



**Government response to the Stakeholder
Advisory Group on extremely low
frequency electric and magnetic fields (ELF
EMFs) (SAGE) recommendations**

**Department of Health
Department for Communities and Local Government
Department of Energy and Climate Change**

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Government response to the Stakeholder Advisory Group on extremely low frequency electric and magnetic fields (ELF EMFs) (SAGE) recommendations.

Executive summary

1. The Government is grateful to SAGE for their detailed recommendations and advice to Government as contained in their First Interim Assessment¹. We have considered this report in some depth and are now responding to the recommendations it has made. In developing this Government response we have taken account of the advice provided by the Health Protection Agency (HPA). We have also taken note of other evidence such as the report of the Cross-Party Inquiry into Childhood Leukaemia and Extremely Low Frequency Electric and Magnetic Fields (ELF EMF)², the World Health Organization's advice published in June 2007³ and the latest EU Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) report of January 2009⁴.
2. The Government supports the implementation of the low-cost options and those points recommended by SAGE members and supported by the Health Protection Agency in this first Assessment. These are to:
 - (i) support the optimal phasing of overhead power lines in those circumstances where this would significantly reduce public exposure to ELF EMF and would be cost effective to do so;
 - (ii) draw the attention of manufacturers of electrical equipment to the advice issued by the World Health Organization on low-cost ways of reducing exposure;
 - (iii) request the HPA to keep under review the possible relationship between childhood leukaemia and other causes of ill health and ELF EMF exposure;
 - (iv) work with the HPA to deliver public messages that provide clear information about the risk of exposure to ELF EMF in the context of other societal risks.
3. SAGE also made recommendations on wiring practices in the home given that raised electromagnetic fields can be generated by incorrectly installed internal wiring or by traditional rotating disc electricity meters.

¹ www.dh.gov.uk/en/Publichealth/Healthprotection/DH_4089500

² www.epolitix.com/stakeholder-websites/stakeholder-website-page/sites/cpielfemf/pages/report-of-the-inquiry/

³ <http://www.who.int/mediacentre/factsheets/fs322/en/index.html>

⁴ http://ec.europa.eu/health/ph_risk/committees/04_scenihr/04_scenihr_en.htm

One of the report's recommendations was to require the installation of devices that protect against imbalances between live and neutral current. This recommendation has been addressed for domestic properties through measures in the British Standard BS7671 that came into existence on 1 July 2008. More generally, the Government believes that the focus should be on the provision of advice to the public to stress the importance of regular testing and inspection of internal wiring. As regards rotating disc meters, the transition to solid state meters is likely to be aided substantially by a roll-out of smart meters. The Government announced in October 2008 its intention to mandate smart meters for all domestic households in Great Britain with an indicative timetable for completion of the roll-out by the end of 2020. Smart metering lends itself to electronic solid state designs due to the more complex functional requirements.

4. In addition to its recommendations, the SAGE report proposed an option to be considered by Government as to whether precautionary action should be introduced through implementation of a moratorium on new homes and schools being built near overhead power lines and new lines close to existing homes and schools. This option was favoured by some members of SAGE and not by others and was presented as an option rather than a recommendation. However SAGE's cost benefit analysis does not support the option of creating corridors around power lines on health grounds. The Government therefore considers this additional option to be disproportionate in the light of the evidence base on the potential health risks arising from exposure to ELF/EMF and has no plans to take forward this action. The HPA advises that the EMF association with childhood leukaemia is weak and unproven and supports no cost/low cost options to reduce EMF exposure. Our position is in line with the WHO recommendation to explore low-cost ways of reducing exposure to ELF EMF.
5. The UK adopted the 1998 ICNIRP⁵ EMF public exposure guidelines in terms of the 1999 European Recommendation (1999/519/EC)⁶. The electricity industry currently complies with these guidelines on a voluntary basis. Government has looked at the other measures that are in place under Health and Safety legislation to protect the public from the dangers of electricity, and at both historical and more recent scientific evidence relating to exposure to ELF EMF. We conclude that the available evidence does not support the mandatory introduction of corridors around powerlines as proposed by some members of SAGE, given the scientific uncertainty.
6. The Government acknowledges that research is continuing worldwide into the effects of exposure to ELF EMF and notes that other possible

⁵ International Commission on Non-Ionizing Radiation Protection Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). Health Phys, 74(4), 494-522 <http://www.icnirp.org/>

⁶ COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC) http://ec.europa.eu/health/ph_determinants/environment/EMF/emf_en.htm

causes of leukaemia are also being explored. We note for example, the April 2008 report⁷ by the charity 'Children with Leukaemia' that analyses the association between childhood leukaemia and social contact. The Government has asked the Health Protection Agency to keep the scientific evidence under review, thereby ensuring that policies are informed by new scientific findings as soon as they arise.

