



**Government response to the Stakeholder
Advisory group on extremely low
frequency electric and magnetic fields (ELF
EMFs) (SAGE) Second Interim Assessment
on Electricity Distribution (including low-
voltage and intermediate-voltage circuits
and substations) and Report on
Discussions on Science**

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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) Second Interim Assessment on Electricity Distribution (including low-voltage and intermediate-voltage circuits and substations) and Report on Discussions on Science

The UK Government's Departments of Health, Energy and Climate Change and Communities and Local Government have produced this statement jointly as a response to the Second Interim Assessment of the Stakeholder Advisory Group on Extremely Low Frequency Electric and Magnetic Fields. This response has been drafted in consultation with the Devolved Administrations and other Government Departments. The Government Departments and the Devolved Administrations have agreed that the content of this response properly represents their departmental and devolved interests.

Executive summary

1. The Government is grateful to SAGE for the time and commitment it has made to produce the detailed recommendations and advice contained in this Second Interim Assessment¹ on Electricity Distribution (including low-voltage and intermediate-voltage circuits and substations) and Report on Discussions on Science.
2. We have considered this report carefully and in detail, and are now responding to the recommendations it has made. In developing this response we have taken into account the advice provided to Government by the Health Protection Agency (HPA)².
3. The Government welcomes that SAGE has focussed on providing practical and low cost recommendations that would not require the introduction of or any changes to existing legislation if Government were to take the recommendations forward.
4. The Government is of the view that many of the recommendations made in this report support existing industry practices that are also beneficial in EMF terms. It is the Government's role to ensure the public are well informed on these matters and to ensure that public exposure guidelines for EMF are complied with by the relevant industries.
5. However, we consider that there is not a mandatory requirement for Government itself to intervene or to introduce new measures to

¹ <http://www.emfs.info/Related+Issues/SAGE/SAGE+downloads.htm>

² HPA letter dated 12 August 2010. To be published on the HPA website at: <http://www.hpa.org.uk/>

address the recommendations made in this report in order to protect the public health. Where SAGE has specifically requested that Government asks industry to formally adopt, endorse or reinforce best practice that is already taking place, we will consider such requests with the relevant industry and explore their willingness to formalise such best practice either in a voluntary code of practice or something similar, acknowledging that to do so might also help reduce public exposure to EMFs.

6. Government will continue to work with the HPA to raise public awareness of EMF issues and to ensure helpful and proportionate public health messages are maintained.
7. For those recommendations that fall to Government and the electricity industry for consideration, we will explore and discuss with members of the industry through the Energy Networks Association (ENA) if they would be willing to produce one or more industry Engineering Recommendations in response to some of the proposals made by SAGE. An Engineering Recommendation is a document developed and adopted across the industry as good engineering practice. We consider that this would be a more helpful and binding arrangement should industry agree to adopt SAGE proposals. We envisage such Engineering Recommendation(s) to cover:
 - Net currents in distribution circuits; and
 - Final distribution circuits
8. Government notes that in the case of net currents we would also need to communicate the messages for endorsing best practice to the professional and trade bodies for gas and water industries. For the options relating to wiring in multi-occupancy buildings such as siting plant rooms away from occupied areas for new build, again, for these recommendations, Government agrees it will reinforce such messages to the relevant professional bodies. This will be explored initially through relevant standardisation committees on which the Government is represented.
9. SAGE has also made recommendations regarding future investment and maintenance of the electricity networks. Any decisions relating to these matters are commercial ones for the Distribution Network Operators (DNOs) to make and the Government has no place in determining these. Likewise, it is not Government's role as SAGE has suggested to become involved with endorsing industry training or intervening in how DNOs investigate EMF issues. Our role is to continue to provide information and raise awareness of ELF EMF issues for the public.
10. The SAGE Science Forum did not produce any recommendations for Government consideration in this report. However, we agree with both SAGE and the HPA that ELF EMF health effects are a very

complicated area of science. The Government and HPA consider that there is a broad consensus among recognised expert bodies in the UK and elsewhere on the ELF EMF science and health. However both the Government and HPA are aware that there are a range of opinions that also exist in the public domain regarding the possibility of health effects, and that understanding why this spectrum of opinion exists would help HPA and other regulatory and advisory bodies improve their delivery of advice to the public, Government and industry.

