In your home

The In your home set of articles article is separated into 8 sections, each of which can be individually downloaded. It is a 'work in progress' incorporating new information whenever time permits.

Section 7

Appliances S-Z

1. Introduction; powerfrequency (ELF) EMFs; radiofrequency (RF) EMFs; measuring EMFs; the importance of timing

2. Appliances A-C; air conditioners, amateur radio transmitters, amplifiers, electric guitars and keyboards, aquarium, baby monitors, bath hoists, battery operated equipment, battery re-charging mats, beds, blood glucose monitors, bottle warmer, bra, burglar alarm, camcorder, carbon monoxide detectors, CD player, central heating, motor-controlled chairs, clock radio, clothes dryer, coffee grinder, coffee maker

3. Computers; monitors (Visual Display Units or VDUs), wired and optical mice, health effects, laptop computers, wireless enabled laptop, PDA (Personal digital assistant), computer wireless LAN (local area network), Schools' reactions, parents, broadband, computer games consoles, tablets, computers and Electrical Hypersensitivity (EHS), protection devices against EMFs from computers

4. Cooking; electric ovens and hobs, microwave cooking, barbecues, deep fat fryers

5. Appliances D-H; dehumidifier, dishwasher, doorbell, electric (el) blankets, el can opener, el clock, el drill, el guitar, el kettle, el knife, el lawn mowers, el shavers, el shower, el toothbrush, el vehicles, electricity meter, exercise machine, extractor fan, fan, fax machines, fire alarm, fitness devices, floor polisher, food processor, foot spa, foot & hand warmer, fridge, fridge/freezer, hair curlers/tongs, hair dryers, headphones, hearing aids

6. Appliances H-S; heart pacemakers, heaters, central heating boilers, heating pads, hi-fi, etc., hostess trolleys, immersion heater, iron, Jacuzzi, musical keyboard, lift, loudspeaker, magnetic field therapy mats, meters, mixer & blender, music centre, nightlights, pagers, PDAs, pencil sharpeners, personal alarms, personal radios, pet fences, photocopiers, plasma balls, power tools, printers, projectors, radar, radios, radio transmitters, sandwich maker, sauna, scanner, security systems

7. Appliances S-Z; sewing machines, smoke detector, sockets, solar panel water heating, solar photovoltaic panels, soldering irons, spinners, stairlift, static electricity, sun beds, sun lamp, tea maker, telephone, television, TV and radio transmitters, TENS unit, toaster, toys, transformers, trouser press, tumble drier, typewriters, vacuum cleaners, vagina speakers; washing machines, washer/dryer, waste disposal unit, water filters, water heater, water softener, water supply, wheelchairs, wristwatches

8. Grounding & 93 references

Sewing Machines

The motors give off high magnetic fields. Some machines with two-core mains cables give off high electric fields as well. Increases in the incidence of brain tumours in the operator's children (Li 2009) have been detected in machinists using industrial machines. There is some concern about the effect on breast cancers. High EMF exposure is more likely in older sewing machines (Szabó 2006). There does not seem to have been research into domestic machine usage.

Smoke detector

There are many types of these. The most common type are powered by a 9 volt battery and do not give off any EMFs, however they do use a very low level radioactive source and should only be installed on ceilings and disposed of carefully if you renew them.

Smoke detectors feeding a central fire alarm system often have both temperature detectors and infra-red detectors built in. These are quite safe and do not give off EMFs.

Sockets

Electrical power sockets always give off electric fields. "Leakage" and / or residual damp in walls can lead to high electric field levels all over walls.

Solar panel water heating

The system itself will not be an EMF hazard, except for the electric pump used to pump the water around. This could be outside or inside the house. Keep chairs, beds, etc. on the other side of the wall, at least one metre away from the pump.

Solar photovoltaic (PV) panels

These generate a DC voltage that may be fed to a battery for storage. Increasingly they feed an inverter that transforms the low DC voltage to mains AC voltage for selling back to the electricity grid under a UK government incentive scheme. The DC cabling does not cause EMF problems. The inverter and associated cabling will give off both electric and magnetic fields and should be located ideally two metres away from areas where you spend much time.

Solar panel inverters are now, by far, the largest cause of Dirty Electricity. Most installers use cheap switching inverters to convert the DC to 230 volts AC mains and they put masses of noise from 20 kHz to 300 kHz on to the mains supply of the house and often neighbours' houses. They can measure well over 1200 mV on our deTekta DE meter., which is available for hire. There are lots of reports of sleep problems, headaches and poor concentration among people who have had systems installed. Dirty electricity filters can reduce the amount of DE in your home.

