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Children with Leukaemia

**The public's view on an appropriate response to the
relationship between EMFs and childhood leukaemia**

Final Report

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1. Executive Summary

1. Childhood leukaemia is seen as a serious health issue and therefore an important health issue. This is despite the fact that there is a low level of knowledge about its effects and causes beyond awareness that it is a cancer. Indeed, participants are surprised to learn it is the number one killer disease of children and several question why they have not heard more about it given this is the case.
2. Although there is substantial uncertainty about the potential causes of childhood leukaemia, environmental factors are spontaneously raised during initial discussions. This is prompted by a general awareness that installations such as mobile phone masts and nuclear power stations have been linked with cancer in general. As a result, the idea that environmental factors could be related to childhood leukaemia in particular is an obvious extrapolation.
3. However, only a small minority have any spontaneous recall of the specific association between high voltage power cables (HVPCs) and childhood leukaemia. For most this is new information, although their knowledge of the debate surrounding mobile phone masts means they easily accept that this could be the case.
4. Despite low initial awareness of the association between electric and magnetic fields (EMFs) and cancer generally and childhood leukaemia in particular, most of the people who took part in this research believe that something needs to be done to address this issue on the basis of the current evidence.
5. This belief solidifies, and in many cases intensifies, upon reflection and once participants have had a chance to further consider the evidence. As a result, when asked to express their views on whether action should be taken, 16 out of the 18 participants voted in favour of action being taken to address this issue; one participant voted against taking action, whilst one was undecided.
6. Participants spontaneously suggest several possibilities for action moving forward, ranging from burying HVPCs underground, or prohibiting the building of new buildings near HVPCs,

to using alternative energy sources and conducting more research. After exploration of the advantages and disadvantages of each option, participants vote in favour of either burying the cable underground or prohibiting building near HVPCs, with the former the preferred option.

7. Burying the cables is the overall preference. It is an intuitive solution, suggested spontaneously during initial discussions and raised again once participants had reflected on the issue. The support for this option is driven by the fact that it is solution focused, will have relatively quick results, and is immediately possible.
8. However, some participants are concerned about the possible environmental effects of burying HVPCs below the ground. They speculate about whether the EMFs emitted by the power lines will effect the earth itself and, as a result, the food chain. In response to these concerns, prohibiting building near HVPCs is seen as a good alternative option as it avoids creating further problems by burying HVPCs. However, participants are concerned that it will serve to isolate the problem rather than solve it. Clearly, more information about the environmental impact of burying cables is needed and had this been provided the support for this option may have increased.
9. In principle, most participants believe responsibility lies with the Government, given their overall duty to safeguard public health, and the electricity companies as the organisation operating the system. However, some believe consumers themselves as users of HVPCs have a role to play in funding changes moving forward.
10. Indeed, whilst few participants believe that consumers should take full financial responsibility for addressing this issue, most accept that realistically they will have to contribute towards changes. In principle, the suggestion of adding £1 a month to domestic electricity bills for 30 years is acceptable, although there is some feeling that it should take into account energy usage and ability to pay. However, participants feel strongly that consumers alone should not be responsible for the total cost of taking action. Participants say they are willing to pay to address this issue provided they are one of the contributing parties, with Government and private power companies contributing at least equal amounts.

11. As an overall point, participants became increasingly engaged with the issue and concerned from a personal point of view as the research progressed. Indeed, there was much discussion of the importance of raising awareness of this issue, to the extent that raising awareness was suggested by some as a means of addressing the issue on the basis that it would encourage the public to campaign for change. This highlights the importance for Children with Leukaemia of raising the profile of childhood leukaemia in the media in terms of garnering public support for action.

12. These personal concerns were evident when participants were asked their views on the current planning system for when applications are made for the siting of new HVPCs. All participants feel the current system is inadequate; it does not provide sufficient opportunity for public consultation and the use of notices in local papers is not sufficient or appropriate. As a result several suggest changes they would like to see made to the system in line with their expectations of other planning processes. This includes the provision of public meetings, more focused public information campaigns and the appointment of an independent local ombudsman with responsibility for deciding whether or not planning permission should be granted.

13. In conclusion, this research demonstrates the following:
 - Once people are given information about the association between childhood leukaemia and EMFs, there is strong support for addressing this issue now on the basis of the current evidence
 - As a short term option, prohibiting new building is supported although participants recognise this is not a comprehensive long term resolution
 - In the longer term, the preferred course of action is burying the cables as this is seen as the most complete solution to the problem
 - There is a strong feeling that responsibility and cost should be shared by government, the electricity companies and consumers
 - The public want more opportunity to have a say on where new HVPCs are sited through an improved notification procedure for people living and working close to new proposed developments

2. Introduction

2.1 Background to research

Historically, Children with Leukaemia's focus has been on capital investment, but over recent years the charity has been moving towards more revenue funding. In particular, the charity has been investing in research into the relationship between leukaemia and electric and magnetic fields (EMFs) and recently staged a major international conference during which the charity made its first statements about causation. Following the success of this conference, Children with Leukaemia is starting to engage directly with MPs and ministers on this topic as well as participating in the SAGE process (see below).

Simultaneously, the evidence base around the relationship between leukaemia and EMFs has been growing and recently, a high profile paper in the BMJ – the Draper Report – reported epidemiological findings from a major piece of research which provided further evidence of a link but not a causal relationship.

The Government has established the Stakeholder Advisory Group on EMFs (SAGE), which is jointly funded by the Department of Health, Children with Leukaemia and National Grid Transco. This body has recently been confirmed by ministers as the process advising government on what action needs to be taken.

The key topic for this group – and for Children with Leukaemia – is how the Government should respond to the EMF issue. The Government subscribes to the precautionary principle which means that they should take proportionate action on the basis of important evidence, even if it is not conclusive. This raises the issue of what constitutes a proportionate response in this situation.

In addition to the SAGE process, it is anticipated that a Parliamentary Commission will be established on this topic, for which Children with Leukaemia will act as the Secretariat and which will be designed to tie in with SAGE activities. The Parliamentary Commission will need to take into account the scientific evidence and legal background but also public opinion – critical for establishing what would constitute a proportionate response. If this is an issue that

the general public feel strongly about, Children with Leukaemia may also be able to use the research results to encourage the Government to take full account of, and act on, the recommendations of the SAGE process.

2.2 The objectives

There were two key objectives for this research:

1. To establish the public's perspective – and strength of feeling – on the issue of the relationship between childhood leukaemia and EMFs and their views on what constitutes an appropriate response.
2. To gauge public opinion on the current planning status of HVPCs; both in terms of the siting of new HVPCs near existing infrastructure, and the siting of new infrastructure near existing HVPCs.

2.3 Our approach

In order to address the two distinct tasks for this research: first, to explore spontaneous views on the topic based on the public's existing understanding of the situation, and then to enable the public to form an informed view, we adopted a two stage qualitative approach.

Initial group discussions were used to scope out spontaneous views, followed by a deliberative workshop with the same participants to consider the issue in more detail.

- Stage One: two group discussions (each of 10 people for 90 minutes) in North London on 15th August 2005
- Stage Two: one half-day reconvened deliberative workshop (18 participants for 3.5 hours) in North London on 1st September 2005

[It is interesting to note that the discussions took place at a time during which there was substantial coverage of energy prices in the media.]

During Stage One, the discussion covered:

- Views on a range of health conditions, including childhood leukaemia
- A more detailed discussion exploring awareness and knowledge of childhood leukaemia
- Spontaneous reactions to information about the association between childhood leukaemia and electric and magnetic fields

Participants were then given a set of briefing notes on childhood leukaemia and the relationship with EMFs, which they read through during the session to check comprehension, and then took away to consider in more detail.

Between the two stages, participants were directed to speak to their family and friends about the information received at the group stage and to complete a short questionnaire outlining their views once they had had a chance to re-read the evidence and reflect on the discussion.

During Stage Two, the discussion covered:

- Views on the initial briefing notes following further consideration
- The arguments for and against addressing this issue given the current evidence and participants' views on whether action should be taken or not
- The options for addressing this issue, the pros and cons of each and participants' preferences (participants were given some additional briefing notes at this point)
- Responsibility for addressing the issue
- Views on the current planning system (participants were given some additional briefing notes at this point)

In addition, Dr John Swanson , Scientific Advisor to National Grid Transco, and member of the Coordinating Group of SAGE, was present during the Stage Two workshop to answer any queries relating to the topic.

The full agenda for each session and the briefing notes given to participants are appended.

2.4 A note on potential bias

It is important to note that, although every effort was made to address potential bias, this research was conducted on behalf of Children with Leukaemia and therefore it is possible that there was some bias in the way particular elements of the debate were presented during the discussions. In particular, a decision was taken to direct the discussion on the current HVPC planning system to public involvement and consultation rather than reviewing the system as a whole initially, and this inevitably led to a focus on this issue which might not have emerged spontaneously.

However, care was taken to ensure that the briefing notes received by participants were as unbiased and factual as possible. The materials were initially drafted by Children with Leukaemia and then reviewed by Dr Swanson from National Grid Transco to check accuracy and presentation, and also by Opinion Leader Research to check comprehension and accessibility. Although Dr Swanson provided input to the briefing materials, he did not officially endorse them and the final version of the documents were Children with Leukaemia's responsibility.

