuits in the flat below.

There will be high EMFs from the meter cupboard, where the electricity supply enters the building. The more meters there are in the cupboard (e.g. in a block of flats) the higher the fields. The new type of 'smart' meters now being installed, transmit data about electricity use to facilitate meter reading and thus ensure more accurate bills. See the article "Your low EMF Home 4. Smart Meters." They will also be able to interact with many of your white goods to enable them to operate at times of low electricity cost and to help even out demand. The meters transmit RF signals to communicate either with radio vans (transmitting very infrequently to provide information for accounting purposes) or through the mobile phone network (for monitoring unit cost and appliance usage, transmitting most of the time). This is becoming more necessary as electricity usage increases and the supply of electricity is being stretched to capacity. It increases the level of RF radiation in the home. With predicted temperature changes & population expansion and more water needed, especially in some areas, this smart metering is likely to be installed to also monitor and regulate water supply.

Where a building has a lift, whether it is a standard lift in a block of flats, or whether it is a stairlift for people with a mobility problem, there will be high levels of magnetic fields from the machinery powering the motor. When considering a flat, it is worth looking at how far away the machinery is from the living space. It is probably advisable to measure field levels in bedrooms and sitting areas. With a stairlift, the benefits are likely to outweigh the disadvantages, but caution should be used in allowing eager children and grandchildren to 'hitch' rides.

Office buildings may have had a lot of metal in the construction, and this can distort the magnetic fields from the wiring in the walls.

If you are concerned about the level of potential exposure from lifts, wiring and consumer units, you may want to measure powerfrequency EMFs in the flat, especially in bed areas and areas where chairs in which you sit for any length of time are to be placed.

Radiofrequency (RF) EMFs are becoming all pervasive in cities and towns. It often happens that wires carrying electricity can pick up RF signals and transmit them down the wires carrying electricity. This can result in cables emitting both PF EMFs and also RF EMFs.

RF can also be picked up by telephone cables. A simple ADSL filter & ferrite can prevent this from being radiated from the cable and handset.

The switchover from incandescent bulbs to energy saving fluorescent bulbs has led to fierce debate as many people are sensitive to the new type of bulbs and find that they have very uncomfortable and painful symptoms when exposed to them. Many of these bulbs emit RF radiation in use. This is discussed in the article "Your low EMF Home 3. Lighting."

Electrical Appliances

All electrical appliances give off electromagnetic radiation when in use. The most common of these are included in the article in 8 sections "In your Home" in the EMFields library. We include a few of these below which you may not have thought of and which are worth checking.

Any appliance which has a motor and/or heater will give off high levels of EMFs. This can be quite an important consideration with regard to using equipment such as hair driers which are held very close to the head. The pineal gland, which is responsible for body repair, immune system support and mood control is situated in the head. The release of the hormone, melatonin, which the pineal gland produces to perform these functions, is reduced when exposed to power-frequency EMFs. See the EMFields article on "Melatonin".

There is a vast increase in pulsing radio communications devices of all sorts being bought and installed in people's homes. These include digital cordless phones (DECT) and wLAN (Wireless Local Area Network) systems for desktop and laptop computers. Some laptops and broadband systems come with a wireless router as standard. You will need to look carefully at the instructions manual to disable it and phone the manufacturer if it is not clear how to do so. They may also have a bluetooth capability. It can be disabled, and you will need to look at the manual to do so, as it will have to be done differently to the WiFi process. Modern DECT phones and their base units emit continuous microwave radiation even when not being used for phone calls and this exposes people to higher levels than most people will be exposed to from a base station. These fields can extend into bedrooms immediately above the phone, which may be important if a child plays on the floor of that bedroom. The field will also extend sideways to other rooms near the phone. It may be wise to measure the phone and base unit and decide whether you want to have such a source of microwave radiation in your home. An old-fashioned wired phone is

free of radiofrequency radiation, except potentially through the incoming cable and this can easily be stopped with a clip-on ferrite.

The RF radiation from DECT phones (see the separate article for details) and wLAN systems can extend into your house from a neighbour. If you hire one of the measuring instruments described below, you can check whether you are being exposed to high levels of pulsed microwaves by your neighbours.

wLANs and WiFi systems in schools have received a lot of media publicity, as the sort of radiation children are exposed to in the classroom can equal or exceed the radiation from the main beam of mobile phone base stations. The original Stewart report in 2000 recommended that '*the beam of greatest intensity* [from a base station mast antenna] … *should not fall on any part of school grounds or buildings*', due to concerns about the potential adverse health effects on children who are more vulnerable to radiofrequency EMFs.