This DE can be avoided through the installation of decent pure sine-wave inverters. They cost more in the region of £1000 rather than the £700 for a nasty noisy one (but less profit for the firms who install them).

Soldering irons

Those which plug directly into the mains electricity are unlikely to be a problem. Many modern soldering irons run from a low-voltage transformer / controller unit which does give off high magnetic fields. Keep it at arm's length, if possible, when using it.

Spinners

The motors of a clothes spinner give off high EMFs. Bigger machines are used on the floor, draining into the sink via a hose. The field levels will be reasonably low at body height. Smaller units on draining boards, have smaller motors and lower fields, but potentially radiating more vital body areas as they are closer to the body.

Spot Lights

See 'Your low EMF Home 3. Lighting'

Stairlift

See 'lifts' 'In your Home Section 6 H-S'

Static electricity

Static electricity can give rise to electric shocks to your system, which should be avoided. Wear natural materials, and do not have carpets made of nylon or mostly synthetic materials.

Electric shocks when getting out of a car are due to static electricity which is generated when people slide across seat covers as they prepare to get out of it. Car seat covers are usually made of synthetic material, generating static electricity, which the driver or passenger then discharges by touching the metal body of the car. This can easily be prevented by holding onto the metal of the car, perhaps the roof or the door pillar, accessible through the door opening, as you slide across to get out. This prevents static build-up, so there is no sudden discharge.

Storage Heater

See "Heaters"in Section 6 H-S.

Sun beds

These give off high electric and magnetic fields as well as possibly dangerous levels of ultra-violet radiation. Many can give off five times as much UVA as would be expected from bright sunlight at the equator. They increase the risk of skin cancer, especially in fair-skinned people. Regular sun bed use before the age of 30 has been recognised by the International Agency for Research on Cancer (IARC) as a class 1 carcinogen. In 2010, it became an offence to permit people under 18 using a sun bed. A review by Ayala (2013) pointed out the strong association between artificial UV radiation exposure, e.g. tanning devices, and the risk of melanoma and squamous cell carcinoma. The authors concluded that precautionary measures that discourage exposure to tanning appliances are required, as is legislation to prevent their use during childhood.

Sun lamp

These, too, give off possibly dangerous levels of ultra-violet radiation. Ultra-violet is a form of non-ionising radiation that we know causes skin cancers. One study (Clough-Gorr 2008) reported increased melanoma risk with use of sunlamps, which was increased if tanning beds were also used.

Tea maker

Keep a tea-making machine at least one metre from the head of your bed. It gives off high fields when in operation.

Telephone

Ordinary wired telephones are not usually a problem as one side of the telephone system is 'earthed'. However, some electrically sensitive people do have difficulties, as they do with most electrical equipment. Many telephone companies now send RF broadband signals down telephone wires; they are very popular, and it is easier to connect someone, when it is theoretically available for every number. This causes RF radiation to be picked up and re-radiated by the telephone equipment. In this case you might get an ASDL phone line filter. The filter plugs into your ordinary phone socket and the phone is then plugged into the filter. Sometimes people choose a 'loud-speaker phone'. These are not always earthed. If you are unsure, you may want to put the speaker phone into an earthed headnet, which removes radiofrequency and electric fields coming from it.

At some point in the future it is inevitable that ordinary analogue phones will no longer be available in the UK. It will enable the analogue equipment in telephone exchanges to not need replacing and reduce the size needed for the exchange building. All telephone calls in the UK are digital once they get to your local telephone exchange and only go back to analogue at the local exchange close to the person you are calling. If your telephone call goes via Sky or Talk-Talk and you pay for broadband then your call is digital right from your house as they use VoIP techniques.

Voice over Internet Protocol (VoIP) is already widely used in the UK. Skype and other firms use it for computer-based voice and video calls. You can also buy VoIP phones, some of which also have video. If you have BT Broadband then you can use these phones for 'free' calls to other VoIP phones using your broadband connection. That will be very attractive to most people.

Most of the UK (apart from some rural areas) is rapidly being cabled with fibre-optics for speed – and that also stops 'copper cable theft' which is an increasing problem all over the world as copper supplies get rarer and more expensive. Fibre cannot be melted down and re-used and it also has ownership embedded in ways that cannot be removed – so it has little second-hand value (unlike copper).

Answerphones do not usually give off high EMFs, but most are supplied with a plug-mounted power supply transformer which does give off high magnetic fields, and should be situated at least a metre away from chairs and beds.

