



National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Addendum to “Electromagnetic Fields in the Irish Context”

Policy Options

RIVM Report 2015-0111

E.F. Hall et al.



National Institute for Public Health
and the Environment
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Colophon

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Synopsis

Addendum to “Electromagnetic Fields in the Irish Context” Policy Options

The Irish Government commissioned the National Institute for Public Health and the Environment of the Netherlands (RIVM) to report on the current scientific knowledge on the possible adverse health effects of exposure to electromagnetic fields. The focus was on electromagnetic fields from high-voltage overhead power lines and from base stations for mobile telecommunication. In addition, RIVM investigated the policies of five European countries and Ireland concerning exposure of the public to electromagnetic fields. How these policies are implemented in practice was also described.

The information gathered was used to formulate the policy options in this Addendum, which the Irish government can use as a basis to develop its own policy.

Keywords: Electromagnetic fields, potential health effects, practices in other countries, policy options

Publiekssamenvatting

Addendum bij “Elektromagnetische velden in de Ierse context” Beleidsopties

In opdracht van de Ierse overheid heeft het RIVM de huidige wetenschappelijke kennis over mogelijke gezondheidseffecten van elektromagnetische velden op een rij gezet. De nadruk lag op de elektromagnetische velden afkomstig van hoogspanningslijnen en basisstations voor mobiele telefonie. Daarnaast heeft het RIVM het beleid van vijf Europese landen en Ierland aangaande de blootstelling van de bevolking aan elektromagnetische velden in kaart gebracht. Ook is beschreven hoe dat beleid in de praktijk wordt uitgevoerd.

Met behulp van de verzamelde informatie zijn in dit Addendum beleidsopties geformuleerd op basis waarvan de Ierse overheid eigen beleid kan ontwikkelen.

Kernwoorden: Elektromagnetische velden, mogelijke gezondheidseffecten, praktijk in andere landen, beleidsopties

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Executive summary

In Ireland, as in other countries, there is concern that exposure to electromagnetic fields (EMF) from mobile phone base stations and high-voltage power lines may have adverse effects on human health. Given the recent resurgence in interest in EMF within the context of major pylon constructions, the Department of Environment, Community and Local Government commissioned the National Institute for Public Health and the Environment (RIVM) of the Netherlands to prepare a main report synthesizing the existing published scientific information on the potential health effects and on how some other countries deal with this issue.

In this addendum to the main report policy options are given, including the pros and cons of each option, in order to provide the Irish Government with the building blocks for a framework for governance with respect to EMF.

In this addendum, all the information gathered in the main report was integrated into a discussion on the following elements of an EMF policy that might be suitable and applicable to Ireland from the perspective of the National Government:

- Whether or not to implement the European recommendation;
- Ways of implementing the European recommendation;
- A consideration of policy options above and beyond implementing the European recommendation;
- Measurements and monitoring; assessment of risks at certain locations;
- Irish experts and expert groups;
- A dedicated research programme;
- Dialogue between Government, industry and citizens;
- Governmental communication.

For each element, answers are given to the following questions: 'What is the societal driver for considering this element and why would a National Government consider it?'; 'What are the possible policy options and what are the pros and cons of each option?'; and 'What resources are needed to put each option into practice in an efficient and effective way?'. These answers provide the Irish Government with the elements needed to build a framework for governance with respect to EMF.

1 Introduction

In Ireland, as in many countries, there is concern that exposure to electromagnetic fields from mobile phone base stations and high-voltage power lines may have adverse effects on human health. Given the recent resurgence in interest in EMF within the context of major pylon constructions, the Department of Environment, Community and Local Government (DECLG) commissioned the National Institute for Public Health and the Environment (RIVM) of the Netherlands to prepare a main report (Hall et al, 2015) that synthesizes the existing peer reviewed research into key, clear points – with a particular focus on the potential adverse health effects of electric and magnetic fields arising from high-voltage power lines and of electromagnetic fields from base stations for mobile communication. The report should also assess the management of EMF-related issues in other jurisdictions.

This Addendum to the main report provides policy options, including the pros and cons of each option, where applicable. No recommendations or advice is given. The options and supporting information can be used for the preparation of a policy framework with respect to all kinds of issues related to electromagnetic fields and health. The information given provides building blocks for a framework for governance with respect to electromagnetic fields.

The policy options in the Addendum focus on the exposure of the public to electromagnetic fields in the frequency range from 0 to 300 GHz.