Background

International Exposure Guidelines

7. International electromagnetic field (EMF) public exposure guidelines are set at levels designed to protect people from known harmful effects of EMF. The guidelines from the International Commission on Non-ionizing Radiation Protection (ICNIRP)⁸ were published in 1998 and adopted by a European Council Recommendation⁹ in 1999. The Recommendation provided a common framework by which the guidelines could be introduced into each Member State according to local arrangements or regulatory practice.
8. The guidelines set the EMF exposure levels to prevent acute effects resulting from the induction of electric fields and currents in the body. Evidence for such effects comes from a wide range of scientific studies of populations (epidemiology), and laboratory work (biology). These acute effects are well established and a substantial database has been built up over many decades of scientific research since the discovery of electricity and the introduction of its practical use.
9. The Institute of Electrical and Electronic Engineers (IEEE¹⁰) based in the USA has also set exposure standards for safety levels with respect to human exposure to electromagnetic fields that are broadly similar to ICNIRP exposure levels.

⁷ <http://www.leukaemia.org/media-centre/press-releases/908>

⁸ ICNIRP (1998) <http://www.icnirp.org/>

⁹ COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC)

¹⁰ IEEE C95.6-2002 IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0 -3 kHz Institute of Electrical and Electronics Engineers / 01-Sep-2002

Research on ELF/EMF and leukaemia

10. In 1979, a population study in the USA reported an association between childhood leukaemia and the density of wiring that brings electricity into the home. Despite continued research for 30 years, the scientific review bodies that inform the World Health Organization advice (ICNIRP, IEEE) consider that, at present, the scientific evidence related to possible health effects from long-term, low-level exposure to extremely low frequency (ELF) fields is insufficient to justify setting lower exposure limits.
11. The International Agency for Research on Cancer (a World Health Organization body) has classified ELF magnetic fields as a “possible carcinogen”, a classification heavily influenced by associations observed in the population studies on childhood leukaemia. (To put this classification in context, this also includes substances in common use such as coffee and petroleum.)

Current advice in the UK

12. The Radiation Protection Division of the Health Protection Agency, when it was the National Radiological Protection Board (NRPB), undertook a detailed scientific review on behalf of the Department of Health and published its advice in 2004¹¹. It noted “that there is some epidemiological evidence that time weighted average exposure to power frequency magnetic fields above 0.4 μ T is associated with a small increase in the absolute risk of leukaemia in children. Therefore there remain concerns about possible effects of exposure to EMFs and, in particular, power frequency magnetic fields.” (Magnetic flux density of 0.4 microTesla (μ T) is higher than the usual background in houses but much lower than the limit for acute effects).
13. The same NRPB 2004 publication recommended the adoption in the UK of the international (ICNIRP) guidelines based on the known science but also “that government should consider the possible need for further precautionary measures.” Precaution is mentioned because of the uncertainty in the science.
14. The appropriate level of precaution and the practical measures to be taken have been considered by SAGE (the Stakeholder Advisory Group on ELF EMF).

The SAGE process

15. The remit of SAGE has been “to bring together the range of stakeholders to identify and explore the implications for a precautionary approach to ELF EMF (electric and magnetic fields) and make practical recommendations for precautionary measures.” The Department of Health hosted the SAGE discussions and the funding is provided jointly

¹¹http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1195733817602

by the electricity supply industry, the Department of Health and the charity Children with Leukaemia.