Car Phone

Recent brain imaging suggests that having a conversation with a remote person uses the same part of the brain as that part which is involved in recognising events outside the vehicle. The car

driver forms a visual image of the person or context at the end of the phone, which reduces their ability to be aware of the circumstances in which they are driving. We can usually temporarily 'switch off' other distractions, whilst needing to react to an external stimulus such as a busy roundabout, or heavy traffic flow on a motorway, and then switch back. When somebody else, unaware of the circumstances we are coping with is on the other end of the phone conversation, the switch is not under our control.

However, any conversation (including with a passenger) was found to affect reaction time in a simulated condition (Consiglio 2003); even the ringing of a phone affected complex reaction time and quality of a performed task (Zajdel 2012). In a study by Haque & Washington (2014) the reaction times of drivers were more than 40% longer in the group using a phone. The impairment was almost double for those with provisional licences. A reduction in the ability to detect peripheral traffic events whist distracted presents a significant safety concern.

The increase of distracted driving behaviour has resulted in an increase in injury and death. A study by Hoff (2013) indicated that people fail to perceive the dangers inherent in distracted driving. 63% of drivers believed that they could drive safely while distracted, despite the fact that 9% of the drivers surveyed reported being involved in a car accident while distracted.

Using any sort of phone while driving a vehicle slows the driver's reaction time by about as much as being just over the UK drink-drive limit.

Microwave radiation can be reflected from metal surfaces. All the people in the car, including the driver and any children, will not only be radiated by the phone being used, but also by radiation reflected off the metal surfaces of the car. One way of preventing microwave exposure being increased by reflections off the inside of cars is to install a hands-free kit with an aerial outside the car. Aerials inside the car will be nearly as bad as no aerial at all.

Cordless phones

see separate article on DECT cordless phones.

Mobile phones

We do not recommend the use of mobile phones. If you have to have one, use an air tube hands free headset to reduce your exposure when in use. Switch off between calls.

Televisions

CRT colour televisions can give off up to 0.5 microtesla (μT) magnetic field levels and 100 volts per metre (V/m) electric field levels at 1 metre distance, and black and white televisions can give off up to 0.2 μT at 1 metre distance.

Magnetic fields travel through walls, so be aware of what is on the other side when placing a CRT television next to a wall. Avoid placing bedheads or 'favourite' chairs in this position as it will expose the sleeper or sitter to unnecessarily high levels of EMFs. It is very important to keep TV sets as far away as possible in a bedroom, not only for reducing powerfrequency EMFs but also Light at Night, which has an adverse effect on health.

Televisions can give off significant electric fields.

EMFs from digital TVs are not much different in EMF levels from older analogue models, though some people who suffer from electrical sensitivity (ES) seem to find them worse.

Flat-screen LCD TVs do not generally give off significant EMFs. The most common type are driven by LEDs and are known as TFT displays or LCD/LED displays. They almost always have plastic screens.

Plasma displays are larger. They work by stimulating special gases and mercury vapour using high-energy electrons that cause them to glow. They have a deeper black than LCD screens, but always have a glass front and so are usually highly reflective to room lights, etc. Some models (if not all models) generate considerable levels of radio-frequency fields that can interfere with nearby electronics and severely affect ES people.

Smart TVs use WiFi. There should be some way of turning off the WiFi, but there may not be for some as their remote handsets are WiFi and not infra-red.

It is important to sit at least 1 metre away from the front of the screen. Children often seem to choose to sit closer and should be discouraged from doing so. In 1998, Hatch found an increased rate of leukaemia in children watching television. The more they watched, the higher the risk. The risk did not seem to be distance related, so it is likely that there would be other factors than EMFs involved.

Sky TV multiroom system communicates with other television sets using RF at 2.4 GHz. This will add to your RF exposure in the house.

Wireless televisions, which can connect to a set top box or DVD player without any cables, are now available. The set comes with a transmitter, a box the same shape and size as a DVD player. This can sit in a cupboard along with the DVD player and Freeview or Sky box or any other equipment. All the entertainment equipment, including the television aerial, then plug into the transmitter, which sends out a wireless signal to other suitable televisions in the house as long as they are within about 10 metres of the transmitter box.

Photosensitive epilepsy is a rare condition, affecting only about 0.04% of the population. It may become more of a problem as televisions have started to produce the frequencies of light which can activate the epileptic fits.

Aerial cable

These can give off significant electric fields if their metal braid is not earthed, so they should be routed away from chairs and beds.

