

# Danger fields?

A link between childhood leukaemia and overhead power lines has prompted a call for minimum distances between cables and buildings housing children, reports Michael Jayne

The World Health Organisation classifies power-frequency magnetic fields as 'possibly carcinogenic'

High-voltage power lines have, for some time, been linked with concerns about adverse effects on health. These allegations have had a high profile in the media and have no doubt influenced public perceptions.

According to UK Guidance Note 1 (UKGN1) of the *Red Book*, with high-voltage cables, '...there is a risk that public perception may affect marketability'. Furthermore, Practice Statement (PS) 4.1 of the *Red Book* states that, 'high-voltage cables are one of the environmental factors that might impact on the market's perception of the value of the property'.

In light of this, valuers need more information, but facts have been hard to find. This has been complicated by the actions of special-interest groups and various allegations made by them. Recently, however, a group of experts and interested bodies known as the Stakeholder Advisory Group on Extremely Low Frequency Electric and Magnetic Fields (SAGE) published an interim report aimed at promoting understanding of the complex issues involved in the power-health debate. SAGE is funded equally by the Department of Health, the electricity industry and Children with Leukaemia.

The report is the product of a lengthy and continuing process of consideration and deliberation by the contributors. Their remit was primarily to consider how the precautionary principle can be applied to the impact of electric fields on health.

## The nature of the risk

The allegations of health risks relate primarily to radiation fields. These radiation fields take two forms: electric fields and magnetic fields. Electric fields are created as a consequence of the voltage, and field strength increases as the voltage increases. Even when electrical apparatus is not in use, as long as it is connected to the mains wiring, an electric field exists. The field strength declines rapidly with distance from source.

Magnetic fields, on the other hand, are created only when electric currents flow, so, unlike electric fields, they do not exist after the apparatus is turned off. It follows that when equipment is on, or wiring is in use, both electric and magnetic fields exist. Magnetic fields increase with current carried and so will vary with the appliances being used.

At the time of writing, the main proven health problem is a statistical association between a doubling in the incidence of childhood leukaemia and fields of 0.4 microteslas (units of measurement for magnetic fields) and above, although no causal link has been established. The World Health Organisation classifies power-frequency magnetic

fields as 'possibly carcinogenic' – an IARC 2B carcinogen – and power-frequency electric fields as weaker than that.

Such fields may be encountered within 60m of high-voltage overhead transmission lines (HVOTL), although this is a rule of thumb and the actual position is more complex. There have also been suggestions that there are other health problems associated with the radiation fields, but these are more controversial. Members of SAGE agreed to differ over the significance of these other health effects.

Although public concern has been focused mainly on high-voltage pylons and transmission cables, both fields – and magnetic in particular – are generated by the use of domestic electrical equipment and by internal wiring. This is irrespective of any high-voltage cables that might be in the vicinity. Indeed, fields encountered within the home can exceed those encountered living 'near' HVOTLs.

Consequently, it has been suggested that the measurement of electric and magnetic fields resulting from internal wiring could become a requirement of residential property surveys in future. This possibility has been considered by both SAGE and the recent Parliamentary Commission on Childhood Leukaemia and Electric and Magnetic Fields, chaired by the Dr Howard Stoate MP. This is obviously of relevance to both building surveyors and valuers.

## SAGE recommendations

The SAGE interim report, *Precautionary approaches to ELF EMFs*, identified two key precautionary measures that should be taken by government:

- more information should be provided to the public about exposures and actions they could take themselves to reduce exposure
- electricity companies should be encouraged to choose the optimal phasing (usually transposed phasing) for all new 132kV lines, and to convert the 12% of existing 132kV lines that are not transposed but could reasonably be converted.