In addition, Dr Swanson was present during the workshop to address any queries.

3. Main Findings

3.1 Context

Participants at the initial groups stage were asked to compare various health issues ranging from diabetes and asthma to cancer, in order to explore the relative position of childhood leukaemia. The issues considered were:

- Diabetes
- Asthma
- Obesity
- Brain tumors
- Childhood leukaemia
- Other forms of cancer

In the context of these other illnesses, cancer is the most salient health concern, and is seen as the biggest issue for society by most participants. This is primarily because it comes in so many different forms and because many know someone personally who has suffered from it.

Childhood leukaemia is seen as extremely serious by all participants too. This is because it is known to be a form of cancer and therefore it is seen as life threatening, something which people have no control over and do not fully understand.

“You’re ticking against a clock really.”

“It’s the biggest fear because it’s immediately life threatening and you can’t do anything to help yourself.”

Initially some participants believe obesity is as big a problem for society as cancer because it can lead to so many other illnesses and has such huge potential cost implications for the NHS if current obesity trends continue. Participants are aware of the emphasis Government is putting on tackling obesity and it is this that initially leads many to place it above cancer in terms of importance for society.

“They (the Government) are making it a concern aren’t they? They want us to be worried by it to hopefully help them in the long term.”

However, after consideration the consensus is that obesity is a concern because it is topical rather than as because it is as serious as cancer.

3.2 Views of childhood leukaemia

Childhood leukaemia is not seen as very high profile as there has been little, memorable, recent media coverage. Participants from both the initial groups stage recall Gary Linker’s son had childhood leukaemia, indicating how far back people have to go to recall an instance of childhood leukaemia that they have heard of and can remember something about.

Therefore, despite believing childhood leukaemia is serious, knowledge of the illness is limited, with many participants unsure what it really is. Some participants know it is cancer of the blood; others know that it is about white blood cells; and others are aware that it involves bone marrow. However, this level of knowledge is the exception and when asked spontaneously, the majority of participants simply know childhood leukaemia is a form of cancer.

Most participants are equally unsure what causes childhood leukaemia. Some question whether it is hereditary, whilst others believe lifestyle may be an influencing factor, but many feel unable to even hazard a guess as to the causes.

“I don’t have a clue and I wouldn’t like to speculate.”

Those who have had personal experience with the illness through family or friends (a couple of the total sample) are amongst the better informed; they know it is caused by having too many of a certain kind of white blood cell in both the blood stream and bone marrow. However, there were other participants with less personal experience of the condition but the same level of knowledge about it.

A few participants at both the initial groups question whether environmental factors are a cause of childhood leukaemia, and once prompted many others say they are aware of environmental factors and their association with cancer.

Mobile phone masts in particular are widely believed to be associated with cancer. Several participants recall recent media coverage or instances where local communities have actively opposed the citing of a new mast near schools or housing. Indeed, mobile phone masts are particularly well known given they are regularly the subject of media controversy; they are comparably new developments, and the long-term effects of them have not yet been established.

This discussion of mobile phone masts at both groups prompted discussion of wider environmental factors and their association with cancer and therefore, by association, childhood leukaemia. Electrical and nuclear sources are believed by some to be linked to cancer too, and therefore, by association, to childhood leukaemia. Indeed, there is a real sense amongst participants that pylons and power cables are 'bad', although there is no concept of why, or how dangerous they actually are.

Some participants know of streets or areas where a disproportionately large number of people have suffered from cancer and this arouses further suspicion that environmental factors are a cause of childhood leukaemia.

"Lots of people in one street I know all had cancer. It makes you wonder about what's going on with the environment around there."

Participants at both groups believe there is a link between electricity pylons and low cost, or social, housing. Whilst some believe this is primarily because of aesthetic reasons, others say people are aware of the health risks posed by living in close proximity to electricity distribution equipment and are concerned about HVPCs and their proximity to cheap housing in particular.

"You just wouldn't buy a house near a pylon would you? You'd think of the associated health risks and you wouldn't want your kids playing there."

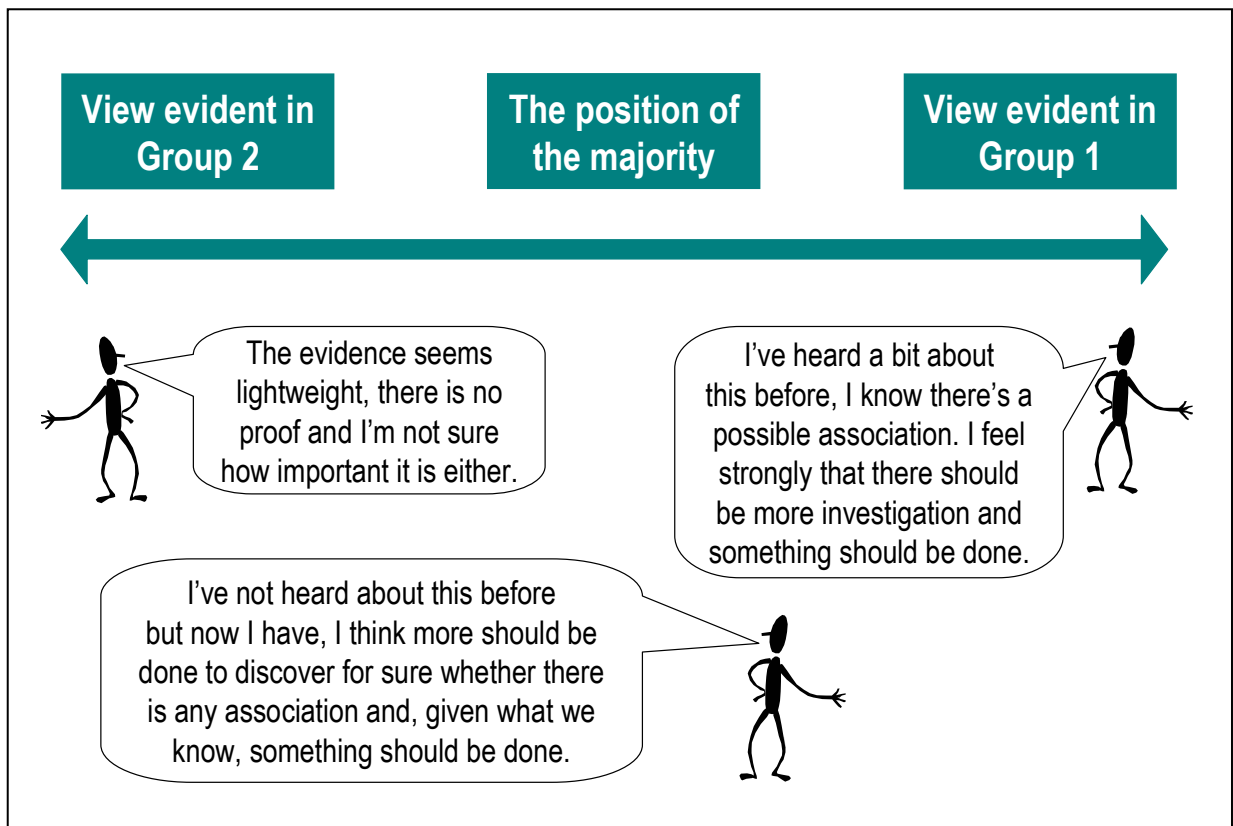
Several participants say they are concerned about the choices available to low income groups with regards to housing and HVPCs, and believe by allowing housing to be built near pylons the Government is acting irresponsibly and not protecting people in the way that they should.

3.3 Childhood leukaemia and EMFs

3.3.1 Initial reactions to the evidence

During the initial groups, participants were informed about the association between childhood leukaemia and EMFs and reactions to this information were explored. It was notable that the two groups displayed quite different responses to the evidence and a range of reactions are evident, with some advocating radical changes whilst others want more proof (see Figure 1 below).

Fig 1. Ranges of reaction to the evidence



In Group 1, there was some spontaneous awareness of an association between cancer – and therefore childhood leukaemia – and power lines. So, for many in this group, the evidence of an association confirms their suspicions that there is a link between childhood leukaemia and exposure to electric and magnetic fields. As such most are highly concerned and feel something must be done to address the problem.

“They’re (HVPCs) killing off our future generations.”

“This should definitely be researched at the expense of less worrying things.”

In contrast, most participants in Group 2 were unaware of the association between EMFs and childhood leukaemia prior to receiving this information. Whilst some participants express concern at the evidence, others feel the evidence is inconclusive and say they do not think that the issue needs addressing as it stands.

“If this is the case, if there’s a link, shouldn’t there be more cases then? There are so many sub stations and pylons and cables and if this is linked to it then why isn’t there more case of childhood leukaemia?”

“I think if (EMFs) was the common denominator people would be more worried about it, but...there’s a lack of cases so I think just get on with it.”