Static electricity

As well as EMFs, televisions generate static electricity. Static electricity attracts fine and superfine aerosol particles. Research from Bristol University shows that these particles can have viruses, bacteria, and carcinogens attached. We recommend that everybody should sit at a reasonable distance from a TV screen. The static effect persists for some time after the television has been switched off.

Remote controls

These days all TV and DVD remote controls work using very low power infrared light and pose no EMF problems.

Satellite dishes and digital TV receptors

They can give off high electric fields if the TV system or satellite decoder is not 'earthed' to the mains electricity safety earth. Most TVs, DVD players and recorders and satellite systems are not earthed when you buy them, as they only have two-wire mains leads. Walls will give some protection from the electric fields; windows are less effective at screening them. People who are electrically sensitive may be affected by electric fields coming in through the windows. It is important that these systems are earthed or, at least, sit on an earthed metal stand.

Digital TV receptors for both satellite and terrestrial signals can be thought of in exactly the same way as satellite dishes and receivers. One person we know who is very sensitive indeed, found it easier when she ensured that the television set was between her and the aerial. If she sat between the TV and the aerial, her symptoms were worse.

Digital TV receivers / Digiboxes / Freeview boxes for both satellite and terrestrial signals can be thought of in exactly the same way as satellite dishes and receivers.

TV interference

Some companies, such as Connex South Eastern, the London Underground, and some other rail companies elsewhere in the UK, use Direct Current (DC) electricity to power the trains on their 3-rail systems. This can cause a high magnetic field disturbance when trains draw power. This can affect the colours on televisions in nearby houses (within about 30 metres of the line) - this is a clear indication of a severe magnetic field disturbance which might have long-term health consequences.

People have experienced analogue TV interference from TETRA mobile radio transmitters. This should reduce as the UK is fully converted to digital TV signals only.

Energy use

Ensure that you use the main switch on the set to switch off the television set when it is not in use. Some types of remote control leave your TV on standby and it continues to consume significant energy and is more of a fire hazard.

Cable TV

Occasionally, when cable systems are disconnected, cables are still left live in houses without terminators, causing the continued radiation of the house in question and possibly nearby houses with a high frequency signal. Any neighbours who are still actively connected should complain to the company who will have to come and remove the 'faulty' connection to the house cable.

Roku Streaming Player

A Roku streaming device gets data (the video stream) via a wired or WiFi connection to an Internet router. The remote control for the Roku device emits high levels of RF. It works in a similar way to smart meters, transmitting for very short periods of time, but at very high levels. The person who measured these fields with his Acoustimeter said he used to watch films with the Roku remote lying on his chest or next to him on his bed. He said that taking the batteries out of the Roku remote is not a good idea. After a while with no batteries in the Roku remote the Roku base station itself increases its transmission strength to very high levels. If you do want to take the batteries out of the remote, unplug the power cord for the Roku device itself.

Research

The American Academy of Pediatrics recommends that children spend less than 2 hours per day with screen media, because excessive viewing has been linked to a plethora of physical, academic, attentional and behavioural problems (Christakis 2004, Zimmerman & Christakis 2005b, Jordan 2006). Television viewing in childhood and adolescence is associated with poor educational achievement (Hancox 2005), overweight (Andersen 1998), poor fitness, smoking, and raised cholesterol (Hancox 2004).

TV viewing at age 4 years is associated with being a bully at ages 6 to 11 years (Zimmerman 2005a).

TV Hearing Aids

see "Hearing Aid" Section 5 D-H

TV and radio transmitters

It has been suggested by industry that living near to TV and radio transmitters is perfectly safe. Some studies have linked proximity to an increased risk of ill health, including leukaemia (Hocking 1996, Dolk 1997, Ha 2003, 2007) brain tumours (Reif 2005), melanoma (Hallberg & Johansson 2002, 2004) and other cancers (Park 2004). A Swiss radio transmitter was shut down, and a 'before and after' study (Altpeter 2006) revealed that the transmissions affected melatonin levels and sleep.

Increasing proximity to radio and TV transmitters, elevation, and line-of-sight visibility were associated with higher RF exposures (Burch 2006). In Turkey living near TV and radio towers was found to be approximately four times higher than the permitted standards (Sirav & Seyhan 2009).

Digital TV transmitters have been reported as associated with constant headaches, pressure in the head, drowsiness, sleep problems, inability to think clearly, forgetfulness, nervous tension, irritability, tightness in the chest, rapid heartbeat, shortness of breath, depressed mood, total apathy, loss of empathy, burning skin, inner burning, leg weakness, pain in the limbs, stabbing pains in various organs, weight gain.

