Sag

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Dokumenter

Aktnr.	Doknr.	Titel	Brevdato	Type
14	14330146	RE: Review of the publication "Establishing a dialogue on risks from electromagnetic fields" (2)	24-09-2024	I, Indgående
0	14330147	Comments to WHO Document on Establishing a Dialogue on Risks from EMF_May 2024	24-09-2024	I, Indgående
0	14330148	2024_EMF Dialogue Handbook_for IAC circulation	24-09-2024	I, Indgående
13	14089115	WHO: Tak for svar	26-08-2024	I, Indgående
12	14089093	SIS kommentarer til revideret dokument (1)	26-08-2024	U, Udgående
0	14089094	Comments to WHO Document on Establishing a Dialogue on Risks from EMF_May 2024_SIS	26-08-2024	U, Udgående
11	14046731	WHO anmoder om at kommentere på udkast til revideret dokument om risikokommunikation (2)	31-05-2024	I, Indgående
0	14046732	2024_EMF Dialogue Handbook_for IAC circulation	31-05-2024	I, Indgående
0	14046733	Comments to WHO Document on Establishing a Dialogue on Risks from EMF_May 2024	31-05-2024	I, Indgående
10	13714135	Den endelige, fulgte dagsorden + surveylink (1)	01-07-2024	I, Indgående
0	13714136	FINAL IAC Agenda 2024	01-07-2024	I, Indgående
9	13569563	Kontaktdetaljer rettet	13-06-2024	U, Udgående
8	13569561	Kontaktdetaljer rettet	13-06-2024	U, Udgående

7		13557900	Opdatering af kontaktdetajler for DK	12-06-2024	U, Udgående
6		13517839	Udkast til dagsorden samt referat og og praktisk (2)	06-06-2024	I, Indgående
	0	13517840	DRAFT IAC Agenda 2024_participants	06-06-2024	I, Indgående
	0	13517841	DRAFT Minutes 28th IAC EMF meeting June 2023	06-06-2024	I, Indgående
5		13482759	WHO bekræfter modtagelse af rapporter	02-06-2024	I, Indgående
4		13444169	[Indico] Registration approved for Annual WHO Meeting of the International Advisory Committee (IAC) on Non-Ionizing Radiation	28-05-2024	I, Indgående
3		13397729	National reports from Denmark, 2024 (2)	22-05-2024	U, Udgående
	0	13397730	National report from Denmark 2024 - EMF	22-05-2024	U, Udgående
	0	13397731	National report from Denmark 2024 - Optical	22-05-2024	U, Udgående
2		13270267	Lidt opdateret mødeinfo og anmodning om nationale rapporter	03-05-2024	I, Indgående
1		12872221	WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH	11-03-2024	I, Indgående

From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 24-09-2024 17:48:14 (UTC +01)
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: RE: Review of the publication "Establishing a dialogue on risks from electromagnetic fields"
Importance: High

Dear IAC members

Hoping that you have enjoyed the summer/winter season.

Following the message below sent last May and the discussion at the IAC meeting in June, we would like to reiterate our invitation to provide feedback on the review of the WHO publication *Establishing a dialogue on risks from electromagnetic fields*.
Thanks to those who have already sent comments, and for those who have not already done so, could you send us back your comments by **Friday 4 October 2024**.

Many thanks for your engagement and collaboration.
Kind regards,
Emilie

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World Health Organization 75 HEALTH FOR ALL

From: VAN DEVENTER, Tahera Emilie
Sent: Friday, May 31, 2024 11:26 AM
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: Review of the publication "Establishing a dialogue on risks from electromagnetic fields"

Dear IAC members

As mentioned last year, we are planning to update the WHO 2002 publication entitled *Establishing a dialogue on risks from electromagnetic fields*. This handbook was published with the intention of aiding policy makers on how to communicate potential health risks from electromagnetic fields

(EMF). It has been well received and translated into 14 languages to date. Your feedback last year was that the document stood the test of time but some parts require an update. Therefore over the past year, we have reviewed and revised the document with the help of several collaborating centres.

We now share with you the draft document. We will discuss the salient changes during the IAC meeting, and invite you

1. to have a look at the overall structure and identify missing overarching topic areas or general themes **prior to the IAC meeting** to inform our discussion,
2. to review the document in detail **by 1 September 2024**.

Looking forward to your cooperation.

Kind regards,
Emilie on behalf of the Working Group

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Establishing a Dialogue on Risks frm EMFs - Comments from IAC members

Name	Section	Line	Type of comment	Comments	Proposed change
			G - general T - technical E - editorial		

ESTABLISHING A DIALOGUE ON RISKS FROM ELECTROMAGNETIC FIELDS

2nd edition

WHO, 2024

This draft is a revised version of the 2002 version

(https://www.who.int/publications-detail-redirect/9241545712)

This draft is for review by the International Advisory Committee of the WHO International EMF Project

Please use the accompanying Excel spreadsheet to record your comments and suggestions.

Note that the graphics and overall design will be reviewed and revised.

Contents

1. ELECTROMAGNETIC FIELDS AND PUBLIC HEALTH: THE PRESENT EVIDENCE

EXECUTIVE SUMMARY (text to be included in the Executive Summary)

Electric, magnetic and electromagnetic fields (EMF) exist as part of nature and artificially as a result of modern technology. These fields surround us in everyday life. In contrast to some optical and all ionizing radiation, their energetic potential is not sufficient for directly damaging the molecules in the cells of the human body. However, high enough levels of EMF above certain biological thresholds can give rise to health effects related to stimulation of nerves and muscles and to heating of body tissues. Taking into account the current scientific evidence, health effects at exposures below these thresholds have not been demonstrated. Over time, an increasing amount of scientific knowledge has confirmed this. At the same time, technological developments continue to raise new research questions and public concern remains.

WHAT ARE ELECTROMAGNETIC FIELDS?

EMF occur in nature and have always been present. However, over the past century to the present, environmental exposure to human-made sources of EMF has steadily increased. Reasons are increasing use of electricity, electrically powered means of transportation, wireless communication technologies based on an increasing number of devices and changes in work practices and social behaviour. Virtually always, most people are exposed to a complex mix of electric and magnetic fields of many different frequencies.

Potential health effects of man-made EMF have been a topic of scientific interest since the late 1800s and have received particular attention since the 1970s. EMF can be broadly divided into static and low-frequency (LF, 0-100 kHz) electric and magnetic fields and high-frequency or radiofrequency fields (RF, 100 kHz-300 GHz). Common sources for LF include power lines and household electrical appliances. Common sources for RF include mobile telephones and their base stations, smart devices, radar, radio and television broadcast facilities as well as microwave kitchen appliances. Applications for inductive charging, heating and cooking operate at an intermediate frequency range (300 Hz – 10 MHz).

Unlike ionizing radiation (such as gamma rays from radioactive materials, cosmic rays and X-rays), EMF are too weak to produce ionization that leads to the breaking of the molecules a cell consists of. This is why EMF are part of the 'non-ionizing radiations' (NIR). Figure 1 displays the relative position of NIR in the wider electromagnetic spectrum. *The energetic difference between EMF and ionizing radiation illustrates that frequencies of EMF are a thousand, million or even more times below the level required to cause ionization. Optical (infrared, visible, ultraviolet) radiation and ionizing radiation will not be considered further in this brochure.*

WHAT HAPPENS WHEN YOU ARE EXPOSED TO ELECTROMAGNETIC FIELDS?

Electrical currents exist naturally in the human body and are an essential part of normal bodily functions. To communicate, the nervous system generates and modulates electrical signals. Most biochemical reactions, from those associated with digestion to those involved in brain activity, involve electrochemical processes.

The effects of external exposure to EMF on the human body depend mainly on the EMF frequency and field strength. The frequency simply describes the number of oscillations or cycles per second. At LF, EMF pass through the body while at RF the fields are absorbed and penetrate only a certain depth into the tissue, the rest is reflected and scattered at the surface. EMF currently used for mobile communication penetrate a few centimetres deep into the body. EMF at higher frequencies (millimetre waves), which are planned to be used more for mobile communication in the future, only penetrate the outer layers of the skin.

