

## Your low EMF Home Articles

Your low EMF Home set of articles is separated into 9 sections, each of which can be individually downloaded. It is a 'work in progress' incorporating new information whenever time permits.

### Section 2

#### Dirty electricity

1. House wiring and EMFs; introduction; what are normal EMFs? Choosing a consumer unit; electric Fields; cables; demand switches; external 'faults' in the supply that can cause high magnetic fields; Wiring in homes - SAGE report July 2007
2. Dirty electricity (DE) – What is dirty electricity? What effect does it have? What sort of levels are you likely to have? What you can do if you have high levels of DE; DE coming into the house; DE generated within the house; dLAN caution
3. Lighting and EMFs; Bulbs, incandescent, energy-saving, fluorescent, halogen, full-spectrum light, daylight, light emitting diode (LED); anglepoise lamps and other metal framed lamps, halogen desk lamps, bedside/bedhead lights, spotlights, standard lamps and table lamps, nightlights; light wiring; light switches, dimmer switches; Physiological effects of blue and red lights; circadian rhythms, melatonin, light and illness, timing of blue lights, timing of red/amber lights
4. Smart meters – What is it all about? Smart Grid; Remote reading meters; Smart meters; Wide Area Network (WAN) technologies; Home Area Network (HAN); RF exposures from Smart Meters; Experiences of smart meters in other countries; Solar storms may affect smart meters
5. WiFi general – cancer; diabetes; DNA; electrical hypersensitivity; eyes; heart; heat shock proteins; immune system defects; neurodegenerative diseases; neurological effects; plant effects; reproductive effects; skin effects and WiFi technical – WiMAX; Wireless Myths 1) We've been exposed to this radiation for years, it must be safe 2) People only got affected when the scare stories started, it must be psychosomatic 3) Being on a phone for 20 minutes is equivalent to 1 year in a WiFi classroom 4) The WHO factsheet says there is no cause for concern, and they should know; Technical Information for Different Protocols
6. Underfloor heating
7. Microwaves, windows & Pilkington K glass – the glass; frames; ventilation

8. Intermediate frequency sources – CFLs; solar-power invertors; a result of DE; electronic article surveillance systems

9. References – 131 References

## Dirty Electricity (DE)

### What is dirty electricity?

Dirty electricity (DE) is high-frequency voltage transients riding along the 50 Hz mains electricity supply. DE is generated by arcing, by sparking and by any device that interrupts current flow, especially switching power supplies. These transients are largely by-products of modern energy-efficient electronics and appliances, such as computers, refrigerators, plasma TVs, Sky boxes, DVD players, video (hard disk) recorders, compact fluorescent light bulbs (CFLs) and dimmer switches, which tamp down the electricity they use. They can also enter the home through wiring from nearby sources including wireless telecommunication antennas connected to the power grid. When the capacity of the primary neutral on distribution lines is exceeded, current runs along the ground and enters homes via grounded water pipes.

Dirty electricity meters can be hired or bought from EMFields Solutions Ltd [www.emfields-solutions.com](http://www.emfields-solutions.com) and filters can be bought from there to reduce DE fields if necessary.

Transients are created when current is repeatedly interrupted. This manipulation of current creates a wildly fluctuating and potentially dangerous electromagnetic field that not only radiates into the immediate environment but also can back up along home or office wiring.

The repeated interruption can also be caused, especially in rural areas, by branches resting on powerlines, causing arc-ing. Investigating this could be worthwhile, and reporting it if you see it. In these days of cutbacks it is still possible the local electricity company will take no action until the supply fails.

Two of its biggest creators are switch mode power supplies (AC adaptors) and energy efficient (particularly lighting) products such as low energy light bulbs (CFLs) and dimmer switches. These cause high-frequency signals to be created and then carried by your house wiring.

All mobile phone base stations operate on DC power, which is changed from the electricity supply AC current by switching power supplies. These interrupt the AC current and create high voltage transients which get back into the grid and travel through the electrical service wires in the neighbourhood of the mast.

### What effect does it have?

Research shows that this pollution could be partly responsible for the rise in some modern health problems diseases such as: cancer, cardiovascular disease, diabetes, insomnia, headaches, neurological disorders, arrhythmia, autism, even suicide, amongst others.

A school in which the transients caused the measurement meters to go off scale had a cancer incidence in teachers nearly 3 times higher than expected. A single year of working in the building raised the risk of developing cancer by 21%. The risk of developing thyroid cancer was

increased over 13 times, and only took 3 years to develop, unlike the 10 years for other cancers. Pupils were not spared either, and some of them also had contracted cancer, even fatally (Milham & Morgan [2008](#)). There are 3, possibly 4, former students now in their 20s who have thyroid cancer.

Other schools found that when dirty electricity was reduced by more than 90% teacher health improved as did student behaviour in the middle/elementary schools (Havas & Olstad [2008](#)). Headaches, general weakness, dry eyes/mouth, facial flushing, asthma, skin irritations, overall mood including depression and anxiety improved significantly among staff. However, 30% of staff felt worse, so the interaction with human biological systems is clearly quite complicated.