TENS unit

A **TENS unit**, (**T**ranscutaneous **E**lectrical **N**erve **S**timulator unit), can help to exercise and relax muscles, using electrical stimulation to give rise to natural endorphins which can give pain relief. We do not consider these to be hazardous from an EMF point of view.

Toaster

Toasters are used only briefly. They give off low EMFs.

Toys

Magnetic toys can interfere with programmable shunt valves (Zuzak 2009). It may be worth checking with hospital staff if you have any concerns.

Transformers

Transformers are used whenever the mains electricity has to be stepped down to operate a piece of equipment. They are used for children's games, fish tank pumps, battery chargers, etc. They can give off very high levels of magnetic fields. Do NOT leave plugged in next to beds, especially children's beds, as it is very important not to expose children to high levels of magnetic fields while they sleep. Tomitsch (2009) found the highest magnetic field levels in houses were from transformers which could exceed 1 microtesla.

Trouser press / electric mangle

Trouser presses and **electric mangles** give off low EMFs and are not a problem over half a metre away.

Tumble drier

Motors give off high fields of several microtesla. Do not work close by these appliances and do not let children play in front of them, whilst they are in operation.

Typewriters

Electric typewriters give off high magnetic fields (due to cheap transformers), and, if unearthed, the keyboards can give off high electric fields. Switch it off at the socket when it is not being used.

Underfloor heating

see 'Your low EMF Home 6. Underfloor heating'

Vacuum Cleaners

Motors produce high magnetic fields; up to 2 µT at 30 cm. and up to 0.8µT at half a metre. The type of vacuum cleaner that runs over the floor, with an attached suction hose is better with regard to EMFs than an upright cleaner, as the motor and wires are further away from your body.

Hand-held cleaners, such as those used to vacuum furniture or cars, produce high fields right next to your body.

Vagina speakers

Pregnant women who like the idea of playing music to their unborn babies can now do so through a brand new gadget: a vaginal speaker; it turns a woman's vagina into a sound system – and connects it to her smartphone - transporting music up into the womb at a volume of 54 decibels (similar to a gentle conversation).

Washing Machines

Close to they give off high fields of several microtesla. Often pushed under work surfaces, the machines can expose vulnerable areas of the body to these high fields. We recommend you do not work close by these appliances, especially when pregnant and do not let children play in front of them, whilst they are in operation.

Washer / dryer

A combined **washer / dryer** is similar to the two separate appliances for generating power frequency magnetic field levels. Keep a reasonable distance while they are working.

Waste disposal unit

The **waste disposal unit** is likely to have quite a high-powered motor, which will give off high EMFs when in operation.

Water beds

See Section 2. Appliances A-C under Beds.

Water filters

Some reverse osmosis filters require a pump for the membrane that separates the water molecules from other molecules. Flow rates may be slow and, along with harmful chemicals, beneficial particles including calcium and zinc salts, that people require for optimal health, can also be removed.

Other in-line filters which store filtered water temporarily require an electric pump to release the water through the tap. These pumps give off EMFs which are unlikely to be a problem, but may affect the molecular structure of the water. Some people will be sensitive to this. It may have long-term subtle health effects on the general population.

Water heater

The heater will give off EMFs similar to an electric kettle. Height and distance from the body will vary. Minimise evening exposure time when it is dark and your pineal gland is susceptible to being deactivated.

Water softener

Some in-line water softeners use magnetism to change the molecular structure of the mineral impurities in the water. These changes can cause biological reactions and long-term health problems. Keep drinking water separate from the water softening system, if magnets are used.

Water supply

Electricity substations can be interconnected in a way that generates 'net' currents, see 'Buying an EMF safe Property section 3. Substations and transformers'. When electricity cables and mains water pipes share the same trenches in the street distribution system, the water supply pipe can enter a house carrying an EMF 'charge'. This causes a current to flow when the pipe is connected to the electricity earth inside the house as required by regulations. This current then flows around the house through the water pipes, central heating radiators, bathroom showers, etc., causing high levels of magnetic field.

Wheelchairs

Motors and heavy-duty battery wires give off high EMFs when a motorised wheelchair is in use, especially starting and stopping. Short periods of time are likely to give few EMF problems. The longer the time you spend in an electrically active wheelchair the more you will be exposed to high fields.

Wristwatches

All watches with batteries give off significant magnetic field pulse levels every time the mechanism is activated.