LF electric fields influence the distribution of electric charges at the surface of the body and cause the induction of an electric field and a related current to flow in the body (Fig. 2A). LF magnetic fields induce circulating currents within the human body (Fig. 2B). The strength of these induced currents depends on the intensity of the outside electrical or magnetic field. Regardless of the origin, if the current exceeds certain thresholds, it can cause stimulation of nerves and muscles.

At RF, the fields penetrate a certain distance into the body. The energy of these fields is absorbed and transformed into heat which increases the velocity of the molecules in the body. This results in a rise in temperature. This effect is used in domestic applications such as warming up food in microwave ovens, and in industrial applications such as plastic welding. These kinds of applications use RF at high field strengths. The levels of RF fields to which people are exposed in their living environment are in most cases much lower than the RF levels needed to produce noticeable heating of the body.

EMF may also have indirect health effects by interacting with certain medical body implants, such as interferences with pacemakers or heating of metallic prostheses. Doctors or manufacturers may give advice on protective measures.

BIOLOGICAL EFFECTS AND HEALTH EFFECTS

Reacting to changes in the environment is a normal part of life. Biological effects are measurable responses of organisms or cells to a stimulus or to a change in the environment. *Responses, e. g. an increased heart rate during a workout, are not necessarily harmful to health. However, the body might not possess adequate compensation mechanisms to mitigate all environmental changes or stresses. Prolonged exposure to environmental stressors, even if minor, may constitute a health hazard if it results in physiological stress.* In humans, an adverse health effect results from a biological effect that causes detectable impairment in the health or well-being of affected individuals.

Complying with exposure limits recommended in national and international guidelines helps to control risks from exposures to EMF that may be harmful to human health as described in Chapter 3. There has been a debate going on for decades on whether long-term exposure below recommended exposure limits can cause adverse health effects or influence people's wellbeing.

WHAT ARE THE CONCLUSIONS FROM SCIENTIFIC RESEARCH?

Scientific knowledge about the health effects of EMF is substantial and is based on a large number of epidemiological studies on humans and experimental studies on animals and cells. Many health outcomes ranging from reproductive defects to cardiovascular and neurodegenerative diseases and cancer have been examined.

LOW-FREQUENCY FIELDS

In 2001, an expert scientific working group of WHO's International Agency for Research on Cancer (IARC) reviewed studies related to the carcinogenicity of static and extremely low frequency (ELF) electric and magnetic fields. Using the standard IARC classification that weighs human, animal and laboratory evidence, ELF magnetic fields were classified as possibly carcinogenic to humans (IARC category 2B). "Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals*. The classification of ELF magnetic fields is based on consistent evidence from epidemiological studies on childhood leukaemia. This evidence has been judged by the IARC's working group as "limited" because a causal interpretation of the observed association between exposure to the agent and cancer is credible, but other explanations for the observations (technically termed "chance", "bias", or "confounding") could not be ruled out with reasonable confidence.* Up until now, no plausible biological mechanism has been identified by experimental research on animals and cells to explain the reported association between exposure to ELF magnetic fields and childhood leukaemia.

Evidence for all other cancers in children and adults, as well as other types of exposure (i.e. static fields and ELF electric fields) was considered inadequate to classify either due to insufficient or inconsistent scientific information. In 2007, the WHO published a monograph of the series "Environmental Health Criteria" that examined not only cancer, but also all other effects studied so far.

RADIO-FREQUENCY FIELDS

Concerning RF fields, research has been conducted for more than fifty years. The balance of evidence suggests that exposure to low level RF fields, such as those emitted by base stations for broadcasting services and mobile communications or those emitted by mobile phones, does not cause adverse health effects.

Some studies have reported minor effects of mobile phone use, including changes in brain activity, reaction times, and sleep patterns. In so far as these effects have been confirmed, they appear to lie within the normal bounds of human variation.

Some epidemiological studies conducted in the early 2000s indicate a possible increased risk for brain tumours by mobile phone use. Consequently, IARC in 2011 classified RF electromagnetic fields as "possibly carcinogenic to humans". The findings of these observational studies were not supported by experimental animal studies. Ongoing research efforts are concentrated on whether long-term, low level RF exposure, even at levels too low to cause significant temperature rise, can cause adverse health effects. Several recent epidemiological studies on trends in cancer incidence in the general population of mobile phone users found no convincing evidence of increased brain cancer risk. However, monitoring possible long-term effects of the technology is an ongoing process.

Mobile phone handsets and base stations present quite different exposure situations. Depending on factors such as way of usage and mobile phone reception, RF exposure from active handsets close to the body can be much greater than the exposure contribution from mobile phone base stations. Apart from infrequent signals used to maintain links with nearby base stations, handsets transmit RF energy only while a call is being made or data is transmitted. However, base stations are continuously transmitting

signals (the so-called "always-on" signals), although the levels to which the public is exposed are small compared to the maximum levels that can occur, even if the base station is located nearby. For more recent mobile communication standards such as 4G (LTE) and 5G (NR), the percentage of always-on signals is drastically decreased compared to 2G (GSM).

Given the widespread use and rapid development of technology, public concern persists despite increasing scientific evidence showing no health effects at exposures below the biological thresholds of established effects of EMF. Continued research activities and clear communication with the public remain important tasks.

2. EMF RISK COMMUNICATION: DEALING WITH PUBLIC PERCEPTION

EXECUTIVE SUMMARY ***(text to be included in the Executive Summary)***

Protection from exposure to EMF is based on science. However, risk perception may differ from science. Adopting a communication approach taking into account EMF risk perception is one way to address community concerns. Communication advice in this document is only a starting point based on international best practice. approaches. The advice in this section is intended to enhance local communication approaches.

Modern technology offers powerful tools to stimulate a full range of benefits for society, including economic development. However, technological progress in the broadest sense has always been associated with hazards and risks, both perceived and real. Industrial, commercial, and household applications of EMF are no exception. Around the start of the twentieth century people were worried about the possible health effects of light bulbs and the fields emanating from the wires on poles connecting land-based telephone systems. No adverse health effects appeared, and these technologies were gradually accepted as part of normal lifestyle. Understanding and adjusting to newly introduced technologies depends partly on how the new technology is presented and how its risks and benefits are interpreted by an ever more wary public.

Worldwide, some community members have indicated concern that exposure to EMF from sources like high voltage power lines, radar, mobile telephones, and their base stations could lead to adverse health consequences. As a result, the construction of new power lines and wireless technology infrastructure has been met with considerable opposition in some countries. Public worry about new technologies often stems from unfamiliarity and a sense of danger from forces that they cannot sense.

This section aims to provide governments, industry, and members of the public with a framework to establish and maintain effective communication about EMF associated health risks.

DEFINING RISK

In trying to understand people's perception of risk, it is important to distinguish between a health hazard and a health risk. A hazard can be an object, an energy source or a set of circumstances that could potentially harm a person's health. Risk is the likelihood, or probability, that a person will be harmed by a particular hazard.

Box: HAZARD AND RISK

Driving a car is a health hazard and presents a risk depending on speed. The higher the speed, the more risk is associated with driving.

Every activity has an associated risk. It is possible to diminish risks by avoiding specific activities, but one cannot abolish risk entirely. In the real world, there is no such thing as zero risk.

MULTIPLE DETERMINANTS OF THE EMF RISK ISSUE

Scientists assess health risk by weighing and critically evaluating all the available scientific evidence to develop a sound risk assessment (see box below). The public may perform its own assessment of risk by an entirely different process, often not based on quantifiable information. Ultimately this perceived risk could take on an importance as great as a measurable risk in determining government policy.

Some factors that shape risk perception of individuals include basic societal and personal values (e.g., traditions, customs) as well as previous experience with technological projects (e.g., dams, power plants), and Sudden or extra-ordinary events and developments (e.g., base station construction or catastrophes / disasters. These factors may explain local concerns, possible biases or hidden agendas or assumptions.