2 Policy options

2.1 Introduction

Chapters 2 and 3 of the main report (Hall et al, 2015) give an overview of available scientific research and practices in other countries focused on the possible risks present when members of the public are exposed to electromagnetic fields (EMF). In this Addendum, this information is integrated into a discussion on the elements of an EMF policy that might be suitable and applicable to Ireland.

The elements discussed are:

- deciding on implementing the European recommendation (Council of the European Union, 1999);
- ways of implementing the European recommendation;
- a consideration of policy options in addition to implementing the European recommendation;
- measurements and monitoring; assessment of the risks at certain locations;
- Irish experts and expert groups;
- a dedicated research programme;
- dialogue between government, industry and citizens;
- governmental communication.

For each element, the following questions have been answered:

1. What is the societal driver for considering this element?
2. Why would a National Government consider this element?
3. What are the possible policy options?
4. What are the pros and cons of each option?
5. What resources are needed to put each option into practice in an efficient and effective way?

In this Addendum, an outline is given from the perspective of the National Government, following basic policy principles in Ireland, with the opportunity to go into detail. The involvement of Local Government has therefore not been elaborated on.

2.2 Deciding on implementing the European recommendation

The Council of the European Union has recommended limiting exposure to EMF. Because a Member State is not bound to implement the European recommendation in national legislation, the government of a Member State first has to decide whether or not to adopt the recommendation. Rejecting the recommendation is possible, but this calls for thorough argumentation. For example, a government may decide not to adopt the recommendation if it has already adopted stricter exposure limits and corresponding measures. The recommendation allows Member States to provide a higher level of protection. A government can set more lenient exposure limits or even no exposure limits. An alternative to adopting the European recommendation in formal legislation is to require industry to adopt the exposure limits from the European recommendation through binding guidance or codes of practice.

When the exposure limit values from the European recommendation are copied into national legislation, this means there will tend to be a (long) lag in adapting that legislation to any change in the recommendation or in the underlying science. It is often more efficient and manageable when the national legislation references the latest recommended values or when the recommendation is used as guidance.

2.3 **Ways of implementing the European recommendation**

After the government has adopted a position with respect to the European recommendation and its elements, it must decide on the implementation. Societal drivers come from sectors such as manufacturers and importers of equipment producing EMF. The actions to be considered are (Council of the European Union, 1999; p. 60 and 61):

- a. adopt a framework of basic restrictions and reference levels;
- b. implement measures for the general public;
- c. aim to achieve respect of the basic restrictions;
- d. perform exposure assessments and in doing this:
 - take into account the reference levels or use standards (measurement and calculation procedures) to evaluate compliance with the basic restrictions;
 - evaluate situations involving sources of more than one frequency;
 - consider whether it facilitates and promotes respect of the basic restrictions when taking into account criteria such as the duration of the exposure, exposed parts of the body, age and health status of the public;
- e. when deciding whether action is required or not, pursuant to the European recommendation, consider both the risks and benefits of possible policy options or measures on exposure;
- f. provide, in an appropriate format, information to the public on the health impact of EMF and the measures taken to address them;
- g. promote and review research relevant to EMF and human health in the context of its national research programmes, taking into account Community and international research recommendations and efforts from the widest possible range of sources;
- h. prepare reports on the experience obtained with measures taken and inform the Commission about it.

The above considerations are elaborated below.

a Framework of basic restrictions and reference levels

The European recommendation differentiates between basic restrictions and reference levels. The easiest option is to use the framework of basic restrictions and reference levels provided in the recommendation. An alternative framework would deviate from internationally accepted practices that are mostly based on the ICNIRP guidelines (see Section 2.3.1 in the main report). If the framework of basic restrictions and reference levels in the European recommendation is adopted, it is also possible to apply the reference levels as binding exposure limits. Respect of the reference levels will ensure respect of the relevant basic restrictions (the reverse is not necessarily the case). Yet it is not

inconceivable that, in some cases, in practice, the exposure will have to be reduced to such an extent that some applications may no longer be viable. Especially EMF from devices that are used close to the human body could possibly exceed the reference levels whilst not exceeding the basic restrictions (Stam, 2014).