Despite the existence of these polarised views in the different groups, across the two groups as a whole the majority of participants fall somewhere in the middle; they have not necessarily heard about the link between childhood leukaemia and exposure to magnetic fields but, once they hear about it, they believe that something should probably be done about it, although it is not something that they feel particularly strongly about initially. There is strong support for the idea of investigating the issue further.

“It needs investigating. Everyone thinks atomic power stations cause cancer, it wouldn’t surprise me if electricity, high voltage had the same effect.”

“If there’s a suspicion anywhere in anyone’s mind then it should be investigated further.”

3.3.2 Considered reactions to the evidence

At the end of the initial groups, participants were given a briefing sheet providing more information about childhood leukaemia and its causes, and summarising the scientific evidence gathered to date about electric and magnetic fields and their link with childhood leukaemia. They were asked to take them away with them and consider the information and evidence in more detail and discuss them with their families, friends and colleagues prior to the reconvened workshop as well as to complete a short questionnaire. At the start of the workshop two and a half weeks later, participants fed back their thoughts and feelings about the information and evidence they had received.

Many were surprised to learn leukaemia is the number one killer disease among children, especially given they had heard very little about it before attending the groups, whilst others were interested and encouraged to learn that there is a 75% survival rate and ‘only’ 500 cases per year, and others still thought 500 cases per year was quite high.

“I really thought it was a death warrant but 75% is quite high isn’t it?”

“I was surprised there’s only 500 cases per year. I don’t know how many I thought there would be, but I definitely thought there would be more than that.”

“In a strange way, it’s encouraging that the number 1 killer of children is 75% curable and only 100 children die of it a year. I mean, it’s still awful but it’s less awful than I thought.”

“(I was surprised at) the amount of children affected. I thought the figure was much lower.”

After speaking to their friends and family most reported low levels of both knowledge about childhood leukaemia and awareness of the association with EMFs. This is in line with the

findings from the initial group stage. Some people they spoke to had heard of the disease, or may have read an article on it, however it is very much at the back of people's minds rather than a topical issue. Participants did however say many of their friends and family are aware of the health issues linked to the use of mobile phones, particularly the perceived link with cancer, and several believe electricity pylons are 'bad' – although not necessarily the cables.

“It's interesting the cables as well as the pylons are bad. It's not something you hear about as much. Certainly people I spoke to hadn't heard anything about the cables, just when new pylons were being put up.”

Several participants had questions for John Swanson, the scientific expert present at the workshop, about electric and magnetic fields in their homes and those they might encounter going about their lives on a daily basis. These questions highlighted an increase in levels of concern about the dangers posed by EMFs; indeed, many said they had started to notice the number of pylons and cables in a way they never have before and expressed concern at the frequency with which they come into contact with EMFs.

3.4 The arguments for and against addressing this issue

Participants worked in two smaller groups to list the arguments for and against taking action to address this issue. In addition to considering the argument from their own personal perspective, they were asked to consider the argument from the point of view of several other interested parties, including:

- Residents in an area near an HVPC
- Parents of young children
- Power companies
- Construction companies
- Local authorities
- National government
- Scientists

The two groups then came back together to compile a master list taking into account points of view of all the above parties.

The arguments for taking action were:

- No disadvantages to doing more research
 - Participants feel that doing more research is a minimum requirement, and that there could not be any disadvantages to pushing for more research to be undertaken as a response to the existing evidence of an association

- Safeguarding future generations / saving lives now and later
 - Participants feel that taking action would help to prevent children from developing childhood leukaemia

- Future and current savings for the NHS if something is done to address this issue
 - Reducing the need to use NHS resources to treat the condition is seen as an additional consequence of preventing children from developing childhood leukaemia

- Taking action could create jobs
 - The idea of burying the power cables had been raised during the initial group discussions, so participants identify job creation as a potential benefit of taking this course of action in particular

- Peace of mind
 - There is a strong feeling that it is important to address this issue in order to reduce people's concerns about it

- Raise awareness of the issue
 - Participants feel strongly that this is an issue that needed to be more widely recognised and debated, so are keen for action to be taken to raise awareness

- Would address other health problems

- The briefing notes that participants were given made reference to the potential association between EMFs and other health conditions, so participants feel that taking action would have wider health benefits
- Would improve the environment
 - Here, participants were referring to the potential aesthetic benefits of burying HVPCs and so removing unsightly pylons

The arguments against taking action were:

- Apathy
 - Some participants feel that this is not an issue that the general public feel strongly about and therefore it is not a priority for action
- Experiments on animals by scientists
 - As many feel that undertaking more research is a likely consequence of taking action on this issue, they identify the possible disadvantage of more animal experimentation as part of that research
- Cost
 - Participants believe that electricity prices would rise if action is taken, and that compensation would have to be paid to those affected; this also raises the question of who would cover these costs
- It takes time to initiate effective change
 - Some participants feel that it would take a significant amount of time to get agreement to take action on this issue, and that this in itself it a reason not to pursue the case
- Concerns about other electrical equipment which is beneficial might arise
 - There is some concern that drawing attention to the association between childhood leukaemia and EMFs might cause people to become concerned about the effect of other, beneficial electrical equipment such as life-support machinery

- Disturbance / disruption
 - This is primarily a point relating to the potential option of burying the cables; participants felt that the disturbance or disruption caused to people's property or land by any action would be a disadvantage

There was a noticeable change in the views held by several participants between the groups stage and the workshop. At the groups stage many are un-convinced by the evidence presented to them and are unsure whether something should be done to address this association between childhood leukaemia and EMFs. Indeed, some of those who are less convinced by the evidence and concerned about the potential risk of EMFs question the costs associated with change and consider the trade-off between cost to the tax payer and the number of lives that could potentially be saved.

"It's a lot of money for the Government to spend without real proof isn't it?"

However, the pre-workshop questionnaires reveal a discernable increase in concern about childhood leukaemia and EMFs (see appendix 3) and by the workshop most participants evidently feel quite passionately that something must be done to address this issue; even those who were not initially convinced or concerned by the evidence now say they believe steps should be taken to protect society from the potential risk posed by HVPCs and EMFs whatever the cost.

"If they think there's even the slightest link they should do whatever it takes, even if that's starting from scratch."

"Something definitely needs to be done now by an independent body - more research into the causes. Research can go on forever but some action should be taken immediately on the information already known."

"I think it definitely needs to be addressed. The information given means for 25% the news is very bad and currently 100 children would die a tragic death."

After discussion about the arguments for and against taking action to address this issue, participants were asked to vote as to whether they personally think that in principle action

should be taken. Sixteen of the eighteen participants voted for action in principle as they feel that it is an issue that should be addressed on the basis of the current evidence; one was undecided and feels more information is needed in order to take a decision; and one was against taking action given the costs involved and the fact that the issue does not affect him personally.

3.5 Possible actions to address the issue

At both the initial groups stage and the workshop, if participants said they think this is an issue that needs to be addressed, they were asked what should be done about it.

In the groups a number of potential options were suggested. Several participants believe it might be possible to run all electricity cables underground and so reduce or eliminate the EMFs omitted by them, others suggest creating a building exclusion zone around HVPCs or putting a stop to new building until more is known. The final course of action proposed at the groups is to insulate electricity pylons and cables. Participants believe the latter is probably the cheapest option but question whether this would be effective.

The question 'what should be done about this issue' was again posed to participants at the workshop after they had had a chance to consider the evidence further and form their own personal views more clearly. At this stage, participants spontaneously came up with a more extensive list of possible options for action moving forward:

- Bury the HVPCs
- Insulate the HVPCs
- Conduct research into other options
- Use alternative energy sources in new homes (e.g. solar panels, individual wind turbines)
- Stop siting new buildings near HVPCs
- Change the voltage levels in the power to reduce emissions
- Raise awareness of HVPCs and EMFs using the media

After arriving at this list at the workshop, briefing notes written by Children with Leukaemia were then given to participants outlining the policy options for reducing risk from high voltage overhead power lines, including possibilities for what could be done and three different options for covering the cost of these actions (see appendix 2).

Participants were given the chance to read through the notes and ask John Swanson any questions that arose from this. They were then split into groups of three to consider the pros and cons of each option in more detail.

In order to ensure these discussions were focused and productive, John Swanson was asked to step in at this stage to advise participants which of their suggestions were feasible and worth discussing further and which were not. Consequently participants did not discuss the possibility of insulating the cables or changing the voltage levels.

After discussing the pros and cons for each of the suggested actions in small groups, each group fed their views back to the wider group, who then discussed each option in more detail, building a list of advantages and disadvantages of each option based on the contributions of all participants. These views are detailed below along with comments that arose from individuals in the initial groups.

3.6 The arguments for and against each of the suggested actions

a) *Bury the HVPCs*

In addition to the aesthetic benefits, participants believe burying the cables would reduce or eliminate the EMFs and so both reassure, and protect, the public at large. A further advantage of this option is that building would not be prohibited. Indeed, participants believe house prices may increase in some areas if overland HVPCs and pylons are removed.

“It’ll save lives and have an immediate effect”

“Burying them won’t stop people building in certain places”

Several participants are however concerned about the costs associated with this option, as well as the time, and amount of damage, inconvenience and disturbance this option would involve. Participants also recognise that mending faults would become more difficult if the HVPCs were buried and some are concerned about the possible effects on the environment, e.g. to crops or the water table if EMFs are emitted by cables underground.