Careful attention to the social dimensions of any project allows policy makers and managers to make informed decisions as part of a thorough risk management program. Ultimately, risk management must consider both measured and perceived risk to be effective.

The identification of problems and the scientific risk assessment of those problems are key steps to defining a successful risk management program. To respond to that assessment, such a program should incorporate actions and strategies, e.g., finding options, making decisions, implementing those decisions, and evaluating the process. These components are not independent, nor do they occur in a predetermined order. Rather, each element is driven by the urgency of the need for a decision, and the availability of information and resources. While there is a range of risk management options (see Box below), emphasis in this handbook is placed on the second option, namely communication programmes.

Box: BASICS OF RISK ASSESSMENT

Risk assessment is an organized process used to describe and estimate the likelihood of adverse health outcomes from environmental exposures to an agent. The four steps in the process are:

1. Hazard identification: the identification of a potentially hazardous agent or exposure situation (e.g., a particular substance or energy source)
2. Dose-response assessment: the estimation of the relationship between dose or exposure to the agent or situation and the incidence and/or severity of an effect
3. Exposure assessment: the assessment of the extent of exposure or potential exposure in actual situations
4. Risk characterization: the synthesis and summary of information about a potentially hazardous situation in a form useful to decision-makers and stakeholders

Box: RANGE OF RISK MANAGEMENT OPTIONS

DECISION TO TAKE NO FORMAL ACTION is an appropriate response in cases where the risk is considered very small, or the evidence is insufficient to support formal actions. This response is often combined with watchful waiting, i.e., monitoring the results of research and measurements and the decisions being made by standard-setters, regulators, and others.

COMMUNICATION PROGRAMS can be used to help people understand the issues, become involved in the process and make their own choices about what to do.

RESEARCH fills gaps in our knowledge, helps to identify problems, and allows for a better assessment of risk in the future.

CAUTIONARY APPROACHES are policies and actions that individuals, organizations or governments take to minimize or avoid future potential health or environmental impacts. These may include voluntary self-regulation to avoid or reduce exposure, if easily achievable.

REGULATIONS are formal steps taken by government to limit both the occurrence and consequences of potentially risky events. Standards with limits may be imposed with methods to show compliance or they may state objectives to be achieved without being prescriptive.

LIMITING EXPOSURE or banning the source of exposure altogether are options to be used when the degree of certainty of harm is high. The degree of certainty and the severity of harm are two important factors in deciding the type of actions to be taken.

TECHNICAL OPTIONS should be used to reduce risk (or perceived risk). These may include the consideration of burying power lines.

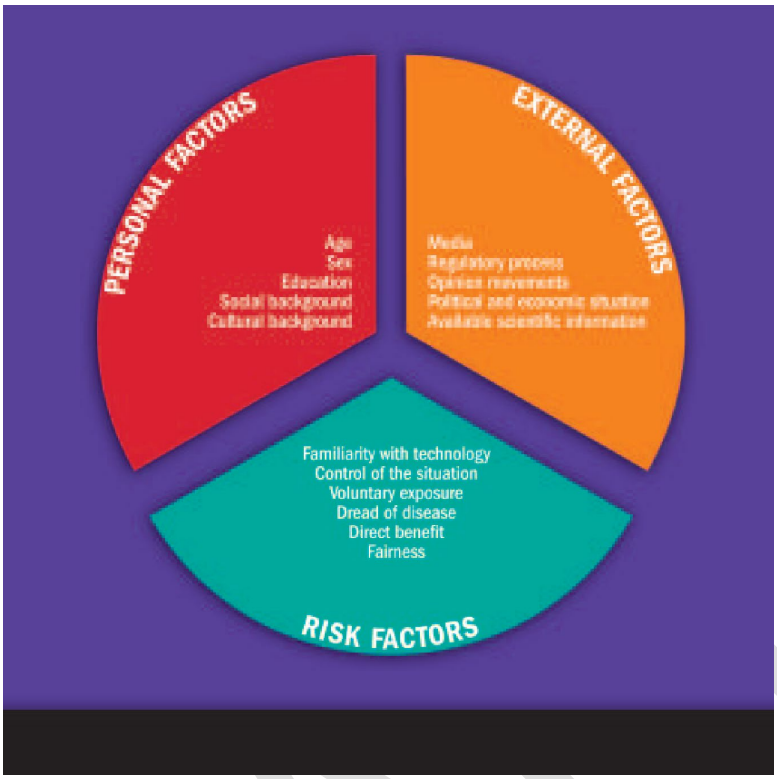
MITIGATION involves making physical changes in the system to reduce exposure and, ultimately, risk. Mitigation may mean redesigning the system, installing shielding or introducing protective equipment.

COMPENSATION is sometimes offered in response to higher exposures in a workplace or environment. People may be willing to accept something of value in exchange for accepting increased exposure.

HOW IS RISK PERCEIVED?

Many factors influence a person's decision to take or reject a risk. People perceive risks as negligible, acceptable, tolerable, or unacceptable, in comparison to perceived benefits. These perceptions depend on personal factors, external factors as well as the nature of the risk. Personal factors include age, sex, and cultural or educational backgrounds. Some people, for example, find the risks associated with sun tanning as acceptable. On the other hand, many people do not. Inherent acceptability in personal risk-taking is the belief in the ability to control it.

However, there are situations where individuals may feel that they do not have control. This is especially true when it comes to exposure to EMF where the fields are invisible, and the degree of exposure is beyond immediate control. This is further exacerbated when individuals do not perceive direct benefit from exposure. In this context, public response will depend on the perception of that risk based on external factors. These include available scientific information, the media and other forms of information dissemination, the economic situation of the individual and community, activism, and the structure of the regulatory process and political decision-making in the community (Figure 4).



The nature of the risk can also lead to different perceptions. The greater the number of factors adding to the public's perception of risk, the greater the potential for concern. Surveys have found that the following pairs of characteristics of a situation generally affect risk perception.

- FAMILIAR VS. UNFAMILIAR TECHNOLOGY.
  Familiarity with a given technology or a situation helps reduce the level of the perceived risk. The perceived risk increases when the technology or situation is new, unfamiliar, or hard-to-comprehend. Perception about the level of risk can be significantly increased if there is an incomplete scientific understanding about potential health effects from a particular situation or technology. As with the introduction of new wireless technologies like Wi-Fi, 5G, smart meters and so on, there is an initial increase in concern when they are first introduced but then the concerns seem to subside once they become more common.

- PERSONAL CONTROL VS. LACK OF CONTROL OVER A SITUATION.
  If people do not have any say about installation of power lines and mobile telephone base stations, especially near their homes, schools or play areas, they tend to perceive the risk from such EMF facilities as being high.

- VOLUNTARY VS. INVOLUNTARY EXPOSURE.
  People feel much less at risk when the choice is theirs. For example, there tends to be opposition to new mobile phone towers partly because of concerns about involuntary exposure to EMF. In this case, the risk from the relatively low RF fields emitted from mobile telephone base stations may be perceived as high. However, people generally perceive as low the risk from the much more intense RF fields from their voluntarily chosen mobile telephones.

- DREADED VS. NOT DREADED OUTCOME.
  Some diseases and health conditions, such as cancer, or severe and lingering pain and disability, are more feared than others. Thus, even a small possibility of cancer, especially in children, significant public attention.

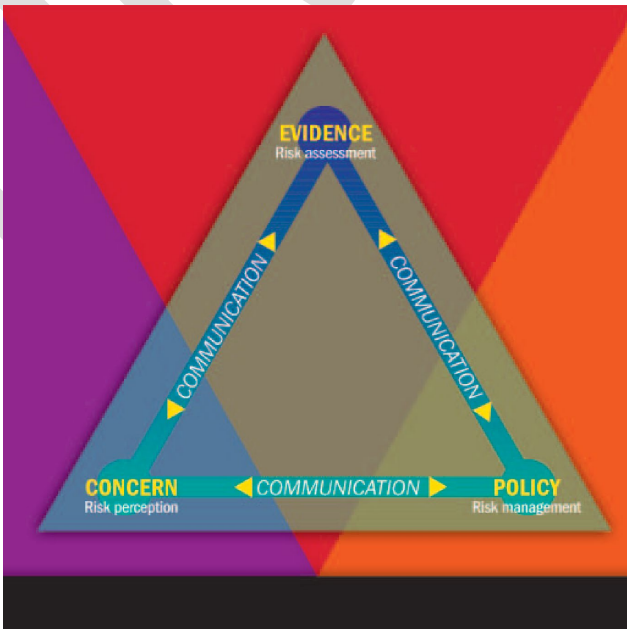
- DIRECT VS. INDIRECT BENEFITS.
  If people are exposed to the electric and magnetic fields from a high voltage transmission line that does not provide power to their community, they may not perceive any direct benefit from the installation and are less likely to accept the associated risk.