The European recommendation gives no quantitative restrictions on static electric fields and therefore it recommends avoiding perception of surface electric charges and spark discharges that could cause stress or annoyance. It is not possible to elaborate on possible measures without additional investigation into situations in which surface electric charges or spark discharges can cause stress or annoyance to members of the public.

b+c+e Measures, basic restrictions and risks and benefits

In order to provide a high level of health protection, effort is needed to find those exposure situations in which reference levels (or basic restrictions) may be exceeded (for further elaboration of this effort, see Section 2.5).

Once a situation is found in which reference levels (or basic restrictions) are exceeded, the government has to decide on proportional actions. If no action is taken, the government has to come up with well-founded arguments to justify the inaction, such as 'the probability that a person will actually be highly exposed is so small and the costs of preventing this kind of exposure situation are so high that it is considered not proportional to take any action'.

Every type of exposure situation calls for evaluating and exploring the possibilities to reduce exposure, including the effort needed to mitigate the situation, such as remedial costs. The government needs criteria for determining what is practical (effective and efficient) and what is a suitable inspection and enforcement framework. Only then can the government make a well-informed decision on what type of action is needed.

There are various possibilities for action to avoid exposure in excess of the limits in the European recommendation:

- corrective: action in those situations in which basic restrictions are exceeded (reduce exposure by: lowering the source strength while preserving functionality; increasing the distance to the source of EMF; shielding, if possible);
- corrective: action in those situations in which reference levels are exceeded (take measures to reduce exposure to levels below the basic restrictions or conduct additional investigation to determine that basic restrictions are not being exceeded);
- preventive: recommend companies to investigate possibilities to reduce exposure (lower source strength; increase distance; shielding);
- preventive: recommend members of the public to avoid (as much as possible) specific exposure situations or specific uses of certain equipment, devices or products;

- preventive: forbid certain (ways of using) equipment, devices or products (without hampering the free traffic of products in the European Union).

These actions can be laid down in binding or non-binding legislation or in guidelines or codes of practice. One can also consider whether to make these measures applicable to all situations or only to new situations (or new equipment, devices or products).

d Exposure assessments

There are several possibilities to perform exposure assessments: see Section 2.5.

f Information to the public

See Section 2.9

g Research

See Section 2.7.

h Prepare reports on the experience

Chapter 4 of the main report (Hall et al, 2015) discusses experiences in Europe with implementing the European recommendation in 2002 and 2008. Publishing and sharing national experiences of implementing measures could help other Member States with their decision-making.

2.4 Considering policy options in addition to implementing the European recommendation

According to the Council of the European Union '*it is imperative to protect members of the general public within the Community against established adverse health effects that may result as a consequence of exposure to electromagnetic fields*'. However, although the recommendation states that it '*implicitly covers possible long-term effects in the whole frequency range*', a Member State can also consider developing additional policy options to protect against uncertain or even unknown health effects. Societal drivers are public concern about the possible long-term health effects and health complaints attributed to EMF exposure. Examples from the five selected countries (see Chapter 3 in the main report) are (1) a precautionary policy near overhead electricity lines to protect children from the possible, though uncertain, development of childhood leukaemia; (2) a precautionary policy on the siting of base stations for mobile telecommunication; (3) advice on ways of using mobile phones to protect people from the possible, though uncertain, development of cancer in the head; (4) providing help to people with health complaints in the vicinity of sources of EMF.

Note: The Council of Europe adopted a (non-binding) resolution on 'the potential dangers of electromagnetic fields and their effect on the environment'. The Council advised on the societal calls for application of the 'as low as reasonably acceptable' principle and the precautionary principle.