16. SAGE meetings started in November 2004. The first SAGE report entitled the “First Interim Assessment: Power Lines and Property, Wiring in Homes, and Electrical Equipment in Homes” was published and presented to the Minister for Public Health on 27th April 2007. The Minister referred the report to the Chairman of the Health Protection Agency (HPA) for advice. The HPA provided its considered advice to Government in October 2007.¹² (NRPB had become part of the HPA in April 2005).
17. The HPA’s advice has given shape and direction to the approach taken by the various departments of the UK Government and Devolved Administrations with related responsibilities. These include:
 - a. the Department for Communities and Local Government (CLG) for planning aspects,
 - b. the Department of Energy and Climate Change (which took over responsibility for the energy sector from the Department of Business, Enterprise and Regulatory Reform (BERR) in October 2008) for the electricity sector,
 - c. the Department of Health (DH) for public health issues,
 - d. the Health and Safety Executive (HSE) for risks to health and safety arising out of work activities (for the whole of the UK), and
 - e. related departments in the Devolved Administrations.
18. Officials in each of the departments have engaged in a number of bilateral and group discussions with the relevant industrial and professional partners to develop practical ways of responding to the recommendations and advice.
19. In addition to advice on the implementation of precautionary measures, the SAGE report offers a valuable source of information having brought together many of the strands of concern and codified the relevant information. It sets out the various views of the stakeholders, offers some reasons for the areas of disagreement, and draws together the areas of agreement. In addition to the main body of the report and its recommendations, there are supplementary papers that collate factual information about electromagnetic fields, potential health effects, wiring practices, EMF exposure measurements and limits.

The current context

20. Other publications in 2007 addressed precautionary action with respect to ELF EMF. One was the Environmental Health Criteria Document¹³ on ELF electromagnetic fields on behalf of the World Health

¹²

http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1204276682532?p=1207897920036

¹³ WHO - World Health Organisation. Extremely low frequency fields. Environmental Health Criteria, Vol. 238. Geneva, World Health Organisation, 2007.

Organization (WHO) and an associated WHO fact sheet that provided a summary and WHO advice on precautionary measures. The WHO advocates low-cost ways of reducing exposures but acknowledges that exposure reduction measures will vary from one country to another. The other was the Cross-Party Inquiry into Childhood Leukaemia and Extremely Low Frequency Electric and Magnetic Fields (ELF EMF). The Cross Party Inquiry also recommends a moratorium on house building near power lines and new power lines near housing.

The SAGE Recommendations and additional SAGE option

21. The four key areas proposed to Government by SAGE for action and/or consideration were:
 - a. optimal phasing of high voltage overhead electric lines,
 - b. electrical appliances in homes,
 - c. household wiring practices and
 - d. the provision of advice to the public on ELF EMF.
22. SAGE also put forward to Government, as an option rather than a recommendation, what they considered to be the “best available option” for obtaining a significant reduction in exposure to power frequency ELF EMF regardless of costs. This was to introduce a moratorium on new homes and schools being sited near power lines and on new power lines sited near homes and schools. This is more commonly known as the “corridor option”. The SAGE report urged Government to make “a clear decision on whether to implement this option or not”.
23. The following response will address each of the four key areas in turn. But, firstly it shall address the SAGE option outlined above.

DEVELOPMENT CORRIDORS FOR NEW BUILD NEAR TO POWER LINES AND NEW POWER LINES NEAR TO EXISTING DEVELOPMENT

24. SAGE put forward the following option as the best available precautionary intervention for obtaining significant reduction in EMF exposure from high voltage power lines:

SAGE Option:

Stop building any new buildings for residential use and some other uses including schools within specified distances (SAGE suggested 60 metres as an example) of overhead power lines, and to stop building new overhead power lines within the same specified distances of existing such buildings.

SAGE acknowledged that the main costs of this option arise from the effects on land and property values and urged the Government to make a clear decision on whether to implement this option or not.

This option was not supported by SAGE's own cost benefit analysis. SAGE thought that taking action in relation to existing situations i.e. power lines near housing and schools, would be more complex and more expensive and suggested that initially Government should take a decision as to whether to act in relation to new construction.

Government response

25. The Government considers this option to be disproportionate in light of the evidence base on the potential health risks arising from exposure from ELF/EMF and has no plans to take forward this action.
26. The SAGE proposal is a high cost option that is not supported by its own cost benefit analysis nor supported by the HPA.
27. The HPA advises that the EMF association with childhood leukaemia is weak and unproven and supports no cost/low cost options to reduce EMF exposure. This position is also in line with the WHO recommendation to explore low-cost ways of reducing exposure to ELF EMF.
28. The Government does recognise that work is needed to ensure that new building developments and the siting of new power lines take proper account of the 1998 ICNIRP exposure levels and the EU Recommendation and will work proactively with the electricity industry and local authorities to explore the incorporation of the international standards formally into the planning system.
29. The Government recommends that the electricity industry takes appropriate action to identify any homes and schools that do not currently meet the ICNIRP requirements because of the proximity of high voltage power lines, and addresses the need for remedial actions to ensure that exposures do not exceed the relevant ICNIRP guidelines.