- FAIR VS. UNFAIR EXPOSURE.
  Issues of social justice may be raised because of unfair EMF exposure. For example, if facilities were installed in poor neighbourhoods for economic reasons (e.g., cheaper land), the local community would unfairly bear the potential risks.

Reducing perceived risk involves countering the factors associated with personal risk. Communities feel they have a right to know what is proposed and planned with respect to the construction of EMF sources that, in their opinion, might affect their health. They want to have some control and be part of the decision-making process. Unless an effective system of public information and communication among scientists, governments, industry, and the public is established, it is more likely that new EMF technologies will be mistrusted and feared. Careful attention to the social dimensions of any project allows policy makers and managers to make informed decisions as part of a thorough risk management program. Ultimately, risk management must consider both assessed and perceived risks to be effective.

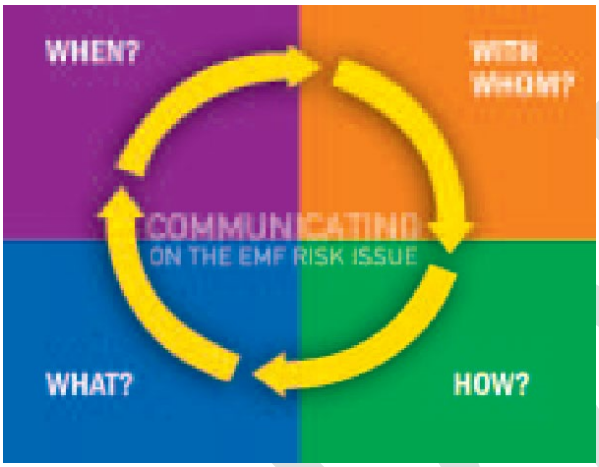
THE NEED FOR RISK COMMUNICATION

Scientists must communicate evidence clearly, and government agencies must inform their citizenry about regulations and policy measures in place. In this process, it is important that communication between these stakeholders be done effectively (Figure 5).



MANAGING EMF RISK COMMUNICATION

A successful approach to planning and evaluating risk communication should consider all aspects and parties involved. As the public becomes increasingly aware of environmental health issues, trust in public officials and technical and scientific experts has declined. Many sections of the public also believe that the pace of scientific and technological change is too fast for governments to manage. Moreover, in politically open societies, people are ready to act. Individuals, community-based organizations, and non-governmental organizations are willing to intervene with action to direct decisions or to disrupt activities if they are excluded from the decision process. Such a societal trend has increased the need for effective communication between all stakeholders. This section introduces communication on the EMF issue through the four-step process described in the following pages.



WHEN TO COMMUNICATE

Key questions:

- *When should you start a dialogue?*
- *Is there sufficient planning time?*
- *Can you quickly research who and what influences community opinions?*
- *When do you include the stakeholders?*
- *When do you plan the process, set the goals, and outline the options?*
- *When are decisions made?*

There can be public anxiety over sources of EMF, such as transmission lines and mobile phone base stations. This anxiety can lead to strong objections to the siting of such facilities. When community opposition builds, it is often because the communication process was not started early enough to ensure public trust and understanding. To counteract this, communication about a project requires planning and skill. It is important to anticipate information needs: know what to share and when to share it.

A challenge with EMF risk communication is timeliness and agility. Governments are not known for acting fast. The speed with which social media users can disseminate information – false, accurate or otherwise - is quick. Governments have been compelled to use social media as the public are increasingly turning to these sites to access news and information. The experience of health protection authorities competing with social media misinformation is that you must communicate early.

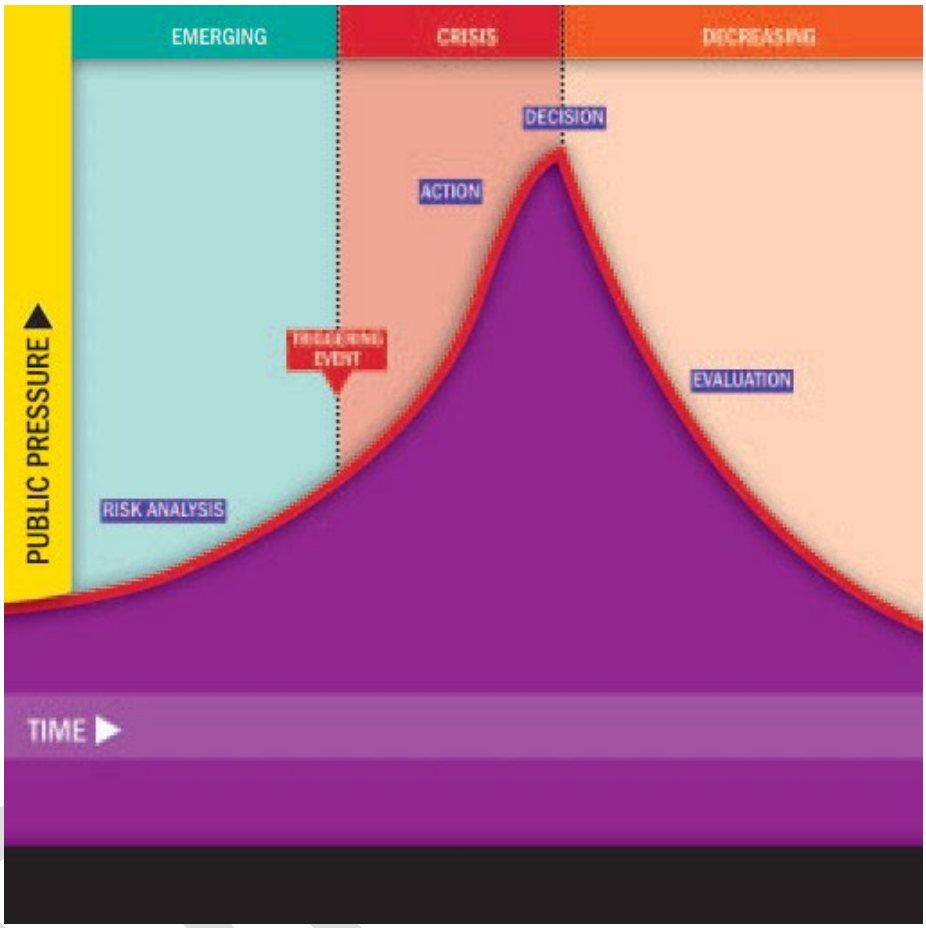
Establishing a dialogue as early as possible is recommended because it provides several benefits. First, the public will see the communicator as acting in a responsible manner and demonstrating concern about the issue. Avoiding delays in providing information and discussion will also dispel controversy and decrease the likelihood of having to rectify misinformation and misunderstandings. Initiating risk communication proves that one is trying to build a relationship with stakeholders, and that can be almost as important as what is communicated.

The communication process passes through various stages. At the beginning of the dialogue, there is a need to provide information and knowledge. This will increase awareness and sometimes concern on the part of the different stakeholders. At this stage, it will become important to continue communication, through an open dialogue, with all parties involved before setting policies. When it comes to planning a new project, for example, building a power line or installing a mobile phone base station, the industry should start immediate communication with regional and local authorities as well as interested stakeholders (landowners, concerned citizens, environmental groups).