11. As such, Government welcomes HPA's initiative to actively consider the future remit of its EMF discussion group or similar, comprising stakeholders with knowledge of or an interest in this area of science, possibly including some members of SAGE, to continue to explore why different interpretations of the science exist.

Future of SAGE

12. In this report, SAGE had asked Government to reconfirm that it did want SAGE to continue, to think about policy issues that it may want SAGE to consider, and to confirm that Government will seriously consider any emerging advice from SAGE in the future.
13. The Government is committed to a continued dialogue to explore remaining or emerging EMF issues that concern people, and is very appreciative of the hard work and commitment of SAGE members to produce two helpful and informative reports. Unfortunately Government funding for a formal dialogue process as currently constituted cannot be guaranteed at present. Consequently, the other funders of the SAGE process – the electricity industry and the charity Children with Leukaemia (now Children with Cancer UK) – have decided they would be unable to fund the process in its present form alone, and the difficult decision has been made to disband SAGE.
14. The Government confirms its wish to continue dialogue in some form afresh, retaining the valuable lessons that have been learned from the SAGE process. We understand that a new stakeholder group is likely to be formed by the two other funders so that dialogue can continue albeit at a lower level of activity to SAGE. The Government would welcome the opportunity to participate in such a stakeholder group on an observer basis and confirms it is strongly committed to keeping the science on EMFs under review.

Background

International Exposure Guidelines

15. 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)³ were published in 1998 and adopted by a European Council Recommendation⁴ 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.
16. 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 over many decades of scientific research since the discovery of electricity and the introduction of its practical use. The electricity industry in the UK currently complies with these guidelines in terms of the EU Recommendation.
17. ICNIRP published⁵ revised guidelines covering the range 1Hz to 100kHz in December 2010. The HPA will be considering these new guidelines as part of their scientific review cycle. Should the EU decide to revise its 1999 Recommendation based on these new ICNIRP guidelines, it will be for Government to consider at that time and to decide whether they should be adopted in the UK or not.

The SAGE process

18. 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.” SAGE has been made up of organisations representing a broad spectrum of views, including people from local interest groups, campaign groups, academic researchers, relevant industries, Government (Department of Health, Department for Communities and Local Government, Department of Energy and Climate Change,

³ ICNIRP (1998) <http://www.icnirp.org/>

⁴ 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)

⁵ <http://www.icnirp.de/documents/LFgdl.pdf>

Devolved Administrations) and the HPA, bringing together many areas of expertise. The Department of Health hosted the SAGE discussions with funding provided jointly by the electricity supply industry, the Department of Health and the charity Children with Leukaemia.

19. SAGE has looked in turn at EMFs produced by different sources, the appropriate level of precaution and the practical measures that might be taken to reduce EMF exposures for the public. The Group has produced two reports in which it makes recommendations to Government. The first interim assessment on Power Lines and Property, Wiring in Homes, and Electrical Equipment in Homes⁶ was published in April 2007. The HPA gave advice to Health Ministers on the SAGE first interim assessment in October 2007⁷. The Government responded to SAGE in October 2009⁸. Government took forward SAGE recommendations regarding the optimal phasing of high voltage overhead electric lines, home electrical appliances and household wiring. The Government is now responding to SAGE's second interim assessment published in June 2010 covering low voltage electricity distribution (e.g. 11kV lines, underground street cables, substations etc) and the difficult issue of how different people and groups approach and interpret the available scientific evidence.

Current advice in the UK

20. The Centre for Radiation, Chemical and Environmental Hazards 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 2004⁹. It 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 and these recommendations started the SAGE process. The NRPB became part of the HPA in April 2005.
21. The Department of Health, on behalf of Government, asked the HPA for its advice on the SAGE second interim assessment. The HPA provided its advice¹⁰ on 12 August 2010.

⁶ SAGE first interim assessment at:

<http://www.emfs.info/Related+Issues/SAGE/SAGE+downloads.htm>

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http://www.hpa.org.uk/Publications/Radiation/HPAResponseStatementsOnRadiationTopics/rpdadvice_sage/

⁸ Government response to SAGE first interim assessment at:

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_107124

⁹ Documents of the NRPB Volume 15 No. 3 (2004), see the HPA website

http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1194947383619

¹⁰ To be published on the HPA website at: <http://www.hpa.org.uk/>

22. The HPA's advice has helped inform the approach taken by the various departments of the UK Government and Devolved Administrations with related responsibilities. These include:
- the Department for Communities and Local Government (DCLG) for planning aspects,
 - the Department of Energy and Climate Change (DECC) for the electricity sector,
 - the Department of Health (DH) for public health issues,
 - the Health and Safety Executive (HSE) for risks to health and safety arising out of work activities (for Great Britain),
 - the Department for Environment, Food and Rural Affairs (Defra) regarding water supply pipes, and
 - related departments in the Devolved Administrations.
23. Officials in each of these departments have engaged in a number of discussions with the relevant industrial and professional partners to develop ways of responding to the recommendations and advice.

