

POWER LINES

AND POSSIBLE ADVERSE EFFECTS ON HEALTH

By **Michael Jayne**, principal lecturer at Nottingham Trent University and an Environment Faculty Board member

High voltage power lines have been linked with concerns over the alleged possible adverse effects on health for some time. These allegations have sometimes attained a high profile in the media and have no doubt influenced public perceptions on the topic.

According to UK GN1 of the red book, with high voltage cables, "...there is a risk that public perception may affect marketability." Furthermore, PS4.1 of the Redbook states that, "high voltage cables are one of the environmental factors which might impact on the market's perception of the value of the property."

Consequently it would seem useful for surveyors and valuers to have an understanding of the issues involved, but it has been difficult for valuers to know what the actual position is. This has been made more difficult by the conflicting opinions and allegations which exist. However, recently a group of experts and interested bodies known as the Stakeholder Advisory Group Extremely Low Frequency and Electric and Magnetic Fields (SAGE) published an interim report which can help an understanding of the many issues involved. SAGE is funded equally by the U.K. Department of Health, the electricity industry and Children with Leukaemia. Their remit has been primarily to consider how the precautionary principle may be applied to electric fields and health and consequently SAGE has also considered issues such as electrical equipment and internal wiring in buildings.

SAGE recently published an interim report which is the product of a lengthy and continuing process. The allegations of health risks relate

primarily to the radiation fields. These radiation fields take two forms; electric fields and magnetic fields. Electric fields are created as a consequence of voltage and the field strength

increases as the voltage increases. Even when electrical apparatus is not in use, so long as it is connected to the mains wiring, an electric field still exists. The field strength declines rapidly



with distance from the source. Magnetic Fields are created when an electric current flows so, in contrast to electric fields, no magnetic field exists 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 the current carried and so will vary with appliances being used.

At the time of writing, the main proven health problem is a statistical association with a doubling in the incidence of childhood leukaemia with fields of 0.4 Microteslas 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 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 the primary public concerns have been expressed over high voltage pylons and transmission cables, both fields, magnetic in particular, will also be encountered when using electrical equipment and from internal wiring within a building. Domestic exposure can occur from internal property wiring and electrical appliances; televisions, lighting, electric kettles and so on. This is irrespective of any high voltage cables which might be in the vicinity. Indeed, the fields encountered within the home due to internal wiring and electrical equipment can exceed those encountered by living 'near' overhead high voltage transmission lines.

As internal wiring can have an effect, it has been suggested that measuring fields resulting from internal wiring could be a future requirement for residential property surveys.

Consequently the topic should be of particular interest to building surveyors as well as valuers

Further details of the SAGE interim report can be found on the RICS Environment Faculty web pages.

SAGE recommendations

The SAGE report, *Precautionary approaches to ELF IMFs*, identified two key precautionary measures that should be taken by the 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. Although not a recommendation, SAGE identified that "... the best-available option for obtaining significant exposure reduction" 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 (for children up to the age of 15), other childcare facilities, hotels and holiday accommodation close to existing lines, and outlawing 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 may lose value, and compensation would be payable

in some circumstances.

The main benefit 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.

The members of SAGE, regardless of their views on the science, were broadly in agreement that:

- the government should make a decision on the adoption of the 'corridors for new build' option as quickly as possible
- there were no other agreed and realistic options that were more cost-effective at reducing exposures
- the financial cost and other consequences of implementing it had been made clear, although they noted some uncertainties
- this option would not reduce exposure for people already living near high-voltage power lines
- there should be more research to clarify differences in interpretations of the science.

Further details of the SAGE interim report can be found on the RICS Environment Faculty web pages:

<http://www.rics.org/RICSWEB/getpage.aspx?p=CbloBuK2P0KwiCQsX8P9ng> ■