Managing time sensitive issues

Public health and environmental health issues have a dynamic life - they evolve with time. The life cycle of an issue illustrates how social pressure on decision-makers develops with time (Figure 6). During the initial stages of the life cycle, when the problem is dormant or just emerging, public pressure is at a minimum. While the problem may not yet be on the research agenda, there can still be ample time to research and analyze potential risks. As the problem bursts into current public awareness, often brought into the forefront by a triggering event (e.g., due to media attention, organized activist intervention, social media, or simple word of mouth), it is important to act in the form of communication with the

public. As the problem reaches crisis proportions, a decision must be taken but a hurried outcome can leave all sides dissatisfied. As the problem begins to diminish in importance on the public agenda, time should be made for a follow-up evaluation of the issue and decisions made. The transition between phases in an issue's life cycle depends on the levels of awareness and pressure from various stakeholders (Figure 6).



Box: SOME DRIVING FORCES OF THE ISSUE LIFE CYCLE

- Lack of trust
- Perception of a “villain” in the story (e.g., industry)
- Dis- and misinformation
- Sense of injustice – not part of the decision-making process with respect to siting
- Media coverage
- Intervention of activist groups and other highly motivated interest groups
- Delay of immediate communication efforts
- Emotional dynamics in the public

The earlier that balanced information is introduced, the more able decision-makers will be to prevent the issue reaching the crisis stage. Missing early opportunities to attempt risk communication can cause

"ripple effects" that may backfire in the future. For example, when decision-makers try to quietly push through a siting project. Once there is a crisis, it is increasingly difficult to conduct effective risk communication and to achieve successful outcomes from the decision-making process since there is less time to consider options and to engage stakeholders in dialogue. Because topics that can generate controversy become even more critical in periods of elections and other political events, it is advisable to prepare strategies and have options at hand for action.

Adapting to a dynamic process

Throughout the issue's life cycle, the communication strategy must be tailored to the groups or individuals concerned on an ad-hoc basis and may take a variety of forms to be most effective. The means of communication and actions should be appropriately modified, as new information becomes available. An opportunity to influence the life cycle can arise from the timely publication of scientific results. While international scientific bodies must respond publicly to technological advances in an unbiased manner, decision-makers can prove to stakeholders that their concerns are taken seriously by adopting a similar strategy. Indeed, risk surveillance is a key component to ensure proper risk management, as continuing information is essential for monitoring and providing feedback to the ongoing risk management process.

WITH WHOM TO COMMUNICATE

Key questions

- *Who will be interested in this issue?*
- *What is known about the interests, fears, concerns, attitudes, and motivation of the stakeholders?*
- *What authorities are responsible for determining and implementing policy?*
- *Are there organizations with whom to form effective partnerships?*
- *Who can provide advice or scientific expertise?*

Developing effective communication about risk depends upon identifying the key stakeholders, those who have the strongest interest or who can play the greatest role toward developing understanding and consensus among the relevant constituency. Identifying these stakeholders and recognizing their role often requires a substantial investment in time and energy. Failure to make this investment may compromise the effectiveness of the message.

Identifying the stakeholders

It is crucial to have a good understanding of the 'playing field' and the key players or stakeholders in the EMF issue. Depending on the situation, the communicator may need to consider several, if not all, of the stakeholders listed in Figure 7 (below).

The roles of some of these key stakeholders are discussed below:

The *scientific community* is an important stakeholder as it provides technical information and is therefore assumed to be independent and apolitical. Scientists can help the public understand the benefits and risks of EMF, and help regulators evaluate risk management options and assess the consequences of different decisions. They have the important role of explaining available scientific information in a way that helps people understand what is known, where more information is needed, what the main sources of uncertainty are, and when better information will become available. In this role, they can also try to anticipate and put boundaries on expectations of the future.

Industry, such as electricity companies and telecommunications providers as well as manufacturers, is a key player and is often seen as the risk producer as much as the service provider. Deregulation of these industries in many countries has increased the number of companies (and, in some cases, the number of EMF sources as companies compete for coverage). In several countries industry players, especially electrical utilities, have taken a proactive and positive approach to managing risks and have emphasized open communication of information to the public. However, profit motive ultimately causes the public to have misgivings about their messages.

Government officials at the national, regional, and local levels have social and economic responsibilities. Because they act in a political environment, the general public does not always trust them. Regulators have a crucial role as they devise standards and guidelines. To that end, they need detailed and complete information from the major stakeholders to decide on policy measures regarding protection from EMF exposure. They must consider any new sound scientific evidence, which would suggest revising the existing exposure measures, while being sensitive to society's demands and constraints.

The *general public*, now better educated and better informed on technology-related issues than ever before, may be the single greatest determinant to the success or failure of a proposed technology project. This is especially true in democratic and highly industrialized societies. Public sentiment often makes itself heard through highly vocal associations or other special interest groups that usually have good access to the media. The media plays an essential role in mass communication, politics, and decision-making in most democratic societies.

Media —newspapers, radio, television, and the Internet—has a major impact on the way an environmental risk is perceived and ultimately on the success of the decision-making process. The media can be an effective tool to increase problem awareness, to broadcast information through clear messages, and to increase individual participation. However, it can be equally effective at disseminating incorrect information, mis- and disinformation, and thereby reducing trust and support of the decision-making process. This is especially true of social media since there is no quality control. The professionalism of presentation does not necessarily reflect in the quality of content. Individuals must establish in their own minds how much they trust a particular source, which is not an easy decision for a layperson to take.

WHAT TO COMMUNICATE

Key questions

- *Do the stakeholders have access to sufficient and impartial information about the technology?*
- *Is the message intelligible or does it contain a large amount of complex information?*
- *Are the messages of all key stakeholders being heard? i.e., is there an effective means of providing feedback?*

Identification of public concerns and potential problems is critical for strategic and pro-active approaches. Once stakeholders become aware of an issue, they will raise questions based on their perceptions and evaluations of the risk. Therefore, the dissemination of information should be done in a way that is sensitive to these preconceived notions, or else the decision-makers risk offending and alienating the stakeholders.

The strategy and rationale to pursue will depend on the audience. The public will also dictate which questions can be expected. To convince the audience, appropriate and credible arguments that appeal not only to reason, but also to emotion and social bonds should be advanced. Diverse types of arguments are described in Figure 8.

Communicating the science

Scientists communicate technical results derived from research through publications of different scientific value (the highest being peer review publications), expert reviews and risk assessments. Through this process, the results of scientific investigation can be incorporated into the development and implementation of policy guidance and standards. Continuous monitoring and review of technical findings is important to ensure that any residual uncertainties are addressed and minimized in the medium to long term, and to provide reassurance to the public.

However, while scientific information has proven to be valuable in making public health decisions, it is not error-free. The contributions of scientists can fail for several reasons. For example, the available information may be presented in a way that is not useful to the decision-makers (either because it is too complex or oversimplified) and leads to incorrect conclusions or decisions (possibly because of the uncertainty inherent in the data or problems in communicating) or is erroneous.

Simplifying the message

Technical experts are faced with the challenge of providing information that is comprehensible by the public at large. This entails simplifying the message. If not, the media, and other stakeholders will take on this task with the danger of mis-communicating the information. This is especially true of EMF, as most people have a very diffuse picture of electromagnetism, perceiving these invisible and pervasive waves as potentially harmful.

Explaining scientific uncertainty

When it comes to risk assessment, the available information for decision-making is based on science. However, scientific evaluation of the biological responses from environmental exposures rarely leads to definitive conclusions. Epidemiological studies are prone to bias, and the validity of extrapolation from animal studies to humans is often questionable. The “weight-of-evidence” determines the degree to which available results support or refute a given hypothesis. For estimates of small risks in complex areas of science, no single study can provide a definitive answer. Strengths and weaknesses of each study should be evaluated, and results of each study should be interpreted as to how it alters the “weight-of-evidence”. Uncertainty is therefore inherent in the process and should be an integral part of planning any risk management or communication task. Indeed, the public is not always aware of the inherent role of uncertainty in scientific knowledge. The public can interpret scientific uncertainty as a declaration of the lack of adequate studies, and of an underestimation of the EMF issue.