Explanation

30. The Report of the Cross Party Inquiry into Childhood Leukaemia and Electromagnetic Fields supported the option set out above and recommended that the Government introduce a moratorium on the building of new homes and schools within at least 60 metres of existing high voltage overhead transmission lines (275 kV and 400 kV) and the building of new lines within 60 metres of existing homes and schools. The Inquiry also recommended that the Government considered the case for extending this distance to 200 metres for the highest voltage lines and pro-rata for lower voltages.
31. The Government has considered the HPA advice carefully in conjunction with the SAGE Assessment. We agree with both SAGE and the HPA that implementation of this option is not supported by the cost/benefit analysis. The high cost of implementing this approach (estimated by SAGE to be in the region of £1-2 billion in terms of loss of the value in land nationally) even assuming a causal link between exposure to ELF EMF and childhood leukaemia (which has not been proven), is not in line with the low-cost practical precautionary approach outlined by WHO. The 1999 European Council Recommendation that adopts the 1998 ICNIRP guidelines states that actions on limiting the exposure of the general public to electromagnetic fields should be balanced with the other health, safety and security benefits that devices emitting electromagnetic fields bring to the quality of life.
32. The Government, has to strike a fine balance when committing its future funding for the public benefit. Given the uncertainties of the scientific evidence, the Government believes that funding a high-cost option is not justified. Instead its approach to precautionary measures on EMFs will be to focus on low-cost or no-cost measures recommended by SAGE and supported by the Health Protection Agency and the WHO.
33. Alternatively, if funds were to be raised from the electricity consumer to implement this precautionary measure, such action would need to be seen in the context of the significant sums that are already being received from the electricity consumer to meet Government incentives to tackle climate change and to address fuel poverty. It should not be assumed that the consumer would be willing to pay, especially bearing in mind the uncertainties of the science.
34. Ofgem, the industry regulator, has a primary duty to protect the interests of electricity consumers, and an important aspect of that is setting price controls that determine the maximum revenue that the network utilities are permitted to recover from their customers. It would be for Ofgem to make a judgement on whether and to what extent such costs should be borne by consumers.

35. The number of childhood leukaemia cases in the UK is approximately 500 each year. There is no proven causal link between exposure to EMF and childhood leukaemia. However, if we assumed that there was such a link, estimates suggest that 4 or 5 cases might be attributed to this cause of which only a third would be attributable to high voltage power lines. (Other studies have put this figure as high as 25). More children die each year as the result of accidents than from leukaemia. In 2006, 299 children aged under 15 died as the result of injury or poisoning, a further 149 children were killed in road accidents¹⁴. In view of the uncertainties of the scientific evidence, the Government has to consider with care (and with attention to that evidence) how we can best direct our available resources to achieve the greatest public health benefit.

HPA advice on providing information to local authorities

36. In response to SAGE's recommendation on development near to power lines, the Health Protection Agency recommended that the attention of local authority planning departments and the electricity companies be drawn to the evidence for a possible small increase in the incidence of childhood leukaemia which may result from siting new buildings very close to power lines, or new power lines very close to existing buildings.

37. The Government has considered the HPA's advice on this matter, and acknowledge that the public, local planning authorities and the electricity industry need clarity and assurance about how electric and magnetic fields should be dealt with when new power lines or development near existing power lines is proposed.

38. It is central Government's responsibility (rather than individual local authorities) to determine what national measures are necessary to protect public health. In the absence of established scientific advice on how to address these issues, Government will consider how to encourage decision makers to take a consistent approach in relation to ELF EMF issues when assessing planning applications for residential development near to power lines.

39. The Government therefore proposes the following actions to take this work forward.

ICNIRP Guidelines

40. In the absence of any practical precautionary low-cost measures for reducing the exposure to ELF EMF associated with high voltage overhead lines, the Government believes that the 1998 ICNIRP Guidelines on exposure to EMFs in the terms of the 1999 EU Recommendation, as recommended by the Health Protection Agency

¹⁴ Child Accident Prevention Trust <http://www.capt.org.uk/pdfs/factsheet%20accident%20facts.pdf>

and in line with the view of the World Health Organization, remain relevant.