“If you put it (the cables) underground it might, well it’s (EMFs) still going to back to us from the food isn’t it?”

b) Conduct research into other options

The obvious benefit of this option is that if successful, further research could ultimately lead to a reduction in EMFs. Participants who are less convinced, or wavering, as to whether something should definitely be done are particularly keen on the suggestion that further research should be carried out into other options, as they believe it could potentially result in a more effective, cheaper option being found which would save money being invested into something which may not work, or is more expensive than necessary. A further consequential benefit of conducting more research into the other options would be the creation of jobs for researchers.

“It will save you putting money into something that in 10 years they decide is ineffective.”

Participants do however acknowledge that conducting research is a costly exercise in itself, especially as there is no guarantee as to how long it will take, or whether it will deliver a result at all.

“What if it doesn’t show anything even after years? It’s a waste”

c) Use alternative energy sources in new homes

The advantages of this option centre around the environment. Not only would using alternative energy sources in all new homes eliminate some of the future problems with

regards to childhood leukaemia if HVPCs cease to exist, or exist with decreased frequency; the whole environment would benefit from an increased number of homes utilising alternative sources of energy – from global warming, to the depletion of resources.

“It would help the environment in general I suppose. You always hear how we should be moving to trying new forms of energy to stop the energy crisis”

Again participants are concerned about the cost and feasibility of this option. In addition, some are concerned about widespread unemployment that would be created at electricity companies and National Grid, whilst others believe some alternative energy sources, such as wind generators, would be both noisy and unsightly.

“Well it would be noisy wouldn’t it? Imagine a great big wind turbine at the bottom of your garden, you wouldn’t want it.”

d) Stop building new buildings near HVPCs

Participants believe creating a building exclusion zone around HVPCs would ensure public safety from EMFs, in particular that of those less well off who are attracted by the cheap prices of housing built near HVPCs, and safeguard, or in the very least reduce, the risk for the next generation.

“Ultimately it’ll save lives of those who live near the cables”

However, questions are raised about the distance that would be required in order for this to be effective, and whether this distance would be feasible, especially in the South East where building space is in high demand. They believe the cost of housing would increase if space became even harder to come by and that the cost of living, in terms of travel, would increase for those forced to live further out of cities than they might otherwise be.

“The concept we’ve come up with as well is where would that new building be built? We’ve got green belt areas that obviously can’t be touched. And people won’t be very happy about that. So you’ve got to build it out further and then travelling to work is a problem.”

Furthermore some are concerned that advances in evidence over the coming years may mean the distance at which it is currently believed to be safe to build near HVPCs may change, thus rendering any exclusion zone previously arrived at ineffective.

Some simply do not think this is a realistic option – they do not believe private construction companies and local government would agree to this, not least because of the amount in compensation that would have to be paid to those currently living near HVPCs, but also given Government housing policy and targets.

“The construction companies would have to pay compensation – that’s not realistic, that would be like them admitting they caused it (childhood leukaemia).”

“The Government say they want to put up cheap, affordable housing, they’re not going to put this in prime locations, they’re going to put it near power cables.”

e) Raise awareness of HVPCs and EMFs using the media

Participants feel that using the media to raise awareness of childhood leukaemia and the association with HVPCs and EMFs would encourage the public to campaign for further action. Indeed, one participant felt it could lead to a referendum.

“Government would have a referendum for the people. They know how much people like voting totally against what they want so it would suit them.”

Others however believe this could be wasted money if the Government is prepared to do something about this issues regardless of whether there is widespread public support for it. Indeed, some believe that a public awareness campaign could create unnecessary panic and confusion.

“It would be like the beef scare, or eggs, or whatever. People go mad don’t they? ...they might want to start leaving areas in droves or something.”

3.7 The preferred option for further action

After discussion of all the options in plenary at the workshop, participants were asked to vote for their preferred option, or options.

Two options are clearly more popular than the others. Burying the HVPCs emerged as the most popular option with six participants voting for it outright as their preferred option and six participants voting for it in conjunction with stopping building new buildings near the cables. Indeed, stopping building new buildings near HVPCs emerged as the second favourite option, with six voting for it in conjunction with burying the cables and three participants voting for it outright.

Beyond these two options, two participants voted to stop building new buildings near HVPCs in conjunction with using alternative energy sources in new homes, whilst one participant voted for further research into other options for action. (See Figure 2 below.)

Fig. 2 Number of votes for each suggested action

SUGGESTED ACTION	NUMBER OF VOTES
Bury the HVPCs	6
Bury the HVPCs OR Stop building new buildings near HVPCs	6 joint votes
Stop building new buildings near HVPCs	3
Stop building new buildings near HVPCs OR Use alternative energy sources in new homes	2 joint votes
Conduct research into other options	1
Use alternative energy sources in new homes	0
Raise awareness of HVPCs and EMFs using the media	0

Those who vote in favour of burying the cables say they favour this option as it is solution focused, will have relatively quick results, and is immediately possible.

“It’s taking action now so the situation would immediately start to get better.”

“It’s current, quick, immediate, positive action.”

However, some participants who split their vote between burying the cables and stopping building near HVPCs do so because they are concerned about the possible environmental effects of burying HVPCs below the ground, particularly the effect on food and animals.

In terms of solving the issue in question, they don't believe stopping building near the cables is the best possible option - it will serve to isolate the problem rather than solve it, or halt the problem where it is now - however they are keen to avoid creating further problems by burying HVPCs, although in principle they favour this option.

“This option (burying the cables) is good but would we be solving one problem and creating another?”

“If we put the cables underground won't that mean that we're just eating crops which have absorbed electric fields so we're not actually solving anything?”

“I don't think stopping building new buildings will do anything to solve the problem. It'll stop it getting worse, or make sure it's only a problem for certain people in certain places, but it won't solve it.”

Those who vote to stop building new buildings near HVPCs outright do so because they believe it is a cheaper, more feasible course of action which shares the responsibility across a range of parties and is therefore less likely to be objected to.

“People won't want their houses or farms dug up to create tunnels for cables – you'll have to pay them.”

“This way, it's not just the power companies who will pay to solve it. Government and construction companies will play a role too so it's more likely to happen.”

3.8 Perceptions of responsibility

During the groups and at the workshop, participants were asked who they believe should be responsible for addressing this issue and who should bear the cost.

There is a noticeable difference between the attitudes of participants between the group stage and at the workshop, after participants had been given information outlining a variety of different ways in which the cost might be covered (see Appendix 2).

Initially, participants were unsure who should be held responsible, with many split in their views of who is responsible for addressing the association between childhood leukaemia and EMFs. Most believe that ultimately responsibility lies with national Government, even though they know they do not own the electricity distribution equipment. Some say that private companies should be responsible, although they do not think that they will not act unless they are forced to, as it is not in their best interests to incur cost by altering the current system.

Local Government is seen to have a role to play too by some, specifically in terms of planning applications which many believe should be considered more carefully and that the social and health costs and risks should play a greater role in decision making.

Some participants in the first group suggest a consortium of those with a vested interest in HVPCs should be held responsible for protecting society from the effects of EMFs. They believe this should include, amongst others, representatives from both national and local Government, Energywatch, National Grid, and private electricity companies.

“You’re talking about billions of pounds. It’s up to the people that the money is going to, those who benefit, to protect people...but the Government will need to orchestrate it.”

When asked the same question at the workshop and presented with ways in which the cost of the different proposed actions might be covered by different parties, participants express clearer views as to who they believe is responsible and the way in which action should be funded.

In principle, most believe responsibility lies with the Government and the electricity companies, and many build on the consortium idea which arose in the groups stage, saying they believe split responsibility is more likely to result in action being taken, rather than expecting one party to shoulder all the associated costs.

“If you’re asking one section to pay I don’t think it’s going to happen”

Those who believe the Government should accept responsibility and pay for action to address the link between childhood leukaemia and EMFs do so because they believe Government is duty bound to protect the nation and implement changes which will benefit the nation, and the nation’s health as a whole. As taxpayers, they feel the Government should invest some of ‘their’ money into something they are genuinely concerned about and an area where they want to see action being taken.

“They have a duty to the electorate.”

“They tax everything anyway so they have the money to do it.”

“They reckon they have so many billion that they don’t actually want for, for emergencies, surely this should be one?”

“£10 billion isn’t much when you think how much Government spend on war. Use some of that money for something we care about.”

Some participants are however concerned that relying on Government to fund action to address this issue will result in spending cuts in vital areas, and are keen to avoid such a situation.

“They shouldn’t divert money from health or anything...every time you ask for another chunk of money from Government they say, well it’s going to affect so and so. It doesn’t have to be like that.”

Others believe the electricity companies are ultimately responsible for addressing this issue and a range of different reasons for this view are expressed. Whilst some participants believe

electricity companies should be compelled to deliver a service that is safe to their customers, others believe they should shoulder the responsibility because they ultimately are the biggest beneficiaries of HVPCs, and some believe electricity companies should pay on the grounds that they object to consumers paying whilst board members of electricity companies receive 'fat cat' salaries.