Presenting all the evidence

The public will often base its preconceptions on publicized scientific results that have shown a possible association with a health effect. It is important for the scientist to present all the available evidence when disseminating scientific information even if research is showing opposing results. Only then can scientists be seen to be truly independent. Scientific reasoning can always be used to argue against a particular finding.

Box: SOME RULES OF THUMB TO POPULARIZE TECHNICAL INFORMATION.

- Determine and classify the key messages that you want to pass on, i.e., define your information goals
- Explain concepts in simple language
- Avoid oversimplifying, as you may seem to be ill-informed or hiding the truth.
- Acknowledge that you are simplifying and provide references to supporting documents.

Understanding the audience

It is important to discern what type of information the public wants and to address that need head on, acknowledging when necessary that science is incomplete. Restricting communication to those issues about which there is scientific certainty may leave the public, and sometimes policy makers, with the feeling that their information needs are not being met. Understanding the motivations of the stakeholders will help to finetune the message. For example, a resident facing the possibility of construction of a nearby power line or mobile phone base station may be worried by unforeseen depressed property values or the impact on landscape or environmental damage, while a potential home buyer in the vicinity of an existing power line may be mostly worried about health.

Distorting scientific information

Science is a powerful tool and has earned its credibility by being predictive. However, its usefulness depends on the quality of the data, which is related to the quality and credibility of the scientists. It is important to verify the knowledge and integrity of so-called “experts”, who may look and sound extremely convincing but hold unorthodox views that the media feel justified in airing “in the interests of balance”. In fact, giving weight to these unorthodox views can disproportionately influence public opinion. For the public, often the best sources of information are from panels of independent experts who periodically provide summaries of the current state of knowledge.

Box: TIPS TO BUILD EFFECTIVE RISK COMMUNICATION STRATEGIES

- Do research to answer these questions:
  - What are the sources of information?
  - What are the key journals or magazines?
  - What are the relevant websites?
  - Are there other similar issues you could learn from?
  - Who can explain scientific research to lay people?
- Make yourself available in both formal and informal settings to improve communication. Private meetings can destroy trust if access is not balanced among all stakeholders.
- Acknowledge uncertainty, describe why it exists, and place it in a context of what is already known.
- Acknowledge that risk communication skills are important for all levels of the decision-making organization, from inception to project management.
- Avoid unnecessary conflict but understand that a personal or policy decision is by nature a dichotomy; e.g., a person will decide to buy or not to buy a home near a power line.
- Recognize that even if you communicate well, you may not reach an agreement.

- Remember that in most societies, even though it may take a long time, communities ultimately decide what is an acceptable risk, not governmental agencies, or corporations.

Putting the EMF risk in perspective

Even though the scientific evidence does not indicate health risks from EMF, the public remains concerned about facilities that produce EMF. This discrepancy in viewpoint is mostly based on differing approaches to risk issues on the part of the experts and the public. On one hand, the experts will have to evaluate the scientific evidence of the risk (risk assessment) using objective and well-defined criteria. Their findings will then be used to draft responses through public policies. On the other hand, the public evaluates the risk incurred by EMF technologies at the individual level (risk perception). The differences in approach are further detailed in the Box below. Quantifying risk is of limited utility in communication with the public who may not possess a technical background.

Box: DIFFERENCES IN RISK EVALUATION AMONG STAKEHOLDERS

Expert evaluation (risk assessment)

- Scientific approach to quantify risk
- Uses probabilistic concepts (deals in averages, distributions…)
- Depends on technical information transmitted through well-defined channels (scientific studies)
- Product of scientific teams
- Importance given to objective scientific facts
- Focused on benefits versus costs of technology
- Seeks to validate information

Layperson's evaluation (risk perception)

- Intuitive approach to quantify risk
- Uses local, situation-specific information or anecdotal evidence
- Depends on information from multiple channels (media, general considerations, and impressions)
- Individual or peer-bound social group-filtered process
- Importance of emotions and subjective perceptions
- Focused on safety
- Seeks to deal with individual circumstances and preferences

When quantitative information is used, it may be most useful when compared with readily understood quantities. This has been used effectively to explain the risk associated with commercial air travel by comparing it with familiar activities such as driving, or to explain the risk of radiation exposure from routine diagnostic X-rays by comparing the exposure to that coming from natural background radiation. However, care must be taken when using risk comparison (see Box below). It is indeed important to quantify different risks to health in a comparable framework, particularly for setting policy agendas and research priorities.

Box: COMPARISON: A TOOL FOR COMMUNICATION

Risk comparison can be used to raise awareness and be educational in a neutral way. It is an advanced tool that requires careful planning and experience. While a comparison puts facts into an understandable context, be careful not to use it to gain acceptance or trust. Inappropriate use of risk comparison may lower the effectiveness of your communication and even damage your credibility in the short-term.

NOTE: *Never compare voluntary exposure (such as smoking or driving) to involuntary exposure. For a mother with three children who lives close to a mobile phone base station, the risk she is taking is not voluntary. If you were to compare her exposure to EMF with her choice to drive on the freeway at 140 km/h, you may offend her.*

- Consider the social and cultural characteristics of the audience and make your comparison relevant to what they know
- Do not use comparisons in situations where trust is low
- Make sure that your comparisons do not trivialize peoples' fears or questions
- Do not use comparisons to convince a person about the correctness of a position
- Remember that a comparison of exposure data is less emotional than a comparison of risks
- Be aware that the way you present risks may affect how you are perceived
- Use a pre-test to learn if the comparisons you plan to use cause the response you hope to elicit
- Acknowledge that the comparison in itself does not dispose of the issue
- Recognize that if your comparison creates more questions than it answers, you need to find another example
- Be prepared for others to use comparisons to emotionalize or to dramatize

EXAMPLE: To illustrate the power level of an EMF emission source, you could:

- Show emission data before and after a similar facility went into operation
- Compare with guidelines limits, but acknowledge that people concern might be about levels well below the guidelines

Explaining policy measures

When discussing policy measures with the public, the communicator should be ready to explain what the guidelines on exposure limits cover (e.g. frequencies, reduction factors…) and how they were established, i.e. what scientific facts were used, what assumptions were made, what administrative resources are needed to implement them, and what mechanisms are in place to ensure compliance by product manufacturers (e.g. mobile phones) or utilities providers (e.g. electricity or telecommunications supplier). It is also of interest to let the public know if there are procedures and timetables for updating the guidelines as scientific research advances. Indeed, decision-makers often rely on preliminary results or insufficient data, and their decisions should be reviewed as soon as an assessment is completed. In the case of precautionary policies, it is important to explain the meaning of "precaution", explicitly recognizing that a risk may not exist. Where not-science based exposure limits are enforced, it is necessary to explain that these exposure limits do not represent either safe or hazardous exposure levels.

Box: EXPLAINING EXPOSURE LIMITS TO THE PUBLIC

Using EMF exposure limits as a formal policy argument requires good scientific understanding on the part of the decision-maker and the communicator – please refer to the third chapter of this document, *The Present Situation.* From a communications perspective, it is important to stress to the public that:

- The determination of field levels at a certain location: If possible, it is useful to show data from field measurement surveys at selected sites and compare them with numerical calculations and with accepted exposure guidelines.
- The field strength is dependent on distance from the EMF source, and normally decreases rapidly away from it: To ensure human safety, fences, barriers, or other protective measures are used for some facilities to preclude unauthorized access to areas where exposure limits may be exceeded.
- Often, but not in all standards, the exposure limits are lower for the public than for workers

HOW TO COMMUNICATE

Key questions

- *What type of participation tool do you employ to address your audience (social media, traditional media, public engagement …)?*
- *Where, when and under what circumstances does the discussion take place?*
- *What tone prevails?*
- *How formally is the situation handled?*

Effective risk communication relies on the message's content and the context. In other words, the way that something is said is as important as what is said. Stakeholders will receive information at various stages of the issue. This will come from a wide range of sources with differing perspectives. This diversity influences how stakeholders perceive risks and what they would like to see happen.