The Government response to the SAGE Second Interim report

24. SAGE recommendations and observations were made in the following areas:

1. Net currents in distribution circuits
2. Wiring in multi-occupancy buildings
3. Intermediate voltage circuits
4. Final distribution substations
5. Training and response
6. Discussions on science
7. Future of SAGE

25. This Government response addresses each of the SAGE recommendations in turn below.

Net currents in distribution circuits

SAGE recommendations

- Distribution Network Operators (DNOs) make reasonably practicable effort to balance loads on three-phase final distribution circuits.
- DNOs assist customers who take a three-phase supply to balance loads to the extent reasonably practicable.
- DNOs investigate and repair broken neutrals.
- Disconnect redundant cables, when they are assessed as genuinely redundant, and when work is being done on the circuit anyway.

SAGE suggested that Government ask the Energy Networks Association (ENA) to adopt these as a Code of Practice or similar.

Government response

26. The Government welcomes SAGE's recommendations that highlight and reinforce existing good working practices by the DNOs. There is not a mandatory requirement for Government to intervene or to introduce measures here to protect the public health. The Government will however discuss with the electricity industry through the Energy Networks Association (ENA) the possibility of reinforcing such existing best practice through the development and adoption of one or more Engineering Recommendations across industry.

SAGE recommendations

- Use plastic gas and water pipes for new build.
- Insert plastic sections in metal gas and water pipes when work is being done anyway.

SAGE suggested that Government communicate reasons for these recommendations to relevant professionals and or trade bodies for gas and water industries.

SAGE also suggested that Government identify where the debate about use of plastic sections in metal pipes is being conducted and ensure that EMFs are part of that debate.

Government response

27. The Government is not aware of any existing guidance on EMFs aimed at installers of gas and water supply pipes. The Government considers that it would be appropriate to explore existing good practice generally regarding the circumstances where plastic and/or metal pipes are used, and to include EMFs in the discussion, initially with the standardisation committees for the electrical, gas and water distribution services on which Government departments are represented, then to communicate the outcome to the relevant trade bodies and associations.

Background and discussion

28. Full details of SAGE's options and rationale are given in section 9.1 of its second interim assessment.
29. SAGE noted from the HPA Residential Sources study^{11,12} that it is net currents in distribution circuits that contribute most to increasing exposures from magnetic fields in homes.
30. SAGE ruled out the option of removing the system of Protective Multiple Earthing (PME) used extensively in the UK. This would dramatically reduce magnetic fields in the home, but SAGE noted that PME is used partly to prevent electric shock, so to remove it would compromise safety.
31. SAGE therefore recommended reinforcement of existing practice in the areas of balancing loads, investigating and repairing broken

¹¹ Investigation of the sources of residential power frequency magnetic field exposure in the UK Childhood Cancer study. Maslanyj MP, Mee TJ, Renew DC, Simpson J, Ansell P, Allen SG, Roman E. *J Radiol Prot* (2007) 27, 41-58

¹² Health Protection Agency document HPA-RPD-005 available on the HPA website at: <http://www.hpa.org.uk/Publications/Radiation/HPARPDSeriesReports/HpaRpd005/>

neutrals, disconnecting redundant cables and using plastic gas and water pipes for new builds and in remedial work. SAGE recommended that the bodies responsible for these areas should be informed that EMFs constitute an additional reason for retaining them.

Balancing loads

32. SAGE's rationale was that, if the loads on the three phases are exactly equal, there is zero neutral current and hence no possibility of net current. Thus the better the balance of the load, the less is the net current.

Broken neutrals

33. SAGE commented that identifying and repairing broken neutrals improves network reliability and safety and that DNOs do this anyway. As SAGE itself noted, DNOs already have a legal obligation under the Electricity Safety Quality and Continuity Regulations (ESQCR) Regulation 7-1 "to take all reasonable precautions to ensure continuity of the supply neutral conductor". SAGE commented that it is not clear realistically what DNOs could do more than they do at present, except that they might be made more aware of elevated EMFs as a possible indicator of broken neutrals.