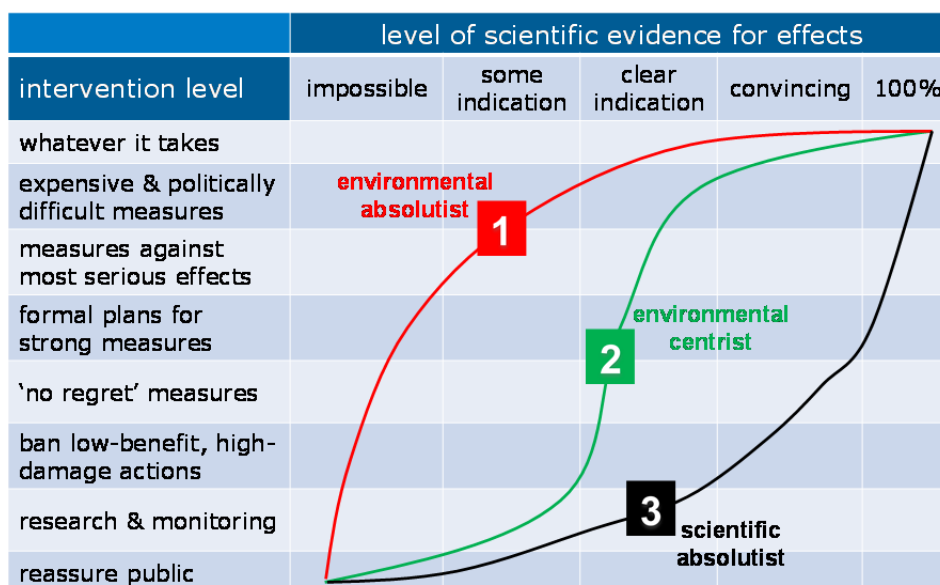


Figure 1. The type of intervention depends on the level of scientific evidence and on the attitude of the person that makes the comparative assessment (based on Weiss, 2003).

It is advisable to at least consider additional policy options, explicitly because the public is aware of the scientific controversies and pressure groups may base their arguments on these controversies to attain their objectives. Whether or not these additional policy options are actually implemented, discussing the pros and cons with stakeholders can improve their understanding of the basis of the policy that is chosen and thereby its acceptability.

The statements in Section 2.3 also apply to these additional policy options. The extent of the potential measures (type of intervention) not only depends on the level of scientific evidence (and the actual state of knowledge concerning practical situations), but also on the attitude of the person that makes the comparative assessment (Figure 1). When deciding on the intervention deemed necessary or acceptable, people take into account the strength of evidence that a particular hazard is present, the nature of that hazard (e.g. cancer versus discomfort), the variation of the risk in relation to exposure (assuming the hazard is really linked to exposure), distribution of exposures in the population, and whether the exposure is voluntarily or not. The subjective character of a complete health risk assessment (not just a hazard assessment - like IARC does) and the final conclusion of that assessment influence the level of intervention. When there is agreement on the level of scientific evidence, there can still be disagreement in society. When there is for instance 'some indication' of adverse health effects from EMF, an 'environmental absolutist' will plead for extensive measures to be taken, while a 'scientific absolutist' will plead for more research.

2.5 Measurements and monitoring; assessment of risks at certain locations

To enable a well-informed decision to be made on what type of action could be chosen, an investigation is needed. This investigation aims to

find exposure situations in which basic restrictions (or reference levels) may be exceeded.

There may also be calls in society for measurements in situations that are (far) below reference levels. The monitoring near base stations in Ireland is an example of a response to this need. This monitoring is paid for by the Government (Department of Communications, Energy and Natural Resources). Concerned citizens may be reassured when it is demonstrated, preferably by a trusted organization, that exposure is (far) below the reference levels and therefore complies with the basic restrictions, as well as when sources of more than one frequency and criteria such as the duration of the exposure and exposed parts of the body are taken into account.

There are several (types of) options, in order of increasing (governmental) efforts in measurement and monitoring:

- request or demand information on elevated exposure levels from the industry producing EMF (drawback: the administrative burdens of the industry will rise);
- collect exposure measurements from other countries and extrapolate them to the Irish situation (drawback: the exposure situation in other countries can be different from that in Ireland and not all relevant types of exposure situations will be found);
- identify the most serious generic exposure situations through a literature survey and concentrate on measuring only in these situations;
- perform ad hoc measurements on demand from municipalities or citizens; an alternative is renting out measurement equipment or perhaps using 'citizen science': engaging volunteers in the collection of measurement information (drawback: results could be unreliable);
- set up a long-term national monitoring programme (drawback: this probably could be costly and time-consuming; advantages: government can make well informed decisions and can inform citizens on the basis of accurate, up-to-date information).

To make these options possible, there is a need for:

- governmental, academic or commercial experts who can perform a literature survey and can interpret the information (see also Section 2.6);
- companies that can perform measurements of sufficient quality or a governmental organization dedicated to performing measurements;
- political commitment and/or the commitment of the industries that cause elevated exposure levels;
- a plan for communicating the results by national/local authorities or a dedicated governmental organization;
- sufficient financial resources (e.g. paid for by national or local government, or from a tax on network operators).