41. While we recognise that these guidelines on the restriction of public exposures relate particularly to the avoidance of the known acute effects of exposures to ELF fields, we note that the EU recommendation suggests that ICNIRP guidelines remain relevant where the exposure is potentially for a significant period of time. We are therefore of the view that protection of the members of the public from the possible risks of long term exposure should be based on compliance with the ICNIRP guidelines.
42. It is for EU Member States to determine the circumstances in which the adoption of the ICNIRP guidelines is appropriate in terms of the EU recommendation. In this regard, the UK Government considers that exposure for potentially significant periods of time might reasonably be regarded as referring to residential properties, and to properties where members of the public spend an appreciable proportion of their time. The ICNIRP guidelines are formally incorporated into the planning system for radio telecommunications but not in regard to overhead power lines, so in taking forward actions in response to the SAGE report the Government will take the opportunity to consider this matter further.

Development near to power lines

43. The four UK administrations will consider jointly how to provide clarity to developers, Local Planning Authorities (LPAs) and the public on how development near to power lines should be treated in terms of EMF issues. In particular, this will consider how ICNIRP guidelines might be taken into account in the planning system. These considerations might or might not result in a common approach for devolved planning issues.

New high voltage Power Lines

44. Similarly, the ICNIRP guidelines are relevant when designing and constructing new high voltage power lines near existing residential properties. Development consents for all new power lines in England and Wales are currently granted by the Secretary of State for Energy and Climate Change and by Scottish Ministers in Scotland under Section 37 of the Electricity Act 1989.
45. As part of the Planning Reform agenda in England and Wales, applications for Nationally Significant Infrastructure Projects (NSIPs) will be decided by the independent Infrastructure Planning Commission (IPC). For overhead lines this means those of 132kV and above. The IPC may also consider new lines below 132kV that are submitted with a Nationally Significant Infrastructure Project application as associated works. The IPC will take decisions on consents in accordance with National Policy Statements (NPSs). The relevant NPSs for electricity networks are the Overarching National Policy

Statement for Energy in conjunction with the Electricity Networks Infrastructure NPS. A key element of the NPS will be an 'impacts' section that includes overhead lines and EMFs. This will provide advice and information on what the IPC should consider when processing applications for consent and how EMFs should be taken into account. This will include details of the 1998 ICNIRP guidelines on exposure to EMFs in terms of the EU recommendation, and that as a precautionary measure for reducing EMFs, overhead lines should where reasonable, have optimal phasing. The IPC will follow this guidance when determining any decisions in regard to a specific development. For overhead lines below the IPC threshold the Department of Energy and Climate Change will continue to grant consent in England and Wales under section 37 of the Electricity Act 1989 for a period of two years after IPC commencement when the process will be reviewed. Overhead lines below 132kV will be deemed to comply with ICNIRP guidelines unless evidence is brought to the contrary.

46. The Department of Energy and Climate Change published guidance in April 2009 for LPAs and other interested parties on the existing section 37 consenting regime and how to interpret its new Statutory Instrument The Overhead Lines (England and Wales)(Exemption) Regulations 2009. Reference to the publication of this Government response is made in that document with regard to addressing any further possible precautionary measures that might flow from this response on ELF EMF. It also identifies the UK's adoption of the ICNIRP guidelines as recommended by the Health Protection Agency and in the terms of the 1999 EU recommendation and notes these guidelines are currently complied with on a voluntary basis.
47. In the light of the above advice, we recommend that the electricity industry take steps to identify any existing homes and schools that do not meet the ICNIRP requirements because of the proximity of high voltage power lines and to consider what remedial actions might be taken to ensure that exposures do not exceed the relevant guidelines.

OPTIMAL PHASING

48. As noted in SAGE's supporting papers, many overhead lines have two circuits, each consisting of three conductor bundles or "phases", carried on the same pylons. Each circuit produces an electromagnetic field, and the resultant field depends on the relative order of the three phases of each circuit. This is referred to as the "phasing" and the lowest component magnetic fields to the sides of the line are generally produced by an arrangement called "transposed phasing". Changing a line from un-transposed to transposed phasing reduces the magnetic field to the sides of the line.

49. In the light of this information SAGE recommended the following:

SAGE recommendation:

That electricity companies be encouraged to choose optimal phasing (usually transposed phasing) for all new lines, and also be encouraged to convert existing lines where possible and justifiable.