Disconnecting redundant cables

34. SAGE advised that it was not worth proactively seeking out redundant cables but this should be done when work was being done on the circuit anyway.

Use of plastic gas and water pipes in supply to homes

35. SAGE commented that the use of plastic pipes reduces alternative paths for net currents, and is already existing practice for new build. When retrofitting, inserting a plastic section in already existing metal pipework would also reduce alternative pathways for net currents. SAGE noted safety advantages in this but also noted that there was debate about whether the use of a mixture of plastic and metal piping is desirable or not. SAGE recommended that EMFs be considered in any debate.
36. The design and installation of gas supply pipes to buildings is covered by the Pipelines Safety Regulations 1996, and of gas installations within buildings by the Gas Safety (Installation and Use) Regulations 1998. The Government will approach appropriate Gas professional bodies regarding current practice in the use of plastic pipes. The design and installation of water pipes is covered by the Water Supply (Water Fittings) Regulations 1999.
37. The Government considers that, initially, discussion about good practice regarding use of metal and plastic pipes is best carried out by standardisation committees for the electrical and water distribution services on which Government departments are represented. There may be technical reasons not associated with EMFs that are

important to consider. It would also be important to maintain effective earthing. DCLG and Defra are represented on British Standards Institution (BSI) committee B/504/2, which is responsible for Standard BS 6700:2006+A1:2009, "Design, installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages". The Health and Safety Executive (HSE) and DCLG are represented on the joint Institution of Engineering and Technology/BSI committee JPEL/64, which is responsible for Standard BS 7671, "Requirements for Electrical Installations".

38. The Water Regulations Advisory Scheme have confirmed that there are no standards or guidance which recommend the sole use of plastic pipes. BS 6700:2006 gives specifications for metal pipes as well as several types of plastic pipes. BS 6700 is in the process of being replaced by BS EN 806 which covers similar ground.

HPA response

39. The HPA agreed with SAGE's recommendations provided they can be achieved at very low cost, do not compromise safety and do not give rise to unnecessary anxiety for householders. The HPA also commented that Government should consider that householders with the highest exposures may have the least ability to pay. The HPA has indicated that this comment was based on findings from the HPA Residential Sources Study and others which suggest that terraced homes and flats are more likely to have higher EMF exposures than detached and semi-detached homes, and that this is probably due to higher density housing and closer proximity to distribution circuits.
40. The Government agrees with the HPA view regarding cost and safety and that it is advisable to guard against the potential for such situations being exploited for commercial or other purposes. The Government considers that this aspect would be best covered, should the need arise, by existing consumer protection bodies. However the HPA's statement relating to householders' ability to pay for remedial work is not supported in their reply by any specific social and economic data, so whilst the HPA asserts this is the case there is no basis for Government action in this regard, and Government can only note the issue raised.

Wiring in multi-occupancy buildings

SAGE recommendations

- Site plant rooms away from occupied rooms
- Use Separate-Neutral-and-Earth (SNE) cables for risers
- Use compact risers

SAGE recommended that these options “should” be implemented for new build and “could” be implemented for retrofit.

SAGE concluded that Government should endorse what would be existing good practice and communicate the reasons for this to the relevant professional bodies (e.g Royal Institute of British Architects (RIBA), Chartered Institution of Building Services Engineers (CIBSE), Association of Consulting Engineers (ACE) and BRE (Building Research Establishment) Group.

Government response

41. The UK national standard for electrical installation work BS 7671, "Requirements for electrical installations", covers bonding of electrical installations to metal gas and water supply pipes; and in particular Chapter 44, which is currently being expanded, covers measures against electromagnetic disturbances. Both DCLG and HSE are represented on the national committee, JPEL/64, responsible for BS 7671, and the Government considers this to be the appropriate route for introducing further guidance on EMFs, which could then be communicated to the relevant professional bodies.