2.6 Irish experts and expert groups

When new information on the adverse health effects of exposure to EMF becomes available, Irish experts are needed to assess and communicate

the possible consequences for Ireland, as citizens may wish to hear it from their own experts. Spending a substantial part of their time on EMF issues (e.g. working on projects in a dedicated research programme: see Section 2.7) can keep their levels of expertise high. This can also be achieved if they have a task in a group of experts that deals with EMF issues on a regular basis. Other suggestions for ways to keep expertise high are: attending key meetings and events, e.g. the BioEM meetings (BEMS, 2015) and WHO/ICNIRP meetings (ICNIRP, 2015); getting involved with the development of technical standards (see Section 4.2 of the main report: NSAI and CENELEC); joining professional networks (e.g. COST Actions) (COST, 2015); subscribing to the ELF and RF Gateway (RSI, 2015). Foreign experts that are dealing with similar situations in their own countries can also be flown in on an ad hoc basis when needed, even though they are not familiar with the Irish situation. A local expert will be more suitable for dealing with the public and can obtain a higher level of trust. Another option is to join forces with other countries in a similar situation.

To make these options possible, there is a need:

- for a plan to train experts;
- to establish a (semi) permanent expert group;
- for sufficient long-term (five years or more) financial resources.

2.7 Dedicated research programme

The societal driver behind considering a dedicated Irish research programme is the need for information on the Irish situation, elucidated by Irish scientists and taking into account international research recommendations.

Options concerning a research programme, as well as building a national pool of experts, are:

- do not start an Irish research programme; this is the cheapest option; drawback: no Irish experts will be trained;
- encourage Irish experts to participate in foreign research programmes by, for instance, co-financing EU research;
- start a small Irish research programme on selected topics to train experts and to keep them trained;
- start a large research programme to train experts and also to contribute to the worldwide scientific body of evidence;
- participate in international research programmes such as ERA-ENVHEALTH.

To make these options possible, there is a need for:

- a motivated scientific community with relevant technical and biological expertise in order to develop this expertise in the EMF field;
- a scientific scoping study on the programme's goal, extent, focus points and research agenda;
- an organization to fund and coordinate the research, to stimulate the use of the knowledge gained and to safeguard the independence of the outcomes;
- an outline for sending out calls for project proposals;
- programme and scientific committees;

- an accompanying communication programme;
- sufficient long-term (five years or more) financial resources.

2.8 Dialogue between government, industry and citizens

There are several societal drivers for considering this element, irrespective of which policy option is chosen. Two clear examples are the opposition of citizens to new transmission power lines and to the siting of new base stations for mobile communication. Besides the government's responsibility to ensure a high level of health protection, it is also responsible for realizing new infrastructures. Furthermore, industry is largely dependent on energy and telecommunications. In this age of the information society, government could encourage or expect stakeholders to participate in decision-making.

The self-reported overall health status in Ireland is higher than in the five selected countries (see Figure 2). In contrast, in Ireland the question 'to what extent do you think high-voltage power lines affect your health' has a higher negative score than in all the five other countries (see Figure 3): 80% of the respondents think that high-voltage power lines affect their health to some or a large extent. The response to the question 'in your opinion, do public bodies act effectively or not to protect you from the potential health risks linked to EMF?' is shown in Figure 4. On average, about half of the respondents think that public bodies do not at all or not very effectively protect them from the potential health risks linked to EMF.

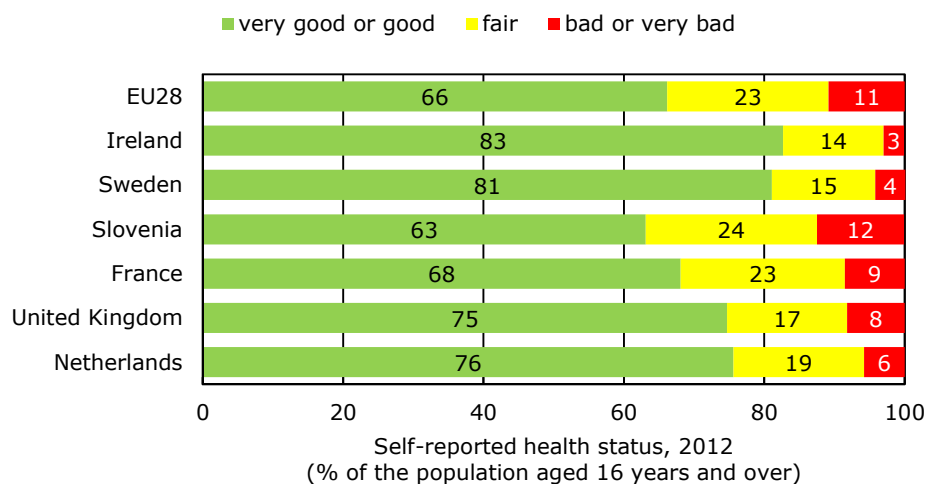


Figure 2. Self-reported health status (data from OECD, 2014)