"It's their scheme, and they should make sure that it's safe for us."

"It's their commodity isn't it? They make big profits out of it."

"We already pay enough in all honesty while they've got fat cats sitting around big mahogany tables who can well afford to do this."

Some participants however believe consumers themselves as users of HVPCs have a role to play in funding changes moving forward. Indeed, whilst few participants believe it should be the sole responsibility of consumers to pay for changes to occur, most accept that realistically they will have to pay something and they are not opposed to this.

"Well we're using it...we have to pay for what we're using don't we? Even though we didn't put it there (HVPCs), it's been provided to us and we're living on whatever it is that's being provided. The concerns that it's giving us are obviously not what we want but we can't live without it. I think that realistically if it was me I'd think, well you know, ok, we have to pay something."

3.9 Preparedness to pay

The briefing sheet handed out to participants at the workshop outlined a proposal whereby by adding an extra £1 a month on domestic electricity bills for 30 years to raise the £10bn needed for burying the power cables which run close to homes and schools. This is the most expensive option considered and therefore maximum amount consumers would be required to spend.

(See appendix 2)

Participants' views on this proposal were mixed. Whilst most are prepared in principle to pay something towards the cost of addressing this issue and feel an extra £1 a month for 30 years is an acceptable amount to be asked to spend, all object to this proposal on the grounds that the figure of £1 a month is arrived at on the basis that the total cost of £10bn would be shouldered by consumers.

£1 per month is seen a reasonable addition to domestic electricity bills, however this is on the grounds that it is a contribution to a larger fund also being contributed to by Government and private electricity companies.

“The figure £1 is about right, yes, but not on our own.”

“It wouldn't be fair to pay that because I don't think it's right that we should pay the whole cost of it.”

Participants feel that at the very most they should contribute one third of the total cost of burying the power cables, with the additional cost to be covered by Government and electricity companies. Some however feel one third would be too much, given perceptions of 'fat cat' salaries and the fact that Government is seen to have a duty to protect the nation.

“I think one third is too high. We should pay something like a quarter because they're the ones with all the money.”

Several participants also feel some kind of scale should be put in place to determine the level of contribution each household has to pay, rather than a blanket increase of £1 per month being introduced for all households. For some, this suggestion arises from concerns about ability to pay (i.e. for the elderly or lower social classes); others however suggest payments should be linked to levels of electricity usage in order to ensure those who use the most electricity contribute more than those who use lesser amounts.

“What about pensioners, people struggling to pay their rent, how are they going to pay for this? £12 a year will seem a lot.”

“Some people use a lot more electricity than others, they’re not your average. Like offices, and big buildings for a start – they should pay more.”

Fundamentally all participants are concerned that the suggested cost of £1 per month will escalate, or continue for longer than 30 years. Indeed, there is huge scepticism of Government and electricity companies; and of promises being broken. Participants say they would need some sort of guarantee if they are going to contribute financially to solving this issue e.g. ring fencing the capital for this work to ensure that it cannot be diverted into other activity.

“If you knew that they were doing to do it absolutely perfectly and as they said, if it was all going to work, and everything was going to be great then you’d be happy to pay.”

“They always lie about costs.”

A minority of participants (two) feel quite strongly that consumers should not be expected to pay, and say that personally they would not be prepared to pay an additional £1 per month. One participant says this is because they are elderly and will not benefit from these changes at all, another says it is because they live in London and do not encounter pylons and cables on a day to day basis, so feel they would be subsidising the benefits received by others.

3.10 Views on the current planning system

In addition to exploring public opinion on the issues around childhood leukaemia and EMFs, Children with Leukaemia also want to establish the public's perspective on the issue of deemed planning rights and in particular the current provisions for public involvement.

Participants at the workshop were presented with a diagram outlining the current planning process that occurs when an application for a new HVPC is submitted and given the opportunity to ask any questions they had. Views of this system were then explored in smaller groups.

Overall participants feel the current planning system is inadequate; it does not provide sufficient opportunity for public consultation and the methods of notifying the public of the plans to erect a new HVPC are not the most conducive to raising public awareness.

There is a general expectation that local residents will receive notification of proposed developments through notices on lamp posts or through leaflets delivered to their homes. Many have experience of this type of notification taking place for other types of development. As a result, they feel that receiving no notification is inappropriate, and that even the use of local papers is not sufficient because they are not widely read and people would be unlikely to pick up on a notice.

“I just can't believe we don't get the chance to have our say on something as important as this.”

“Who reads the local paper these days? And anyway it would probably be a tiny little advert placed on a really random page that nobody would ever think to look for.”

As a result, participants feel quite strongly that changes need to be made to this system to, in an ideal world, allow for more public consultation, and in the very least, to ensure greater numbers of those who will be affected are aware of the development.

“I bet people would be interested in this. It seems quite sneaky that local government aren't obliged to tell you regardless of the voltage.”

Participants' suggestions for alterations to the current system which they believe would result in a better planning system are as follows:

- The local planning authority (LPA) must inform the affected public
 - This includes those living, working or attending school within the vicinity of the proposed HVPC
 - This should be through letters delivered to homes, schools and workplaces, posters in public places and notices in the local press
 - Ideally, this information should outline the potential impact of an HVPC, including the current evidence on the association with childhood leukaemia
 - Participants were clear that this process should be carried out by the LPA rather than the electricity company, but that the electricity company should bear the costs

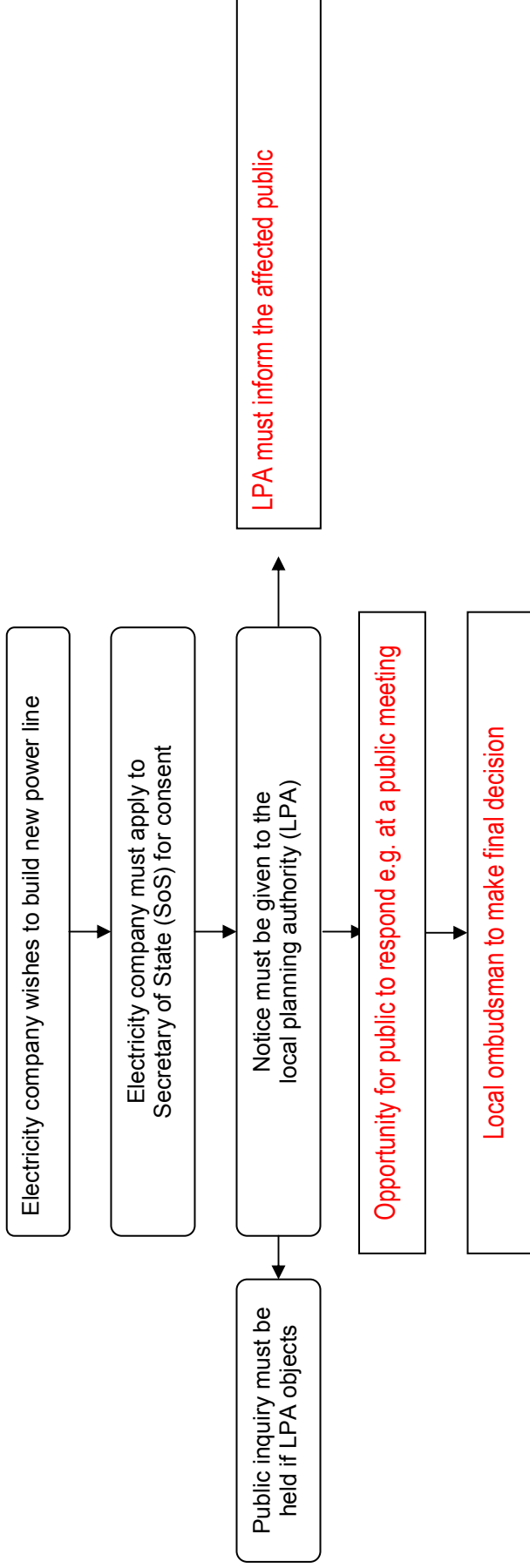
- The public should then be given the opportunity to respond
 - For example, some suggest that the LPA should hold a public meeting where residents can ask questions of local council representatives and representatives from the electricity company involved

- A local ombudsman should be appointed in each area with responsibility for making decisions about the siting of HVPCs once all points of view have been heard
 - There was some debate about the most appropriate decision making process, and participants are extremely sceptical about the independence of planning decisions made by local authorities
 - The suggestion of an ombudsman is seen as a way of ensuring that the final decision is taken as objectively as possible
 - Participants are realistic about the likely outcomes of such a process: they understand that new power lines will be required but would like the opportunity to voice their concerns and enter into negotiations as a recognised stakeholder in the decision making process

These changes are highlighted in Figure 3 below.

Overall, the consensus is that if the notification process is sufficiently thorough and residents or other affected parties are given the opportunity to comment, this would be sufficient. In other words, they do not feel that active consultation is always required.