Some baby monitors (including sensor pads) use microwaves. Digital units emit higher levels of RF than analogue ones. If your baby is restless and does not sleep well on or near one of these, you may wish to measure the RF levels and consider replacing it if these are high.

Microwave ovens need an annual check to ensure there is no leakage of microwaves when in use. They also give off fairly high levels of power-frequency fields, including from the power cable. Keep at least a metre away when they are working. We suggest that the young and those with poor immune systems keep out of the room whilst they are in use.

Some burglar alarms use microwaves to detect intruders. If you have such a system, make sure you disconnect it if you are having a barbecue in the garden as many systems can still be radiating, even when it is not active.

Many white (electrical) goods (and most cars (see separate article on transport)) contain 'bluetooth' technology, which may mean that they are a source of microwave radiation.

Caravans

Care must be taken before obtaining a caravan if it is intended to provide a shield against microwave radiation. A caravan with shielding window curtains would be excellent provided it is an aluminium covered caravan. Some modern ones use various plastic materials instead of aluminium for the outer skin and they would be useless for screening purposes.

Summary of safety points to do with your home, school, office, etc

- Check house wiring for electric and magnetic field levels. Measure field levels in bedrooms where pillows are, where your favourite seats are and on the floor of children's bedrooms.

- If you are buying a property which is part of a multi-occupancy building (flat, bedsit or maisonette), check where the meter cupboard is. You do not want a bedhead next to this. Neither would you want to have your desk in this position in a work environment.
- Check if you have a 'smart' meter and whether the monitoring capability can be disabled, should you wish to do so, leaving the meter reading capability only. Disabling the monitoring capability may well make your electricity bills significantly higher.
- Check where the machinery operating the lift (if there is one) is, and sit and sleep as far away as is practicable. Ideally measure the fields. Check where your work space is in relation to such equipment if relevant.
- If you have a DECT phone giving off high levels of microwave radiation 24 hours a day, you may want to measure RF field levels to see what you may be exposing the people in your house to.
- Check the EMF levels of your baby monitor system, if you use one.
- Have your microwave oven (if you feel you need to use one), checked annually, and keep out of the kitchen when it is working.
- If you wish to purchase a burglar alarm system, models using infrared methods to detect movement do not give off microwave radiation. Choose one that has to be 'wired in' rather than one where the sensors communicate with the control unit using microwaves (these are cheaper to install as they don't need wiring together, though they need expensive batteries changing annually).
- If you have a wLAN system in your house, or you are unsure whether your laptop is wirelessly enabled (many come this way as standard), you may want to measure the RF levels and disable the wireless option. Wired internet access systems are not associated with high RF exposure. dLANs may also be an option if you do not want wires.
- Check whether your office or your child's school has a wLAN system, especially if you (or they) have been experiencing some of the effects associated with RF exposure, such as memory and learning difficulties, behaviour problems, irritability, etc.
- You may want to check the EMF levels before you buy a new car. Many models give off high levels of magnetic and radiofrequency fields that people find very uncomfortable to travel in.

Equipment for measuring electric and magnetic fields

ELF meter (to hire)

MagneMeter (to buy only)

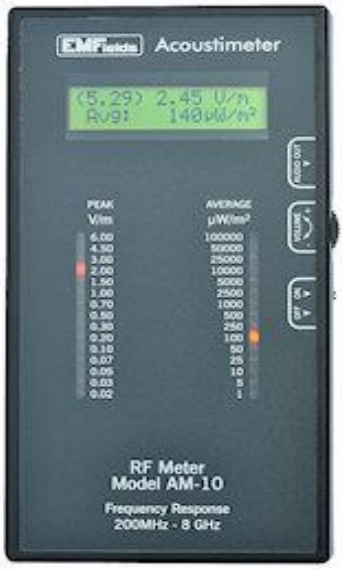
To measure both electric and magnetic fields, you can hire the ELF (PF4) power-frequency meter or to measure magnetic fields you can buy (but not hire) the MagneMeter. Both instruments have been designed by Alasdair Philips (Powerwatch) and Andrew Cohen (EMFields).