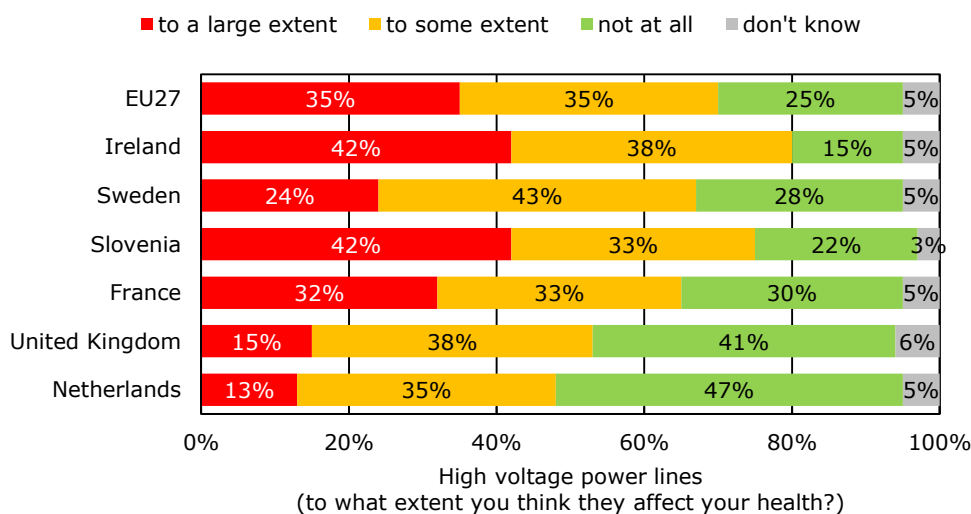


Figure 3. What people think of the health effects from power lines (data from European Commission, 2010)

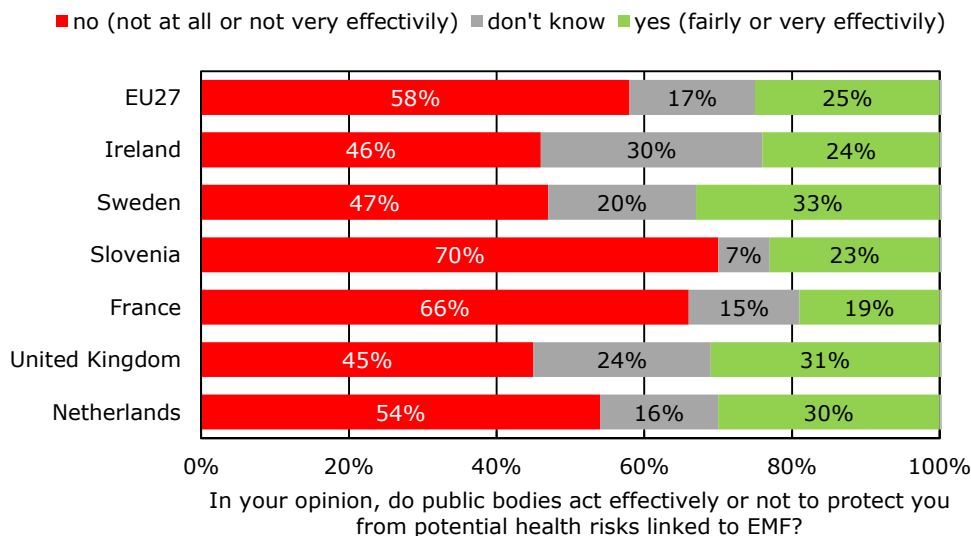


Figure 4. What people think about public bodies (data from European Commission, 2010)

Possible options for a dialogue between government, citizens and industry:

- limit this dialogue to (top-down) informing (and requesting response from) citizens and industry on government decisions and measures in cases in which the risks are well-known;
- consult citizens in all stages of the planning of new transmission lines and new base stations;
- start a dialogue with people who experience health complaints near sources of EMF;
- start a societal dialogue on uncertain and unknown health effects and available, reasonable measures (Figure 5).