Government response

50. The Government agrees with the SAGE recommendation and urges industry to optimal phase overhead lines wherever possible and reasonable. We will proactively work with industry to consider how best to take this forward. This might include developing a voluntary code of practice on phasing for voltages of 132kV and above.

Explanation

51. The Government has considered this option and discussed the feasibility of optimal phasing with representatives of the electricity industry. The industry agrees that where optimal phasing can be achieved at reasonably low cost it should be undertaken.
52. SAGE specifically recommends that optimal phasing is implemented for 132kV lines not already phased. The electricity industry confirms that approximately 12% (2000km) of the existing 132kV system could be considered for conversion, but that there are still certain circumstances where optimal phasing is not possible without introducing remedies at significant cost. For instance the insertion of a separate phase transposition tower where three overhead lines join at a 'T' point or if the line is single circuit. Costs to provide a new phase transposition tower to enable optimal phasing for 132kV lines is estimated at £300k per tower. Similarly changing the terminations at the ends of circuits is estimated by industry as between £10k and £40k. In both these instances implementation would only be considered by industry on a cost/benefit basis.

53. The industry has indicated they will continue to optimal phase lines wherever possible when significant maintenance work is being undertaken or new lines are being designed and installed. It should also be noted that where a transposition tower is introduced to facilitate optimal phasing, the tower would generally be more visually intrusive, bulkier in design and more expensive to procure than a standard design tower.
54. The Government and the electricity industry have agreed to work together to consider how best to develop a code of best practice on optimal phasing in accordance with the above principles. This will define the circumstances in which industry can and will optimally phase lines.

ELECTRICAL EQUIPMENT IN HOMES

55. Electrical equipment and appliances all produce electromagnetic fields as a result of the wiring within the equipment, but to a larger extent as a result of the motor or transformer within the appliance.
56. SAGE did not identify any realistic mechanism for requiring changes to the design of equipment to reduce fields but did recommend the following:

SAGE recommendation:

Equipment manufacturers should investigate whether fields could be reduced at low-costs and whether offering consumer choice of low-field appliances could be an advantageous marketing strategy. The Health Protection Agency should provide information for householders on actions that they can take to reduce fields from equipment in the home

Government response

57. The Government considers this is a matter for industry, but supports the provision of information to households etc by the Health Protection Agency.

Explanation

58. As noted by SAGE, the design and operation of electrical equipment is governed by international and European standards and manufacturers usually manufacture in volume for an international market. Informal discussions with the industry suggest that whilst equipment will continue to be manufactured in line with the relevant standards, it is unlikely that manufacturers would develop and market low-field appliances unless there was consumer demand for such equipment.
59. The Government notes the Health Protection Agency's support for the SAGE recommendation but also their note of caution that the health claims or energy efficiency claims which may be used to market such appliances should be proportionate to the benefit.
60. As discussed in more detail on paragraphs 79-81 of this document, the Government supports the provision of information to householders about actions they can take to reduce exposure to electric and magnetic fields. Well-informed citizens can make their own choices about whether to take actions to reduce exposures in the home and it may be that in future, demand for low-field appliances encourages the industry to develop such products.
61. In the meantime, the Government believes it is for the industry to note SAGE's recommendation on this matter and the advice from the World Health Organization which is set out below and take action where they consider it is desirable to do so.

WHO Advice

62. The WHO advises that when constructing new facilities and designing new equipment, including appliances, low-cost ways of reducing exposures may be explored. Appropriate exposure reduction measures will vary from one country to another. However, policies based on the adoption of arbitrary low exposure limits are not warranted.
(<http://www.who.int/mediacentre/factsheets/fs322/en/index.html>)

WIRING PRACTICES

63. The primary focus of SAGE was to reduce exposure to magnetic fields since it is these that are associated with childhood leukaemia. SAGE therefore recommended a package of measures to apply to all new homes and when rewiring work is being undertaken. Each of the recommendations is discussed individually below.

SAGE recommendation:

Use of rotating-disc electricity meters should be phased out. There is already a strong trend to this and 95% of meters currently being installed in new properties, and to meet re-certification requirements, are electronic. However, it is not clear how this can be made mandatory.

Alternatively, depending on how effectively a move to electronic meters can occur, DCLG (formerly ODPM) should modify the Building Regulations to specify that electricity meters and consumer units for new homes should not be located close to high-occupancy areas.

Government Response

64. The Government believes that the transition to solid state meters is likely to be aided substantially by a roll-out of smart meters. The Government has already announced its intention to mandate smart meters together with an indicative timetable for completion of end 2020.