The number of students needing inhalers for asthma was reduced in one school and blood sugar levels for some diabetics respond to the amount of dirty electricity in their environment. Type 1 diabetics require less insulin and Type 2 diabetics have lower blood sugar levels in an electromagnetically clean environment (Havas [2008](#)). Individuals diagnosed with multiple sclerosis have better balance and fewer tremors (Havas [2006](#)). Havas ([2006](#)) found that *“blood sugar levels for some diabetics responded to the amount of dirty electricity in their environment. Type 1 diabetics require less insulin and Type 2 diabetics have lower blood sugar levels in an electromagnetically clean environment. Individuals diagnosed with multiple sclerosis had better balance and fewer tremors. Those requiring a cane walked unassisted within a few days to weeks after mains filters were installed in their home.”*

Neurotransmitters may be biomarkers for dirty electricity and other electromagnetic field exposures. Dirty electricity is a chronic stressor of electrified populations and is responsible for many of their disease patterns (Milham & Stetzer [2013](#)).

de Vocht ([2010](#)) comments “Environmental exposure to high-frequency voltage transients ('dirty electricity') is an interesting EMF exposure metric, which might explain the variation in results from epidemiological studies using standard ELF and RF exposure metrics.”

## What sort of levels are you likely to have?

Generally levels on a DE meter are between 100 to 1500 without filters. The higher readings are usually in towns, especially in densely populated areas and terraced housing. Flats, especially in high-rise blocks, tend to be worst.

The local DNO (electricity company that is responsible for the supply cables in that area) don't take any notice of DE.

If you suspect you may have transient spikes on your electricity supply as a result of your appliances, you can hire a meter (together with 2 filters) from <http://www.emfields-solutions.com/filters/dirtyelectricity.asp> and see what your levels are.

## What you can do if you have high levels of DE

Firstly turn off (at the socket, not the equipment switch) and unplug EVERYTHING in the house.

See what the reading is with, and without, the DE filters. You need at least one DE filter as close as possible to the electricity meter/consumer (fuse) box. Test the reading there, with and without those fitted. If it is still highish (200+), then it is DE coming into the house.

## DE coming into the house

This is not easy to deal with. You can get sophisticated HF filter units that connect across the supply between the meter and the consumer box, but they are expensive (£500 - £2,000 depending on their specification) and need proper permanent installation on the wall. Alternatively, you could try plugging in a few DE filters as close as possible to the main consumer unit and see how low you can get the reading.

## DE generated within the house

It is most likely that DE comes from equipment inside the house. TV/Sky boxes/DVD players are amongst the worst culprits; plasma TVs are usually terrible; followed by all types of computer equipment, not forgetting the broadband modem/router.

We suggest that all the TV units and all computer equipment are connected via a high quality multi-way filter-strip, see <http://emfields-solutions.com/filters/mains-filter.asp>. It must be a high-spec RF filter strip - that is not the same as a surge-protected strip which are much cheaper, but which do not filter HF and RF. That will keep the TV/computer, etc. generated noise away from the rest of the house wiring.

Next are any plug-top mains adapters/chargers. Some of those are cheap switched-mode power-supply units that create DE noise on the supply wires. Test each (only one on at a time) in turn - measuring next to them at a double-socket outlet.

Fridges, freezers, ordinary cookers are usually fine and not a problem.

Some induction hobs can be a major problem. All induction hobs use HF to induce currents in the pans which then heat up. Some use between 55 and 85 kHz and that is right in the range of DE. Some use higher (real RF) frequencies that are too high for the dirty electricity meter to read, but go around the house wiring all the same. Induction hobs are not recommended from the EMF/EMR exposure point of view.

Some CFL bulbs are relatively fine. Some, especially cheaper ones, are bad. They mostly operate at a switching frequency of 32 to 60 kHz - again in the DE range and that needs internally filtering out to stop it appearing on the house wires. Some cheaper units do not really try to do this. Some older HF (non-flicker) long-tube strip lights are bad.

Some fish-tank lights are a problem for the same reason - again change the units or plug into the mains via a filter strip such as the one referred to above.

Solar panels can produce high levels of dirty electricity. They communicate with the electricity company by sending an RF signal through the house wiring and connecting to the company. DE filters will not stop this communication, as the RF normally rides on both phase and neutral.

Most houses with high levels of transients should not need many filters to reduce spikes to an appropriate level. Too many can be counter-productive and people have reported health effects when they have used up to 20 filters! DE filters increase the currents flowing in the wires around a house. If the wiring is not perfect then this current significantly increases magnetic fields in the house. This extra current can also cause higher electricity bills, though this will not be the case for most people.

It is much better to connect the equipment producing the dirty electricity using a proper filtered mains strip than fitting lots of DE filters that increase the current flowing round the wiring in the house.

**DLAN caution**

However, a dLAN broadband access system will not work if you use one of the mains filters in your system, as the filter is intended to screen the wiring from the RF that the dLAN needs to connect to the internet.

**Other considerations**

The electricity supply industry is very concerned about dirty electricity filters, as they believe they will cause the need for larger substation transformers and thicker cables and also causes greater resistive power losses in the electricity supply system. If most households fitted DE filters the electricity industry estimates that they would need to at least double the number of 11kV-230V electricity substations in the UK.

If your house wiring is not 'perfect', then fitting the DE filter will also be likely to increase the real 50 Hz magnetic fields, as each filter causes an extra amp of current to flow round your house wiring. As it is 'reactive current', your electricity meter will not usually charge for it, though some older type meters will.

Some people with ES tried the DE filters and then removed them because not only did they not improve, but they thought that their symptoms had worsened. They had used between 5 and 20 filters. We suggest that if you need more than 2 or 3, then you need to track down the problem and sort it properly.

Dirty electricity meters can be hired or bought from [EMFields Solutions Ltd](http://EMFields Solutions Ltd) and filters can be bought from there to reduce DE fields if necessary.