Fig 3. Suggested revised planning system



4. Appendices

4.1 Appendix 1: Discussion guides

Discussion guide (Stage One group discussions)

<p>Introduction (5 mins)</p>	<p>Moderator to introduce self and OLR Explain that we are working on behalf of a health charity – will reveal who later on Want to explore views on some health issues Reassure on confidentiality Introduce any observers Obtain permission to tape</p>
<p>Warm up (10 mins)</p>	<p>Participants to introduce themselves</p> <ul style="list-style-type: none"> ▪ Name ▪ Work (if relevant) ▪ Family/home life ▪ What they would be doing if they weren't here this evening
<p>General discussion about health issues (10 mins)</p> <p>Stimulus:</p> <ul style="list-style-type: none"> ▪ Range of health issues on cards for mapping exercise ▪ To include childhood leukaemia, brain tumors, other kinds of cancer, asthma, obesity, diabetes, 	<p>Using a range of health issues on cards, moderator to lead a mapping exercise to explore the relative position of childhood leukaemia</p> <p>Participants to put the health issues into groups with something in common</p> <p>Moderator to probe on:</p> <ul style="list-style-type: none"> ▪ What the groups are ▪ Why these particular health conditions have been put in the same or different groups ▪ Note and probe the position of childhood leukaemia <p>Moderator then to direct participants to rank the health issues in different ways</p> <ul style="list-style-type: none"> ▪ How much they feel they know about each issue ▪ Which they are most concerned about personally ▪ Which they think are the biggest issues for society ▪ Which have the biggest impact on children's lives <p>Within each ranking:</p> <ul style="list-style-type: none"> ▪ Explore the reasons for the ranking ▪ Note and probe the position of childhood leukaemia
<p>Focus on childhood leukaemia (20 mins)</p>	<p>Moderator to hand out short self-completion questionnaire on childhood leukaemia</p> <p>Stress that we want participants to be honest and write down anything they think they know, even if they are not certain</p>

	<p>Then explore responses:</p> <ul style="list-style-type: none"> ▪ Have they heard anything recently about childhood leukaemia? <ul style="list-style-type: none"> ▪ If so, what can they remember hearing? ▪ Where did they hear it? ▪ What do people think causes childhood leukaemia? <ul style="list-style-type: none"> ▪ Are they confident about this? ▪ Why/why not? ▪ What is their impression about how serious childhood leukaemia is? <ul style="list-style-type: none"> ▪ For people affected by it directly? ▪ For society in general? ▪ Why do they have this impression?
<p>Initial discussion on the EMF issue (15 mins)</p>	<p>Moderator to briefly outline the possible relationship between childhood leukaemia and EMFs</p> <p><i>“Since the first publication in 1979, an increasing number of studies into the causes of human disease (epidemiological studies) have shown a link (association) between childhood leukaemia and exposure to magnetic fields. Electric and magnetic fields are created by the electricity supply system. Electricity distribution equipment (such as overhead power lines and substations) can produce high levels of both types of field.”</i></p> <ul style="list-style-type: none"> ▪ Is this something you have ever heard about before? <ul style="list-style-type: none"> ▪ If so, what have you heard about it? ▪ What is your initial view on this issue? <ul style="list-style-type: none"> ▪ Is it something that needs to be addressed? Why/why not? ▪ If it is something that needs to be addressed, what should be done about it? Why? ▪ If something needs to be done about it, who is responsible? <ul style="list-style-type: none"> ▪ PROBE: National government, local government, National Grid, house builders ▪ If a decision is being made about where to site a new HVPC, what should happen? <ul style="list-style-type: none"> ▪ PROBE: Who should make the decision? Who should be consulted?
<p>Briefing notes and task (30 mins)</p>	<p>Moderator to hand out briefing notes</p> <p>Participants to read through briefly, highlighting any terms/issues which are unclear</p> <p>Moderator to clarify if possible or make a note of the issue to clarify with the CWL team between the groups and the workshop</p>

	<p>Moderator to outline the task for participants before the workshop:</p> <ul style="list-style-type: none"> ▪ Read through briefing notes in detail ▪ Think about questions and complete short questionnaire ▪ Discuss with friends and family
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Workshop Discussion Guide

Session and Timing	Task	Materials
Introduction 6.00 – 6.15pm	<ul style="list-style-type: none"> • OLR welcome and outline background and aims of session • Participants to introduce themselves/ice breaker 	
Feedback from homework task 6.15 – 6.35pm	<p>In plenary, participants to share views from homework task:</p> <ul style="list-style-type: none"> ▪ Any surprises? ▪ What did your friends and family say? ▪ What are your views now? ▪ Has anything changed since our initial meeting? <p>Q&A session with expert (John Swanson)</p>	Flip chart / marker pens
Question One: Is this an issue that needs to be addressed? 6.35 – 7.15pm	<p>In small groups, participants to list the arguments for and against addressing this issue</p> <ul style="list-style-type: none"> ▪ Participants will be directed to consider this from their own personal point of view and the point of view of other interested parties, including: <ul style="list-style-type: none"> ▪ Residents in an area near an HVPC ▪ Parents of young children ▪ Power companies ▪ Construction companies ▪ Local authorities ▪ National government ▪ Scientists <p>In plenary, compile master list of arguments in favour of change and arguments against change</p> <p>Participants then to vote on which point of view they agree with most</p>	Stickers/post it notes for voting
Break 7.15 – 7.30pm		
Question Two: If this is an issue that needs to be	7.30 – 8.00pm Discussion in plenary to develop short list of possible actions to address the problem based on	Briefing notes on possible policy options

<p>addressed, what should be done about it? 7.30 – 8.30pm</p>	<p>participants' spontaneous views</p> <p>Participants then given briefing notes to consider</p> <p>Opportunity to ask any questions</p> <p>8.00 – 8.30pm</p> <p>In small groups, participants to discuss the options in more detail and develop thoughts on (N.B. Whether each group considers all the options or only some depends on the number of options identified):</p> <ul style="list-style-type: none"> ▪ The advantages/arguments in favour of each option ▪ The disadvantages/arguments against each option ▪ Who should be responsible <p>Groups then feed back in plenary to develop comprehensive list of pros and cons for each option</p> <p>Vote on preferred option at this stage</p>	
<p>Views on the current planning system 8.30 – 9.00pm</p>	<p>In plenary, participants to receive briefing on current planning system</p> <p>Moderator to outline the following and then hand out planning process flowchart:</p> <ul style="list-style-type: none"> ▪ Over the past few decades the population of the UK has increased and the number of people living in each household has declined, creating pressure for new housing ▪ At the same time reliance upon electrical appliances in the home has also risen ▪ The combined effect of these changes has been a substantial growth in the demand for electricity and as a consequence new transmission lines and substations are needed ▪ As well as pressure to build new transmission lines and substations, there is also pressure to build new homes and schools in locations close to existing transmission lines and substations, as the boundaries of residential areas expand ▪ Although building regulations exist to ensure the health and safety of people in and around all types of buildings, they do not specify any requirements restricting exposure to electric 	<p>Briefing notes on planning process</p>

	<p>and magnetic fields (EMFs)</p> <p>Opportunity for Q&A with expert</p> <p>In two smaller groups, discuss response to information on current planning system</p> <ul style="list-style-type: none"> ▪ Spontaneous response ▪ A good or poor system: why? ▪ If a poor system, what are the problems with it? ▪ What should be done about it? ▪ Who should be involved in making these decisions? <ul style="list-style-type: none"> ▪ Probe for views on importance/role of public consultation ▪ Who should be responsible for making the final decision? ▪ Recommendation for changes to the system 	
<p>Final discussion on preferred options 9.00 – 9.30pm</p>	<p>Participants to break into three groups to discuss three different scenarios:</p> <ol style="list-style-type: none"> 1. What should happen in those areas where houses/schools/etc are already sited near HVPCs? 2. What should happen when it is proposed to build houses/schools/etc near HVPCs? 3. What should happen when a new HVPC is being built? <p>Each group to develop a short list of options to address the situation</p> <p>Groups to feed back in plenary</p> <p>All to vote on their preferred option in each situation</p>	

4.2 Appendix 2: Briefing notes

1. Introduction to childhood leukaemia

Leukaemia is a type of cancer, affecting the bone marrow. It is the most common form of childhood cancer, affecting up to 500 children per year in the UK.

Without treatment, childhood leukaemia is inevitably fatal and until the development of modern therapies in the 1960s a diagnosis of leukaemia was tantamount to a death sentence for a child. Nowadays, however, the outlook is much more positive as developments in treatment and care have led to survival rates of above 75 per cent.

Nevertheless, leukaemia still claims the lives of more than 100 children every year in the UK, making it the number one killer disease among children.

Survival continues to improve as a result of ongoing trials of new drug combinations and treatment regimes in particular subsets of patients, aided by developments in molecular genetic technology. The aim of treatment is to achieve a state called remission where almost all leukaemia cells have been killed and, by further treatment, to completely eradicate the disease and achieve a cure.

Combinations of powerful drugs are used to destroy the leukaemia cells and bring the disease under control. Some children will also require radiotherapy, a bone marrow transplant, or both.

Children are treated at regional specialist centres which can be quite far from home. Their treatment may involve long spells in hospital, combined with regular outpatient visits. Treatment regimes last two years for girls and three years for boys, reflecting differences between girls and boys in disease outcome.