Setting the tone

When dealing with an emotive issue such as the potential health effect from EMF, one of the most important communication skills is the ability to build and sustain a relationship of trust with the other parties involved in the process. To that end, one will need to create a non-threatening atmosphere and set the tone for a candid, respectful and supportive approach to resolving issues. Such behaviour should ideally be embraced by all stakeholders.

How to work with distrust

Communities with concerns about involuntary exposure to EMF are largely likely to be distrustful of official views and sources of information. Considerable effort may then be required to encourage stakeholders to suspend that distrust. Decision-makers need to ensure that all individuals involved in communicating with the public are kept up to date with developments in the debate and are prepared to discuss, rather than dismiss, public fears.

Some of the necessary components of communication under conditions of distrust are:

- Acknowledge the lack of trust
- Recognize uncertainty, where it exists
- Point out what is different this time (e.g., disclosure of information, earlier involvement of stakeholders, clear goals, and roles, etc.)
- Ask what would help to dispel distrust
- Be patient—it takes time to earn trust
- Never hold a closed meeting
- Admit when you honestly do not know the answer to a question
- Be accountable in ways the stakeholders value

BOX: BUILDING EFFECTIVE COMMUNICATION SKILLS

INSPIRE TRUST

- Be competent
- Be calm and respectful
- Be honest and open
- Show your human side, personalize
- Use understandable language, and be careful not to sound or be condescending
- Explain the consequences of the assumptions used
- Demonstrate your own values

BE ATTENTIVE

- Choose your words carefully
- Watch emotions, yours and those of your audience
- Be an attentive listener
- Be attentive to body language

MAINTAIN AN OPEN DIALOGUE

- Seek input from all
- Share information
- Provide means for frequent communication,
- e.g., publication of findings on the Web with opportunity to comment

Selecting tools and techniques

Members of a community where construction of a new facility is proposed will want to be a part of the decision-making process. Therefore, it is important to structure a process that involves the stakeholders in a meaningful way, to seek out and facilitate their involvement when addressing this decision and eventually create optimal conditions for feelings of procedural justice. The process usually will be carried out in three stages: planning, implementation, and evaluation.

The first stage is crucial, because stimulating public interest and involvement can be counter-productive if the communicator is not fully prepared for the public's participation, questions, and concerns.

In the second stage, when it is time to engage the public, the communicator will have to choose the setting to discuss the issue with them. The choice will depend on the type, number, and interest of the stakeholders.

In the last stage, it will be important to evaluate the outcome of the process, take follow-up actions, arrange for documentation of what was said and what agreements were reached, and share these summaries with those who participated.

Individual queries may be handled on an ad-hoc basis through, for example, phone, email, or social media. Communication with groups of stakeholders requires more planning. For a small group of stakeholders, it may be feasible to involve them in sessions devoted to changing undesirable aspects of the project. One could encourage creativity, but always be up front about the limits for change and how

the suggestions will be used to influence the final decision. Proponents will have clear views about the extent to which they have room to manoeuvre.

It may be useful to employ individuals from local community organizations to take advantage of existing networks and enhance credibility, but one should make sure that the individual is qualified, and to establish his or her role, responsibilities and limitations at the start. It is important to identify the stakeholder group that represents the opposition and determine what they specifically want. On key issues it may be possible to use advisory committees to build consensus on specific project decisions to encourage compromise, provide structure, and focus on solving identified problems.

BOX: Key steps to engaging stakeholders

1. Planning

- Design the program: Define or anticipate the role of the public and other stakeholders and tailor the program to enhance stakeholders' involvement.
- Seek comments on the program plan: Test your proposed program internally and externally to ensure that it will work as intended.
- Prepare for implementation: Obtain the necessary resources, choose and train your personnel, develop contingencies, assess your strengths and weaknesses, explain the program internally, find and work with appropriate community partners, develop a communication plan, and prepare the most critical materials.
- Be prepared for managing requests for information and involvement as they arise.
- Co-ordinate within your organization: Even small inconsistencies give an impression of internal confusion and ineptness. The goal is to avoid giving mixed messages. Do all you can to keep the same staff in place throughout the process: They become more proficient and more trusted in the community over time.

2. Implementing

- Implement the stakeholder involvement program: Act on your plan. Use the tools and techniques appropriate to the community and the issue.
- Provide information that meets your stakeholders' needs:
- Determine what they want to know now and anticipate what they will need to know in the future. Develop a list of problems, issues and needs, with responses to each. Address, where possible, specific concerns of different individuals or groups.
- Cooperate with other organizations: Co-ordinate messages, while openly acknowledging any differences. Mixed messages confuse and create distrust.
- Enlist the help of others who have community credibility: Local groups or residents (e.g., local researchers, medical doctors) that have credibility can be helpful to the outsider, but they cannot substitute for a forthright approach and extensive community involvement.

3. Evaluating

- Use feedback from stakeholders for continuous evaluation: As you implement the program, listen carefully to what others are telling you and follow-up with action.
- Evaluate the success of the program: If stakeholders are not informally telling you how your process is working and what would improve it, formally ask their advice with a questionnaire or other method. Ask again at the end of the process so their ideas can assist you to design and implement

the next steps.

For a large group of stakeholders, one could circulate response sheets to gain information on public concerns and preferences. It may also be useful to conduct surveys, questionnaires and polls via email, social media, and the internet to sample the population for attitudes towards specific aspects of the project. Surveys and polls done on the Internet will provide useful information but may not represent a statistically valid sample. They will only be that part of the group that uses the Internet. A much more efficient method of performing surveys, albeit much more expensive, is to use a trained professional or a specialized polling organization.

Box: EXAMPLES OF ALTERNATIVES

PASSIVE ENGAGEMENT TECHNIQUES

- Printed materials (fact sheets, brochures, reports)
- Website
- Newspaper advertisement, insertions or solicited stories
- Press releases
- Radio or television reporter interviews
- Social media posts

ACTIVE ENGAGEMENT TECHNIQUES

- Talk to people about the process
    - Hold “open houses” e.g., with posters
    - Do radio or television “phone-in” dialogue
    - Use third-party networks (do briefings at community group meetings)
    - Provide a staffed information hotline or “drop-in” centre
    - Arrange for tours of successful similar projects
    - Sponsor telephone, internet, or mail surveys
    - Respond to personal enquiries
    - Respond to social media comments and messages
- Conduct small meetings
    - Stakeholder sessions – in person and online
    - Focus groups
    - Citizen advisory councils
- Conduct large meetings
    - Public hearings – in-person and online
    - Professionally facilitated meetings

There are many ways to exchange information with your audience. Different methods will be appropriate for different stakeholders at various times. If stakeholders are engaged early in the process, more passive (one-way) forms of engagement may be the appropriate place to start. If the issue is in a crisis stage, an active form of dialogue that will quickly define and help solve the conflict is a better

choice. Stakeholders will be involved to varying degrees. Some may sit quietly through a meeting, while others will be quite vocal. Some may come to only one meeting, while others will never miss one. Some may choose to communicate through written correspondence, AI, wanting to speak with stakeholders or by posting information using traditional media or social media. Each level of participation is valuable and requires an appropriate response.

3. EMF EXPOSURE GUIDELINES AND POLICIES: THE PRESENT SITUATION

EXECUTIVE SUMMARY (text to be included in the Executive Summary)

Exposure limits are developed by organizations such as ICNIRP, IEEE/ICES or directly by several national authorities. The exposure limits recommended by ICNIRP form the basis for regulations within most countries in the world. While ICNIRP evaluates scientific evidence about both short-term and long-term effects, its exposure limits are set just for short-term effects that are the only established health effects. To derive the exposure limits ICNIRP applies reduction factors to threshold levels to take into account uncertainties in scientific evidence. There is international scientific consensus that there is no substantial evidence that exposure below ICNIRP's limits cause harm.

When there are uncertainties regarding the actual existence of a health effect, as in the case of long-term effects, precautionary policies can be an option, as long as it is explicitly recognized that a risk may not exist. However, the adoption of precautionary exposure limits could undermine the credibility of science-based exposure limits and raise public worries instead of decreasing them.