Explanation

65. The Government notes that the number of rotating disc meters being installed by electricity companies is relatively small. In addition, this recommendation should be considered in the light of the Government's announcement in October 2008 that it intends to mandate smart meters for all domestic households in Great Britain with an indicative timetable for completion of the roll-out by the end of 2020. The transition to solid state meters is likely to be aided substantially by the smart meter roll-out, as smart metering lends itself to electronic solid state designs due to the more complex functional requirements. The Government consulted recently on detailed proposals for the roll-out and its response will be published in due course.

66. For business customers, the Government has introduced a requirement for advanced metering to be provided for all customers in electricity Profile Classes 5-8 by April 2014. For other non-domestic customers, the Government's recent consultation set out its approach to providing smart or advanced metering to all sites by the end of 2020. The Government's response will be published in due course.

SAGE recommendation:

The Institution of Engineering and Technology (IET) should issue guidance to electricians (contained either in the On Site Guide or as a separate Guidance Note) recommending the change to radial power circuits, keeping “go” and “return” currents together, and keeping meter tails together. The IET Wiring Regulations Policy Committee should consider this, and the Government representatives on this committee should take responsibility for monitoring acceptance and implementation of this recommendation. We considered the alternative of recommending a change to BS7671 (the “wiring regulations”), but felt that guidance to electricians would be just as effective and easier to achieve.

Government Response

67. The Government asked the IET Wiring Regulations Policy Committee to consider this recommendation. The Committee has discussed the matter but does not consider that new guidance to electricians is justified. However, the Government will work with the HPA to highlight the importance of regular testing of wiring as part of guidance to householders on reducing the risk of exposure to electric and magnetic fields.

Explanation

68. This matter has been put to the IET wiring committee by Government for their consideration. The Wiring Regulations Policy Committee (WRPC) does not consider that there is sufficient evidence to support the implementation of the recommended changes. The WRPC has stated that correctly installed circuits should not give rise to high magnetic fields and that the emphasis should therefore be on ensuring circuits of any type are installed correctly and in good condition. Guidance Note 3 (Guidance Note 3: Inspection & Testing, 5th Edition) stresses the importance of inspection and testing and in particular recommends that domestic properties should be tested periodically. The Government will work with the HPA to ensure that advice to householders highlights the importance of regular testing of electrical installations.

SAGE Recommendation:

BS7671 should be changed to require Residual Current Devices (RCD) for the whole installation. We understand this is likely to happen with the next revision in January 2008 anyway, but if it does not, then the IET should implement it as guidance for electricians as for the previous options.

Government Response

69. This change has been largely implemented for domestic properties.

70. Residual Current Devices (RCDs) detect imbalances between the live and the neutral current and disconnect the devices to which they are attached. Such imbalances give rise to electromagnetic fields. Therefore RCDs also offer protection from abnormally high electromagnetic fields. The 17th edition of BS7671 which came into existence on 1 July 2008 includes increased requirements for RCD protection in domestic properties so as to cover any socket outlet and concealed twin and earth cables. In practice, this amounts to a requirement for RCD protection for the vast majority of the property. There will continue to be some circuits which will not be protected by RCDs e.g. for smoke alarms, where the harm that could arise from disconnection of the devices far outweighs the benefit of protection from an imbalanced current.

SAGE recommendation :

That where high magnetic fields as a result of house wiring are identified in an existing home, the source of those fields should be removed or remediated.

To identify high fields in existing homes, it should be an option that a simple measurement of magnetic fields be performed when either a Periodic Inspection of the house wiring or a Building Survey in connection with the sale of the home is being performed.

Government Response

71. The Government supports the provision of additional information to the public.

72. As outlined elsewhere in the Government response, we support the provision of information to householders to enable them to make informed choices about taking action to reduce their exposure to ELF EMF. Householders should have the option of commissioning work to identify and rectify high magnetic fields where they are found to be associated with house wiring.

73. SAGE itself noted that international standards on EMF measuring procedures are currently being developed. Until such time as these standards have been adopted, we do not consider it appropriate to incorporate measurement techniques into standard practices and procedures.

74. At present, in England and Wales, the inclusion of a Home Condition Report (HCR) in the Home Information Pack (HIP) is voluntary. The HCR and other existing home condition assessments such as the HomeBuyer Report involve only a visual inspection which might indicate that further investigation may be necessary and then it is up to the buyer to decide whether to commission this.