Background and discussion

42. Full details of SAGE’s options and rationale are given in section 9.2 of its second interim assessment.
43. Wiring within homes was considered in the SAGE first interim assessment. SAGE’s second interim assessment in general considered electricity distribution as far as the entry to a building. SAGE recognised also that consideration was needed for exposures in the case of wiring distributing power to individual units of multi-occupancy buildings – for instance risers supplying individual flats, which can be a source of exposure if a plant room is immediately adjacent to a residential unit or if the risers are separated-phase.
44. SAGE considered that plant rooms, containing for instance the meters, switchgear and distribution boards, can be a source of exposure because there is a concentration of current-carrying cables that are not necessarily well bundled. SAGE considered that the use of SNE cables would avoid further earth to neutral connections and therefore reduce the scope for net currents and associated fields.
45. SAGE concluded that the closer together are the conductors in a riser, the better the cancellation and therefore the lower the field produced.

46. SAGE concluded that Government should endorse what would be existing good practice and communicate the reasons for this to the relevant professional bodies.

HPA response

47. The HPA supported SAGE's endorsement of current practices for new buildings and recognised that there may be occasions when retrofit should not be ruled out in specific circumstances, for instance at very low cost or some other benefit. The HPA observed that it should be recognised that householders with the highest exposures may have the least ability to pay and that this should be considered in the Government decision.
48. Again, the Government is of the view that the SAGE recommendations reinforce and endorse existing practices which already comply with the relevant safety standards and international guidelines for exposure to ELF EMF. There is therefore no basis or added value for Government intervention. The Government however encourages industry to maintain current good practice.

Intermediate voltage circuits

SAGE recommendation

- DNOs make reasonably practical effort for heavily loaded double circuit intermediate-voltage lines to have optimal phasing and loads balanced between the two circuits.

SAGE suggested that Government ask the ENA to adopt this as a Code of Practice or similar.

Government response

49. The Government does not consider that presently there is a basis for intervention concerning intermediate circuits, other than to encourage existing industry good practice. SAGE acknowledged that these circuits are not normally a significant source of exposure, and HPA advice has been that further investigation of the costs and benefits of this option is needed before they could be more specific about their advice.
50. The Government will therefore keep a watching brief through its scientific advisory processes for any EMF related health issues that might arise from the increasing use of embedded generation.

Background and discussion

51. Full details of SAGE's options and rationale are given in section 9.3 of its second interim assessment.
52. SAGE's considerations regarding intermediate voltage circuits included overhead lines above 400 volts and below 132 kilovolts. (400V lines were considered under net currents in section 9.1 of the second interim assessment and 132 kilovolts and above in SAGE's first interim assessment.)
53. SAGE observed that these intermediate voltage lines would not normally be a significant source of exposure. This might change if the lines were unusually heavily loaded. SAGE identified that an increasingly common reason for a circuit being heavily loaded would be if it were connecting embedded generation. Due to the increasing use of alternative and renewable electricity generation the Government will keep a watching brief on this issue through its scientific advisory mechanisms.
54. SAGE's rationale for action in this area for double circuits was that the fields to the side of the line are reduced if the phasing is optimal and if the loads on the two circuits are as nearly equal as possible, leading to the greatest degree of cancellation between the magnetic fields produced by the two circuits and hence the lowest resulting field.
55. However, SAGE acknowledged that it would not be reasonable to expect optimal phasing to be achieved by replacing conductors that would not otherwise be replaced, or by building new structures such as new substations or new lines. The Government agrees that building new structures to achieve optimal phasing would be disproportionate.
56. SAGE also observed that even a heavily loaded line at these voltages would produce lower EMFs than a typical high voltage line and felt the principle by which circuits might be judged as being heavily loaded was unresolved. Given these observations, Government consider that it would be difficult to justify action in this area.

HPA advice

57. The HPA observed that many 400V, 11kV and 33kV lines and cables are single circuits and took the view that there may be instances where these and the double circuit lines may be routed away from homes without significant cost.
58. However, the HPA observed that further investigation of the costs and benefits of this option was needed before more specific advice could be given.

59. Given the lack of evidence for intermediate lines normally being a significant source of EMF exposure, there is no basis for Government to take action. However, the Government endorses existing good practice.

Final distribution circuits

SAGE recommendations

- Reasonably practicable efforts be made to site new substations distant from homes etc.
- New substations to have compact design where reasonably practicable.
- Use compact designs when refurbishing or replacing older substations where reasonably practicable.
- When older substations come to be replaced or refurbished, arrange components in the substation in the lowest-exposure layout reasonably practicable.
- DNOs to consider instances of existing substations producing high exposures when requested and, where practically feasible, to offer options for reducing the exposures at the consumer's choice and cost.
- DNO to record instances of substations producing particularly high exposures so that ELF EMF issues can be factored in to future investment and maintenance decisions for that substation. (This is a new SAGE initiative.)