Whilst these modern treatments are successful in effecting a cure in the majority of children, they simply do not work in around a quarter of all children diagnosed with leukaemia. And those who survive go through years of unpleasant treatment which may leave them with long-term side effects.

The causes of childhood leukaemia are by no means well-established. Because it is a biologically diverse disease, with a variety of forms, it is likely that there are several different pathways to its development. All of these probably combine genetic susceptibility and exposure to external risk factors.

It is thought that there are two events that lead to the development of childhood leukaemia. First, in the womb, there are changes in some of the cells of the foetus and these become pre-leukaemic. In a small number of these children there is a second event at some point during childhood which triggers these pre-leukaemic cells to develop into full blown leukaemia. But there is no scientific consensus yet on the cause of either or both of these events. Exposure to x-radiation in the womb has been proven to cause leukaemia and it is thought therefore that exposure to natural background radiation in the air and the earth may be a risk factor. Exposure to chemical toxins – including in air pollution and pesticides – is thought to be important. There is some evidence pointing towards a link between development of leukaemia and a child's pattern of exposure to ordinary infections like coughs and colds in early life. And

there is now a substantial body of evidence for the role of electric and magnetic fields, such as those produced by power lines and electrical appliances.

Incidence of childhood leukaemia increased fairly steadily through the second half of the last century, most markedly in the under-five age group. The reasons for this increase are unclear but it almost certainly related to aspects of our changing lifestyle.

2. Do electric and magnetic fields cause childhood leukaemia?

What the scientists say.

Electric and magnetic fields are created by the electricity supply system. Electricity distribution equipment (such as overhead power lines and substations) can produce high levels of both types of field. But people can also be exposed to high levels of magnetic fields from common domestic appliances and to above-average levels of electric fields as a result of the way their houses are wired.

Since the first publication in 1979, an increasing number of studies into the causes of human disease (epidemiological studies) have shown a link (association) between childhood leukaemia and exposure to magnetic fields. These studies find a significant statistical association between the rate of childhood leukaemia and exposure to magnetic fields at very low levels (of between 0.3-0.4 microTesla [μT]), levels commonly found under or close to high voltage overhead transmission lines. More recently, associations have been found at greater distances from power lines, which may suggest an effect of electric fields.

Not all scientists accept this epidemiological association and some suggest that there may be other factors affecting people who are exposed to high levels of magnetic fields. However, the World Health Organisation has now classified magnetic fields as a "possibly carcinogenic" (i.e. possibly cancer-causing) and the UK's Health Protection Agency takes the statistical association seriously, identifying possible health implications at magnetic field levels of 0.4 μT or more.

But, even the clearest epidemiological association doesn't prove a causal link. So how could electric and/or magnetic fields cause childhood leukaemia?

Many laboratories have performed experiments to investigate whether electric and magnetic fields can cause cancer. So far few reliable effects have been demonstrated and there is, as yet, no universal scientific agreement. A lot more research needs to be done but the two most promising hypotheses involve melatonin and corona ions.

Melatonin, the hormone our bodies produce to put us to sleep and which has natural anti-cancer properties, is a possible link between magnetic fields and childhood leukaemia. Interrupted melatonin production has been demonstrated to increase cancer rates in animals and magnetic fields have been shown to suppress melatonin production in various human populations.

Electric fields, generated by high voltage overhead power lines, ionise the air surrounding them and produce corona ions. These highly charged ions have been shown to attach to pollutants in the air, creating charged particles of air pollution which, when inhaled, are more easily absorbed, potentially increasing the uptake of cancer causing agents near power lines.

Other reported effects of electric and magnetic fields can not be ignored, including: adult leukaemia and brain cancer, neurodegenerative diseases such as Alzheimers disease, suicide, depressive illness, cardiovascular disease and miscarriage. The growing number of homes in proximity to power lines in densely populated urban areas is increasing the number of children exposed to high levels of electric and magnetic fields.

3. Policy options for reducing risk from high voltage overhead power lines

There is now a substantial body of evidence indicating that there may be an increased risk of leukaemia in children exposed to high levels of magnetic fields such as those found close to high voltage overhead transmission lines (HVOTL). HVOTLs are the power lines carried on the largest pylons. There is also evidence suggesting an increased risk of childhood leukaemia amongst those living a little further away - beyond the range of the magnetic fields from such power lines but within range of effects associated with power line electric fields.

Whilst scientists continue their efforts to establish the existence – or otherwise – of causal mechanisms to explain the links between electric and magnetic fields (EMFs) and childhood leukaemia, the weight of epidemiological evidence is enough to justify the application of the precautionary principle. The precautionary principle aims to enable preventive measures, proportionate to the risk, to be taken in respect of something which is suspected to be harmful even before its adverse effects have been established beyond reasonable doubt.

What could be done?

Power cables can be buried underground. This removes the electric field effect and, if buried deeply enough and routed appropriately, can greatly reduce the magnetic field. Burying all HVOTL underground could therefore remove any harmful effects and afford protection to those who already live in homes close to HVOTL. However the cost would be in the region of £10m per kilometre and it is likely that around 1,000km of lines would need to be buried. This total cost of approximately £10bn would be incurred over 30 years of works.

A cheaper option would be to stop building new homes and schools next to existing overhead lines and to stop erecting new overhead lines near existing homes and schools. This would avoid the addition of new sources of exposure to EMFs whilst there is so much uncertainty over their safety. The costs of this option are made up of compensation which would be payable to house and land-owners near existing lines and also the increased cost of laying new lines underground or re-routing them to avoid residential areas. The cost of this option is likely to be about £2.5bn.

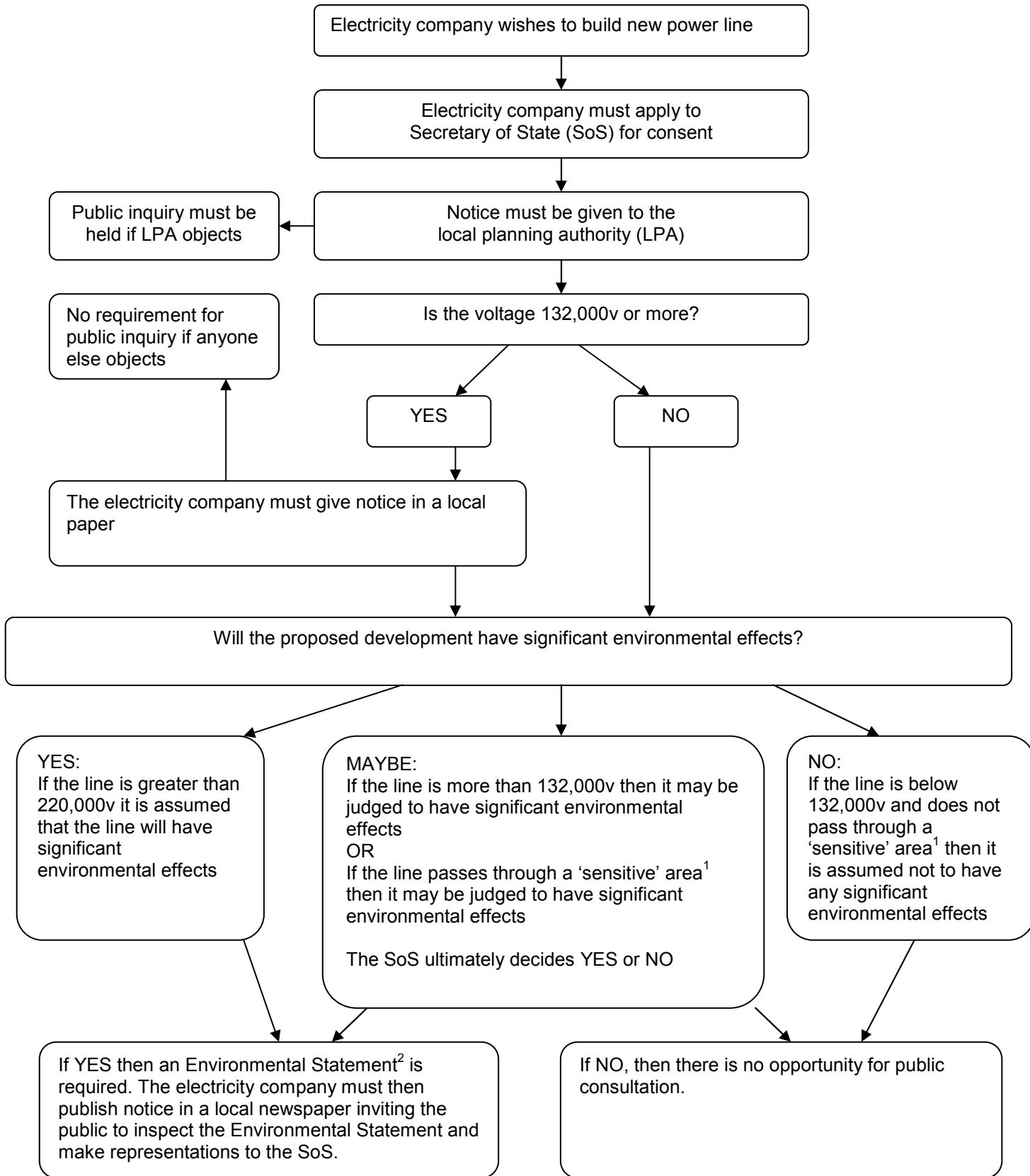
A third option is to do nothing. The only basis on which this could happen without the decision makers being negligent is if the cost of the other options was deemed to be disproportionate to the benefit to be derived.