75. The Government recognises that property condition is an important consideration when buying a home and has established a stakeholder working group to look at options to ensure consumers receive appropriate information on a property's condition. As work on developing the international standards on EMF measurement procedures progresses we will keep this under review to see if there is merit in pushing for its inclusion in condition surveys as part of the home buying /selling process.
76. We note that unusually high readings can be an indicator of a faulty installation and therefore action to remediate the fault should reduce the EMF generated.

PROVISION OF ADVICE TO THE PUBLIC AND ONGOING MONITORING OF THE SITUATION

77. SAGE made two recommendations relating to the provision of advice to the public about exposures. These are set out below.

SAGE Recommendation:

HPA should produce information for householders on sources of field and steps that can be taken to reduce them.

More information should be provided to members of the public about exposures and the actions they could take themselves to reduce exposures if they wished. We consider that the HPA would be a suitable body to issue such guidance, but whoever compiles it should consult at least the same range of stakeholders as are represented on SAGE, and should ensure that the information they provide reflects the spirit of this assessment.

Government Response

78. The Government supports both SAGE recommendations.

79. The Government is supportive of the intention of this recommendation and we will work with the Health Protection Agency (HPA) to identify appropriate and proportionate guidance to householders and members of the public on this matter. However, we also note the HPA's comment that advice and guidance should be evidence based, proportionate to the risks identified by authoritative bodies and should be presented in the context of other hazards in every day life. The HPA point out that raising awareness of a hazard without giving advice on how to reduce exposure could cause anxiety and attendant health detriment especially for those who currently live near to high voltage powerlines. This is an important consideration when viewing the potential public health benefits from the measures that SAGE has proposed. The full text of the HPA's response to SAGE's recommendation on the provision of information is available on the HPA web site at

http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1204276682532?p=1207897920036

80. In this regard, the Government notes the recent publication of a report by the Department for Communities and Local Government "Review of Health and Safety Risk Drivers"¹⁵ which considered the relative hazards inside buildings, ordered by their relative importance in terms of risk of harm in or around dwellings and

¹⁵ <http://www.communities.gov.uk/publications/planningandbuilding/reviewhealthsafety>

especially the hazards that are controlled or could be controlled by regulation. Thirty-three hazards are ordered by their domestic risk index score. The report contains a comprehensive risk assessment process that categorises the severity of harm, assesses the strength of evidence, the numbers of people affected and calculations are based on a matrix methodology.

81. In terms of severity of injury and numbers involved, hygrothermal conditions (the effect on health from either low- or high-temperatures and humidity), and slips, trips and falls are among the most severe – attracting the highest index. By comparison, electromagnetic fields are at the bottom of the list with a risk index of “no basis for risk assessment”. The chapter on EMF cites a number of key papers and it, as well as the whole document, has been peer reviewed.

NEXT STEPS

As outlined above, the Government will:

- a. consider with industry and local authorities how to incorporate the 1998 ICNIRP guidelines in terms of 1999 European Recommendation (EC/519/1999), into the planning system with regard to proposed developments near to high voltage power lines,
- b. incorporate Government policy on EMF levels in terms of the EC Recommendation and industry compliance with ICNIRP standards for new overhead power lines of 132kV and above into the Electricity Networks Infrastructure National Policy Statement for use by the Infrastructure Planning Commission when determining consent. Reference ICNIRP and industry compliance in guidance on the section 37 process produced by DECC in April 2009 for England and Wales and furthermore into any related documents produced by the Devolved Administrations,
- c. work proactively with the electricity industry to consider the implementation of optimal phasing for overhead power lines, through development of a voluntary code of practice,
- d. ask the regulator to monitor the installation of rotating disc meters particularly in the light of developments in the roll out of smart metering,
- e. keep under review the case for incorporating EMF measurement techniques into building condition reports as part of the home buying/selling process.
- f. work with the Health Protection Agency to develop clear information for the public on the risks of exposure to ELF EMF and the steps that can be taken to reduce exposure,
- g. ask the Health Protection Agency to keep under review the possible relationship between childhood leukaemia and other causes of ill-health and exposure and report back to Government any new scientific developments as they emerge.
- h. continue to explore the range of precautionary options through a forum such as SAGE. This is especially relevant to the exposures from lower voltage distribution, substations and transport not hitherto considered by SAGE.