SAGE suggested that Government should ask the ENA to adopt these recommendations as a Code of Practice or similar.

Government response

60. Where appropriate, the Government will explore with the electricity industry through the Energy Networks Association (ENA) the possibility of reinforcing existing good practice through the development and adoption of an industry Engineering Recommendation.

61. However, any decisions regarding future investment and maintenance of the electricity networks are commercial ones for the DNOs, and the Government has no place in determining these.

Background and discussion

62. Full details of SAGE's options and rationale are given in section 9.4 of its second interim assessment.

SAGE's basis for action

63. At the planning stage, SAGE noted that it would normally be good practice for non-EMF reasons – for example to limit noise and vibration – not to site substations close to occupied buildings, although this may depend on the available space in, for example, high density urban areas.
64. At the construction stage, regarding compact design, SAGE observed that “it is common practice to install a “unit” substation, where the transformer and LV board are bolted together (“close-coupled”) and form part of a single piece of equipment, and this ensures the compact design.” SAGE considered that this existing practice should be endorsed for EMF reasons.
65. At the refurbishment stage, SAGE also recommended that an existing non-compact substation could be replaced with a new substation that would clearly reduce exposure, and that this would usually be existing practice that should be endorsed for EMF reasons. SAGE also recommended that if, due to physical constraints of the substation or other factors, a compact design could not be fitted, then the components that produce the greatest exposure should be positioned as far away as practicable from any residential spaces. SAGE however acknowledged that this option might carry a cost, and that a health economics analysis would be needed to assess whether the cost outlay was justifiable.
66. SAGE considered that the DNOs should consider instances of substations producing elevated exposures when requested and offer options for reducing the exposures at the consumer’s choice and cost, and noted that this would often happen anyway. SAGE considered that the trigger would be when the substation produced elevated exposures in a home, school or other public building, and that a field of 0.4 microtesla should be used as a guide as to when the exposure is elevated. SAGE noted that there would be situations where no option is practicable or where options would be considered too expensive to implement.
67. SAGE recommended that DNOs should record instances of substations producing particularly high exposures so that EMF issues can be factored in to future investment and maintenance decisions for those substations. SAGE considered that, even though high exposures may not be a reason for taking action alone, they should influence decisions when they are taken for other reasons. DNOs would need to create a system to record exposures properly. SAGE intended that this option should apply to instances where exposures were well above 0.4 microtesla – that is several microteslas or tens of microteslas.

HPA advice

68. The HPA agreed with SAGE's proposals for new and refurbished substations. The HPA observed that it should be recognised that householders with the highest exposures may have the least ability to pay and that this should be considered in the Government decision.
69. The Government is of the view that there is not a mandatory requirement to intervene or to introduce the recommended measures through a Code of Practice in order to protect the public health. The Government notes that SAGE itself observed that no action is needed when planning new substations as they must already comply with relevant exposure limits, and SAGE thus just endorsed existing practice.
70. The Government, in this instance DECC, does not impose or approve engineering design for overhead lines or substations. However we consider that when refurbishing or replacing older substations, existing best practice should be applied more formally to the design. We will explore with the electricity industry the possibility of developing an Engineering Recommendation in this respect. The HPA has made an assertion that householders with the highest exposures may have the least ability to pay and that Government should consider this in any decision. As before, without supporting social and economic data to substantiate this statement, Government can only note the issue raised.

Training and Response

SAGE recommendations

- Information for the public

SAGE suggested that the Government should ask the HPA to undertake this action. SAGE's first interim assessment had made a similar recommendation, which is being taken forward by the HPA.

- DNOs to investigate when notified of instances of high EMF exposures

SAGE suggested that the Government ask the ENA to adopt this as a Code of Practice or similar.

- Develop awareness within DNOs, by training of relevant staff, of how elevated exposures can be an indication of system problems (but recognising that development of a workable training package is needed first).

SAGE suggested that the Government ask the ENA to develop such a programme and to adopt this as a Code of Practice or similar.

Government response

71. The Government supports the provision of information to the public and will work with the HPA to provide consistent, helpful and proportionate public health messages and raise awareness.
72. Whilst training and raising awareness of EMF issues for industry staff is important, it is not the Government's role to become involved with endorsing industry training or intervening in how DNOs investigate EMF issues. This is a matter, given SAGE's recommendations, for the industry to consider.