The ELF meter measures 1 - 2000 V/m electric fields and 0.01 - 19.99 microtesla magnetic fields.

The MagneMeter measures 0.02 - 2.0 microtesla magnetic fields.

With either of these meters you can measure the powerfrequency EMFs in your property or the property you are considering buying, outside in the garden, inside your car and in other places of concern (schools, nurseries, etc.) from internal sources of EMFs.

Equipment for measuring microwave radiation



Acoustimeter (to buy or hire)

Acousticom 2 (to buy only)

You can buy or hire an Acoustimeter microwave meter. The readings are shown on both an LCD display and two series of graduated LED lights, which display peak, peak hold, and average levels of radio frequency electromagnetic fields. The LEDs update rapidly, and allow you to quickly gauge the levels in an area and find any hot-spots. The LCD display offers high accuracy with a lower update speed, giving you time to take note of the readings.

You can buy an Acousticom 2, which displays peak levels of radio frequency electromagnetic fields. See the reviews to see other people's opinions of this meter, don't just take our word that it is a really useful piece of equipment.

Using either of these meters, you can check the field levels from mobile phone base station masts, WiFi or WiMAX systems near your property or the property you are considering buying, outside in the garden, and in other places of concern (schools, nurseries, etc.). You can also measure fields from mobile phones, DECT phones, baby monitors, cars, wireless computer networks, microwave ovens and some burglar alarm systems, including those you may be exposed to from your neighbour's homes.

They are easy-to-use, hand-held and arrive complete with instructions for use. They come in a lightweight handy carry bag. They are intended for the non-scientist who needs to have no understanding of the physics or technology involved. For details of the cost of hiring or buying, contact EMFields, 12, Mepal Road, Sutton, Ely, Cambs. CB6 2PZ - www.emfields-solutions.com - 01353 778814.

Instruments are sent out by 1st class recorded delivery.

Worksheet EMFs inside buildings

Flats

On which floor is the flat you are considering? How many floors are there altogether?

…….. Floor …….. Floors altogether

How far away is the meter cupboard from the nearest part of the flat? From where the bed(s) will be? From where chairs will be?

…… feet (metres) …… From the bed(s) …… From chairs

How far away is the lift machinery from the nearest part of the flat? From where the bed(s) will be? From where chairs will be?

…… feet (metres) …… From the bed(s) …… From chairs

Do the electricity cables (riser) to upstairs flats pass next to your flat? Yes / No

What are the field levels at these places?

At the nearest point of the flat to any external power source -
…… volts per metre (electric field)
…….. microtesla (magnetic field)

Where the bed(s) will be -
…… volts per metre (electric field)
…….. microtesla (magnetic field)

Where the chairs will be -
…… volts per metre (electric field)
…….. microtesla (magnetic field)

Are any of these fields more than 0.2 microtesla (0.1 microtesla where the bed(s) will be) or more than 5 volts per metre?

Is there a mobile phone base station or stations visible from any of the windows? Yes / No

Microwave field levels where the bed(s) will be -

…… volts per metre

Microwave field levels where the chairs will be -

…… volts per metre

High sources of microwaves could be from DECT phones or wireless computing networks in an adjacent flat.

Wiring and appliances in the home, office, etc.

Wiring

Measure the electric and magnetic fields created by the wiring, at about 3-6" from the walls, and check where they fall to background levels.

Are bedheads or chairs placed at levels of low fields?	Yes / No
Can you move any that are in higher than ideal fields?	Yes / No
Are the field levels on the floors of children's rooms at an acceptable level?	Yes / No
Are the field levels at head height in the kitchen at an acceptable level?	Yes / No

If you feel that there may be problems due to the wiring, see "Your low EMF Home 1. House Wiring."

Make a list of the appliances you use (include mobile and DECT phones, charging units, WiFi systems, electronic toys and games, transformers, low-energy bulbs, etc)

You may want to focus on those appliances that are used most. For an overview of many appliances see 'In Your Home' in 8 sections.

Measure the field levels to determine how far you need to be away from these EMF sources to be precautionary. In some cases, you may want to question whether using the appliance is necessary in view of the exposure you or a family member may be subjected to.