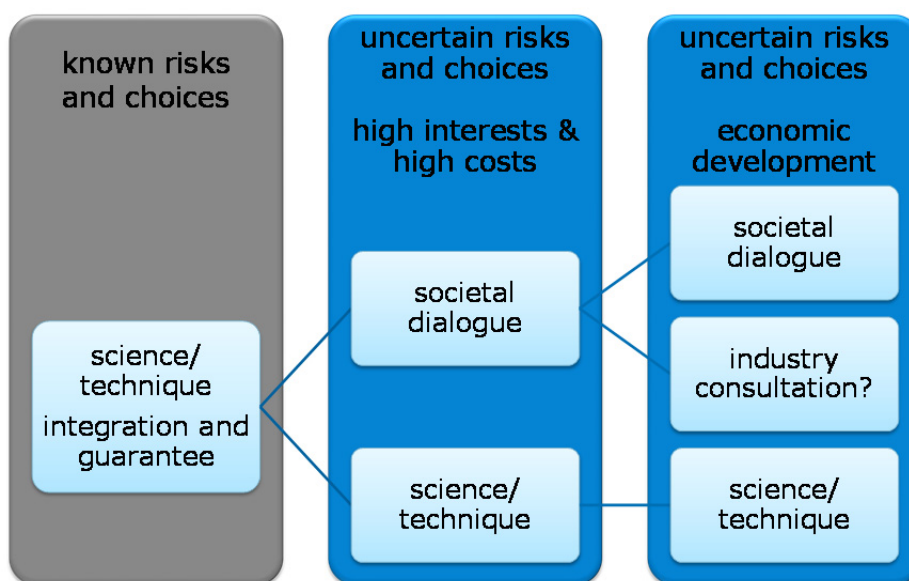


Figure 5. The role of science, society and industry in cases of known and uncertain risks

To make these options possible, there is a need for:

- a dedicated organization that can provide the best available knowledge on health effects and has expertise on risk communication;
- professionals specialized in managing groups of possibly concerned people;
- sufficient financial resources;
- willingness by government, citizens and industry to communicate in an open, transparent and honest fashion.

2.9 Governmental communication

Governmental communication comprises the following topics:

- policy decisions;
- societal (dialogue) processes;
- content (scientific, technical and societal developments).

Communication with all stakeholders is required in all the stages of developing, implementing and enforcing EMF policy. The communication should be honest, transparent and essentially proactive, and should be considered in relation to effectiveness. It can be challenging to respond to communication that may not be well-founded in science, but an honest and clear response is nevertheless essential.

The central question is, 'who best can communicate governmental decisions or the planning of new infrastructural works, such as a new overhead power line?'. One possibility is a top-down approach from government to citizens. This seems (cost-)efficient, but is not necessarily effective. The communication activities can also be outsourced to existing governmental organizations (EPA; local public health services) or to dedicated independent organizations (such as a knowledge platform). Another possibility is to leave the communication to industry. The Transmission System Operator in Ireland has

experience with consultation processes concerning the planning of new routes for overhead or underground power lines that have been thoroughly evaluated. Yet citizens commonly do not trust commercial parties or their government. Communication strategies should take into account the fact that citizens are usually well-educated, well-informed and older citizens have time to gain much in-depth knowledge. As a general guide, the WHO has published a booklet on establishing a dialogue on the risks from EMF (WHO, 2002).

To make these options possible, there is a need for:

- a dedicated organization that can provide the best available knowledge on the health effects and has expertise on risk communication;
- (risk) communication strategies;
- research on risk perception processes;
- sufficient financial resources.

3 Concluding remarks

RIVM has prepared a main report that synthesizes the existing, published scientific information on the potential adverse health effects and about how some other countries deal with this issue. In studying the practices and structures for interaction between (national) government, industry and citizens in these countries, no value judgement has been given with respect to the quality, effectiveness, efficiency, etc., of these practices and structures. Nor has any advice been given on what practices are (the) best practices.

By way of a supplement to the main report, the information gathered has been used to formulate policy options in order to further support the Irish National Government in the process of developing a national EMF policy framework. The discussion in this Addendum on the building blocks for an EMF policy starts with the societal driver for the element considered. For each element, the pros and cons of possible options are discussed and the resources are listed that would be needed to implement an option.

In the opinion of RIVM, this Addendum provides building blocks which the Irish Government can consider when developing a framework for governance with respect to electromagnetic fields.

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