Background and discussion

73. Full details of SAGE's options and rationale are given in section 9.5 of its second interim assessment.
74. SAGE recommended that information should be readily available to the public to answer their questions. SAGE considered that there were also opportunities for proactive provision of information, for example using websites, leaflets and direct mailing. SAGE was clear that information should be part of the approach to EMFs, but did not reach a clear view on how this should happen and the best methods. SAGE considered that progress on this option should be monitored, and noted that a similar recommendation had been made in its first interim assessment which was being taken forward by the HPA.
75. SAGE also recommended that DNOs should investigate EMF issues when notified of them. SAGE acknowledged that this does happen to some extent but that a more systematic process was needed to trigger investigations.
76. SAGE considered that relevant DNO staff – for example those who might interact with the public on EMF issues – should have their awareness of such issues raised, so that they are more alert to reports of elevated EMFs from the public. SAGE considered that elevated EMFs could often be indicative of network problems and that it would be advantageous to pick up on these early.

HPA advice

77. The HPA agreed with SAGE's recommendations and indicated that they would be willing to assist in the development of these objectives.
78. The HPA also emphasised that developing awareness of ELF EMF issues should be based on a proportionate understanding of the risks,

especially in relation to other health risks. The Government agrees with this view.

79. The Government agrees that clear information should be available for the public and welcomes the HPA's offer to assist in development of this.
80. However it is not the Government's role to become involved with endorsing industry training or intervening in how DNOs investigate EMF issues. It is for industry to consider and take forward SAGE's recommendations as appropriate.

Discussions on science

81. In Section 10 of its report SAGE shared the Science Forum's experience and learning from discussions on the science. The Government agrees with both SAGE and the HPA that ELF EMF health effects are "a very complicated area of science" and acknowledges that there are a range of opinions that exist regarding the possibility of health effects. The Government also acknowledges the HPA's view that there is a broad consensus among recognised expert bodies in the UK and elsewhere.
82. The HPA advised in its consideration of the SAGE report that, as part of an ongoing engagement process, further exploration of why a spectrum of opinion exists would be useful, and understanding this would help in improving the delivery of advice on health risks. The Government considers that a group such as the HPA's EMF discussion group or similar, comprising stakeholders with knowledge or interest in this area of science, possibly including some members of SAGE, would be a useful forum to consider these issues.

Future of SAGE

83. The Government is grateful to SAGE for its members' time and commitment in producing both the first and second interim assessments, which have together covered power lines, house wiring and electricity distribution.
84. As SAGE has now considered, at least in the first instance, the main areas it was set up to examine, Government is of the view that in the current economic uncertainty it cannot commit to continue funding the SAGE process in its current form.

85. The SAGE process has been important in the way it has tackled controversial issues, and brought people with widely differing views together to discuss them and produce options and recommendations for Government to consider and take forward.
86. The Government is committed to future dialogue to explore remaining or emerging EMF issues that concern people. Although funding for a formal dialogue process cannot be guaranteed at present, the Government will continue engaging with appropriate parties, retaining the valuable lessons that have been learned from the SAGE process. The Government is committed to keeping the science on EMFs under review.

Next steps

- Government (DECC) will explore with the electricity industry, through the Energy Networks Association, the SAGE recommendations regarding net currents in distribution circuits and final distribution circuits and the potential for the development and adoption of one or more industry Engineering Recommendations;
- Government (DCLG and HSE) will explore through relevant standardisation committees on which it is represented best practice regarding the use of plastic utility pipes for new build and plastic inserts in existing metal pipes in remedial work, then encourage and reinforce messages to the relevant gas and water professional bodies to help reduce EMF exposures arising from net currents in distribution circuits. Government (DCLG and HSE) will communicate through its representation on the national committee JPEL/64 responsible for British Standard BS 7671 best practice to reduce EMF exposure from wiring in multi-occupancy buildings and encourage the continuance of existing best practice in this area;
- Government (DH) will continue to work with the HPA to raise awareness and provide consistent and helpful information for the public on EMF issues while keeping emerging scientific evidence under regular review;
- Government (DH) will keep a watching brief through its scientific advisory processes for any EMF related health issues that might arise regarding the increasing use of embedded generation; and
- The Government, through DH and other Government Departments where appropriate, remains open to a dialogue process and will maintain contact with other interested parties regarding ELF EMF issues.