Who should pay?

1. The electricity industry. The electricity industry works under a price regulator which allows it to recover its costs plus an agreed rate of profit from its customers. It could be determined that electricity companies work on a smaller profit margin, so reducing the dividends payable to share holders (mainly pension funds).
2. Government. If the government were to bear the cost on behalf of society out of tax receipts it would probably not be paid for by increased tax but at the expense of another form of government expenditure. This may result in fewer hospitals or schools being built, or a reduction in the number of civil servants.

3. Consumers. If the electricity companies were to be allowed to secure enough money from their customers to create a £2.5bn compensation fund to be spent over 30 years, it would add about **25p per month** to the average household electricity bill over the 30 years. To raise the £10bn necessary for under grounding the power cables which run close to homes and schools, it would be necessary to add around **£1 per month** to a domestic electricity bill for 30 years.

4.3 Appendix 3: Current opportunities for public consultation in the building of new power lines



¹ Sensitive areas are those which need to be protected from development, such as Sites of Special Scientific Interest and World Heritage sites but not areas of residential development.

² The Environmental Statement should include an estimate of expected emissions resulting from the operation of the proposed installation. The Statement should provide a description of the 'aspects of the environment' (including population) likely to be significantly affected - and a description of the likely effects resulting from the development. The Statement should also include an outline of the alternative options and an indication of the main reasons for the applicant's choice, taking into account the environmental effects.

4.4 Homework Questionnaire Responses

Was there anything in the briefing notes that you found surprising?

"That in particular leukaemia has been on the increase throughout the 2nd half of the century"

"It is pleasing to see that there is a 75% survival rate of children with leukaemia. Medicine must have advanced since my young days (77 yrs). I remember when it was a death sentence or all bad"

"Surprised that it is so common and that it could be found from quite so many causes. The amount of children affected, I thought the figure was much lower"

"The statistics"

"No"

"No not really, only that boys need longer treatment than girls"

"I found all of the info surprising i.e. 1) exposed to high levels of magnetic fields from domestic appliances and above average electric fields in the way your house is wired 2) in the first publication in 1979 its now 2005"

"That domestic appliances and the way houses are wired"

"I wasn't sure how children got leukaemia, for example that it could stem back to cells if the foetus being pre-leukaemic. It is surprising that when the World health organisation has classified magnetic fields as possibly cancer causing and 25% of children suffering from leukaemia die, that there isn't on going research to ascertain if there is a cause or not"

"Rise of childhood leukaemia steadily through 2nd half of century"

"No 1 killer"

"As a novice to the introduction of childhood leukaemia discovering that it starts in the womb stated in the briefing notes, scientists are still searching for the 'triggers' that occur after the child is born, the fact that leukaemia cannot be prevented at this point of time seems to be a complex disease concluding that its precise causes cannot be pinpointed and will be different for each child"

"That electric and magnetic fields can cause leukaemia, that also we can be exposed from common domestic appliances surely more needs to be done to find out more"

What did your friends and family say when you talked to them about this issue?

"They aired concerns that have been long associated been associated with pylons, mobile phones etc"

"Like myself, most people I spoke to thought that leukaemia was a more fatal disease than in the notes. I only had one experience of a child with the disease and she was obviously in a bad way and dying"

"My son had learned a bit about this at school but a lot of people know nothing about the subject"

"Concerned the subject does not get more attention. Surprised that coughs and cold may lead up to it"

"They were wanting to know more. Would like to have a choice and more info. Would not like to live near pylons"

"We all agreed that more research was needed"

"They do believe that there is a link between living near electricity pylons and some illnesses"

"Most of them said that they did not really know about it, because its not spoke about it's at the back of their minds"

"Shocked, more money should be given for research"

"They thought the same as me, they didn't know a link between leukaemia and electric and magnetic fields"

"Shocked, worried that it's seriously considered as a cause of leukaemia for children that it isn't being properly investigated. My sister and mum particularly as my sisters baby is 8 months old and they live on a new housing development, she hasn't noticed any pylons but will be more vigilant in the future"

"Would avoid any risk even slightest if children could be affected. If we want all these up to date things we must take the rough with the smooth"

"On holiday our friends not convinced of 'link' to magnetic fields"

"(1) If my child is diagnosed with leukaemia, can I be sure that I will receive information and support from the hospital in which you are treated, chemotherapy is difficult, I know from the extensive curing my auntie is receiving, will medical staff be sympathetic and will help in so far as they can. (2) In terms of recourses available I think information about cancer should be available from many other sources. I'm sure we be known of any related support groups in my community"

"Of all the friends and family I asked if knew anything about leukaemia not one person knew anything about it. Therefore it proves not enough information has been issued. It seems that people that have come into contact with someone with leukaemia only knows info"

Now that you've read some more information about this issue. Do you think that it is something that needs to be addressed? Why?

"It is an issue that clearly needs to be addressed so to not only clear the issues and concerns of those living near pylons but to protect our children and our future generations, lives are precious, more precious than money"

"Something certainly must be done, children are the future of our country and must be protected"

"Definitely, the population is at risk and some people are not even aware of the risks that are around them"

"Yes, not nice to see children suffer the treatments to cure or holdback the cancer bad enough when you are an adult"

"Definitely. To benefit our lives and future generations"

"Something definitely needs to be done NOW by an independent body-more research into causes. Research can go on forever but some action should be taken immediately on the information already known"

"Yes, but what could be done"?

"I think that if more was said to the people, more people would see what a big problem this is. People have died and family have suffered, kids are in pain and if we can see a way of fixing this so less children get this illness"

"Yes this does need to be addressed the future (children) are at risk. Also the stress it causes to a young child, because they tend to miss out on things due to treatment"

"It should definitely be addressed be cause it has been proven that there is a definite link"

"Yes. It needs to be addressed not only for leukaemia in children but it has implications for other diseases. Housing is an issue, new developments where there are pylons puts disadvantages families at risk"

"I think that if there's the smallest risk, health should be put before technology/progress"

"Work needs to be continued to further reduced %"

"I think it definitely needs to be addressed. The information given means for 25% the news is very bad and currently a 100 children would die a tragic death. The aim in my opinion is

to get to the point where leukaemia can be prevented, or can always be successfully treated, at this point of time this is not the case”

“Yes, mainly because I’m expecting a baby soon and now I’m concerned and want to find out more information on the causes and efforts. By asking family and friends on the subject and no one knowing anything surely more info needs to be issued about possible causes whether great risks or low”

**If you think something ought to be done about it, what do you think should be done?
And who should be responsible for it?**

“The government should be held responsible alongside the people who have installed this and benefit greatly from them”

“R.e electric cables. I think it should be mandatory that the grid have some form of insulator i.e. plastic covering. I know that this would be a huge task, but a start could be made by making it mandatory that any new or replacement cables be insulated or be put underground in plastic ducts”

“Responsibility of the electric companies because of their vast profits”

“Renewable energy-solar panels”

“More research into safe production of energy. The government, power suppliers, national grid”

“More money to be put into research to find a cure”

“The government, we cannot keep relying on charities”

“More info, more action”

“Electricity companies and government”

“The whole electricity system needs an independent study to eradicate the electricity fields we are surrounded by daily- TV’s, computers, houses rewired not with ring systems, insulated cables”

“Research should be influenced by a totally independent body not concerned financially with government or electricity companies, lottery perhaps?”

“Government involvement to work with power companies to fund an alternative means for transporting electricity”

*“Find a way of covering electricity and magnetic fields. Don’t build houses near the source”.
“The government need to sort this”*

“To re-route them underground”

“The government, whoever is responsible for the electricity supply”

“There shouldn’t be houses and property built near electric and magnetic fields”

“I feel the government should do something about the problem”

“Ongoing investigation/research from a scientific organisation, government funded”

“Look into ways of ‘containing’ the highly charged ions generated by the overhead cables. Pursue solar energy and other natural energy channels”

“If government money invested could save NHS millions in the future. Alternative energy providers could receive large grants to help them progress faster”

“Underground cabling (cost prohibitive), testing on animals (receive controversy)”

“Power companies”

*“An investigative procedure should be introduced if not already which should include:
case studies and funding
diagnosis and other criteria of case definition
research and record statistically analyse disease rates
examine potential exposures
determining cluster significance and the need for further examination
broadcast results”*

“More needs to be done to discover the causes of leukaemia. As much as all people want to know causes it is very hard to know where to start, like 1) places, 2) linked cases, 3) what to look for in leukaemia, 4) any common links, 5) causes, 6) need to investigate magnetic fields.

I feel both the government and health authority should pay because no one can determine who should be responsible so they should help each other. More research needs to be done to find out more about melatonin and corona ions”