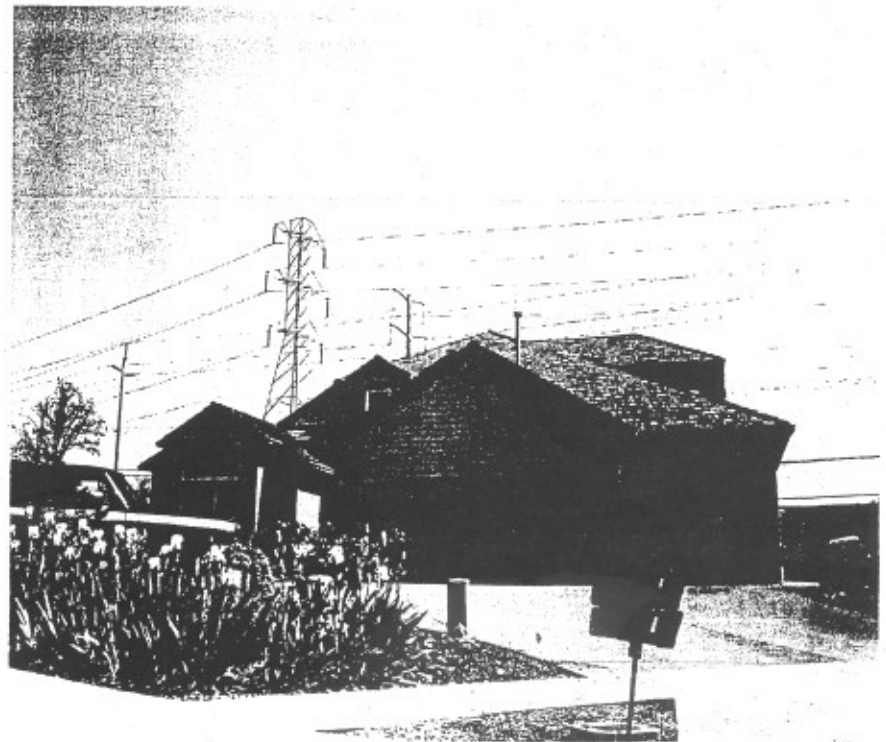
Desirable though these two measures are, however, the group conceded that they would not have a dramatic effect on exposures. The best option for obtaining significant reduction in exposures, SAGE concluded, was the physical separation of buildings and power lines via a strategy they call 'corridors for new build': stopping the building of new homes, schools, other childcare facilities, hotels and holiday accommodation close to existing lines, and preventing the erection of new lines close to these categories of buildings.

Such a strategy could be implemented entirely within the existing legislative and regulatory framework, according to the report, and the main cost would be measured in terms of effects on land and property values. Undeveloped land and existing homes within the corridors would lose value, and compensation would be payable in some circumstances. Existing plans for home building on corridor land would be prevented from going ahead unless expensive underground cabling were possible.

Other implications of the corridor option would be that:

- existing powers of compulsory purchase of land in terms of Schedule 3 of the Electricity Act would be affected and would have to change, which could lead to disputes and court actions, which in turn might affect the viability of the corridors
- Creating corridors would endorse the idea that EMFs are a health hazard, which would create pressure to modify other legislation, to ensure that EMFs were treated like other health hazards.

The main benefit of the corridors would be that new instances of people being exposed to potentially damaging electric and magnetic fields from power lines would be largely prevented. However, because the restriction would be expressed in terms of average distance between buildings and power lines,



about 15% of people would still be exposed to higher-than-desirable levels.

The report goes on to say that decisions about the positioning of power lines often involve balancing a number of factors, including visual amenity. It argues that the 'corridors for new build' option generally promotes visual amenity and that health considerations can assist decision making, when, for example, they back up visual amenity as a justification for placing power lines underground.

#### ELF EMFs and distance

Electric (E) and magnetic fields (M) are generated by the transmission of electricity from power stations to the places where it is needed, as well as by electrical equipment. The energy fields are known as extremely low frequency (ELF) electric and magnetic fields (EMFs). With overhead power lines, the fields are highest close to the line and diminish with distance. Magnetic fields vary as the load on the line changes, whereas electric fields stay roughly constant.

Fields are higher from high-voltage lines. For the highest voltages in use in the UK, 275kV and 400kV, the transmission system carried on large lattice-steel pylons, the magnetic field falls below the level implicated in the epidemiology of childhood leukaemia, on average, at 60m from the line (or 150m from the line in extreme cases, where the load is high or the line unbalanced). The distance is smaller for lower-voltage lines, and small wood-pole distribution lines do not produce a significant energy field at ground level at all.

The possible effects of these fields on people have been the subject of debate for decades, but in 2004, the UK adopted guidelines for 'safe' levels of exposure. Now a question remains around the safety of exposure below these levels. If there is no certainty, should precautionary measures be put in place?

This is the issue at the heart of the formation of the Department of Health's Stakeholder Advisory Group on ELF EMFs, which explores the implications of power frequency electric and magnetic fields and makes practical recommendations for a precautionary approach. SAGE has representation from public concern groups who advocate greater precaution as well as from the power supply industry, government departments and the Health Protection Agency.

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Further details of the SAGE interim report can be found on the RICS Environment Faculty web pages on [www.rics.org](http://www.rics.org)