WHO DECIDES ON GUIDELINES?

Countries set their own national standards for exposure to electromagnetic fields, directly or on the basis of standards developed by scientifical and technical organizations as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronic Engineers/ International Committee on Electromagnetic Safety (IEEE/ICES). ICNIRP and IEEE/ICES have similar approaches in defining exposure limits and, even if the latter still have some differences, they aim towards harmonization of their standards.

The majority of national standards are based on the guidelines set by ICNIRP. *This commission is a non-governmental, non-profit organization, whose members are scientific experts without any commercial or other vested interests, and in official relations with WHO . ICNIRP evaluates all the available scientific evidence relevant to the effects of non-ionizing radiation (NIR) on human health. ICNIRP produces guidelines recommending limits of exposure, which are reviewed periodically and updated when scientific developments make it necessary.*

WHAT ARE GUIDELINES BASED ON?

ICNIRP guidelines developed for EMF exposure cover the frequency range from 0 to 300 GHz*. They are based on comprehensive reviews of the published peer-reviewed literature relevant to adverse health effects from both short- and long-term exposures to EMFs.*

According to ICNIRP, its exposure limits are based on scientifically established health effects, which at the present time are only those related to short-term acute exposures. On the contrary, exposure limits are not based on long-term effects of low-level chronic exposure, because, according to ICNIRP, the available scientific information on these effects is insufficient to consider them as established.

The ICNIRP process of setting exposure limits begins with the identification of the threshold levels, i. e. the lowest exposure levels known to cause the health effects. To allow for uncertainties in science, such as biological and environmental variabilities, these threshold levels are reduced to derive limit values for

human exposure. For example, in order to prevent an excessive whole-body heating due to the absorption of radiofrequency energy, ICNIRP uses a reduction factor of 10 to derive occupational limits for workers and a factor of 50 to derive exposure limits for the general public. The limits vary with frequency, and are therefore different for low frequency fields, e. g. power lines, and high frequency fields, e. g. mobile phones **(Figure to be updated).**

WHY IS A HIGHER REDUCTION FACTOR APPLIED FOR GENERAL PUBLIC EXPOSURE GUIDELINES?

The occupationally exposed population consists of adult workers who are generally aware of their exposure to electromagnetic fields and of their effects. Workers are trained to be aware of potential risk and to take appropriate protective measures and are under medical surveillance. By contrast, the general public consists of individuals of all ages and of varying health status who, in many cases, are unaware of their exposure to EMF. This may include more vulnerable groups or individuals who, in many cases, are unaware of their exposure to EMF. These are the underlying considerations that lead to more stringent exposure restrictions for the general public than for the occupationally exposed population (Figure 9).

Box: PRESENT EXPOSURE GUIDELINES

- In general, standards for low frequency electromagnetic fields are set to avoid adverse health effects due to the electrical stimulation of nerve and muscle tissues by induced electric fields within the body, while standards for radiofrequency fields prevent health effects caused by localised or whole-body heating by absorption of electromagnetic energy in body tissues and its conversion in heat
- Maximum exposure levels in everyday life are typically below guideline limits
- Exposure guidelines are not intended to protect against electromagnetic interference (EMI) with electromedical devices. The EMI issue is in the scope of technical standards that are continuously evolving with the progress of technology

WHAT ARE PRECAUTIONARY APPROACHES?

Throughout the world there are debates inside and outside of government about the adoption of "precautionary approaches" for management of potential health risks in the face of scientific uncertainty. The range of actions taken depends on the severity of harm and the degree of uncertainty surrounding the issue. If the harm associated with a potential risk is small and its occurrence uncertain, it makes sense to do little, if anything. Conversely, if the potential harm is great and there is little uncertainty about its occurrence, significant action, such as a ban, is called for (Figure 10). However, if scientific uncertainty is low (i.e. if there is sufficient scientific evidence), it would be more proper to call measures "prevention" rather than "precaution". *The Precautionary Principle is usually applied when there is a high degree of scientific uncertainty and there is a need to take action for a potentially serious risk without awaiting the results of more scientific research. It was defined in the Treaty of Maastricht as "taking prudent action when there is sufficient scientific evidence (but not necessarily absolute proof) that inaction could lead to harm and where action can be justified on reasonable judgements of cost-effectiveness". There have been many different interpretations and applications of the precautionary principle, which has recently led to insights into its dual role as a safeguard (legal principle to protect people) and a compass (policy principle to trigger debates and research). In 2000 the European*

Commission defined several rules for the application of this principle (see Box), including cost-benefit analyses.

SCIENCE-BASED AND PRECAUTIONARY APPROACHES FOR EMF: WHAT ARE THE DIFFERENCES?

Science-based evaluations of the potential hazards from EMF exposure form the basis of risk assessment and are also an essential part of an appropriate public policy response. The recommendations of ICNIRP guidelines follow rigorous scientific reviews of relevant published scientific papers including those in the fields of medicine, epidemiology, biology and dosimetry. *Science-based judgements on exposure levels that will prevent identified adverse health effects are then made. Here, caution is exercised both with respect to the magnitude of reduction factors (based on uncertainties in the scientific data and on possible differences in susceptibility of certain groups or individuals) and in the cautious assumptions made about the efficiency with which EMF interact with people.*

Box: THE PRECAUTIONARY PRINCIPLE ACCORDING TO THE EUROPEAN COMMISSION (2000)

Where action is deemed necessary, measures based on the precautionary principle should be:

- proportional to the chosen level of protection,
- non-discriminatory in their application,
- consistent with similar measures already taken,
- based on an examination of the potential benefits and costs of action or lack of action (including where appropriate and feasible, an economic cost/benefit analysis),
- subject of review, in the light of new scientific data, and
- capable of assigning responsibility for producing the scientific evidence necessary for a more comprehensive risk assessment.

Precautionary approaches, such as the Precautionary Principle, address additional uncertainties as to possible but unproven adverse health effects. Such risk management policies provide an opportunity to take incremental steps with respect to emerging issues. They should include cost-benefit considerations and should be seen as an addition to, and not as a substitute for, science-based approaches in assisting decision-makers to develop public policy.

In the context of the EMF issue, some national and local governments have adopted "prudent avoidance", a variant of the precautionary principle, as a policy option. It was originally used for ELF fields and is described as using simple, easily achievable, low to modest (prudent) cost measures to reduce individual or public EMF exposure, even in the absence of certainty that the measures would reduce risk.

If regulatory authorities react to public pressure by introducing precautionary limits in addition to the already existing science-based limits, they should be aware that this may undermine the credibility of science and of the exposure limits.

The explicit recognition that a risk may not exist is a key element of precautionary approaches. If the scientific community concludes that there is no risk from EMF exposure or that the possibility of a risk is too speculative, then the appropriate response to public concern should be an effective education programme. If a risk for EMF were to be established, it would then be appropriate to rely on the

scientific community to recommend specific protective measures using established public health risk assessment/risk management criteria. If large uncertainties remain, then more research will be needed.

In some countries, precautionary limits lower than the science-based limit have been introduced in response to public pressure by the most alarmed parts of the population. Contrary to expectations, the public perception of the risk has not diminished, probably because the introduction of measures against possible long-term effects has been regarded as an admission of the existence of these effects, neglecting the meaning of “precaution”.

Moreover, findings from communication research show that precautionary recommendations in risk communication about EMF can have unintended consequences, e. g. an increase in risk perception “triggered” by precautionary messages. The term “precaution” has a switching effect and is understood differently in different social contexts, varying over time. These complex societal dynamics make it difficult to provide adequate cost-benefit-estimates for applying the precautionary principle on EMF and should be taken into account when considering precautionary measures.

GLOSSARY

FURTHER READING

From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 26-08-2024 12:36:45 (UTC +01)
To: Anders Ravnsborg Beierholm <anrb@sis.dk>
Subject: RE: [EXT] SV: Review of the publication "Establishing a dialogue on risks from electromagnetic fields"

Dear Anders,

Many thanks for your timely feedback. Much appreciated.

Kind regards,
Emilie

From: Anders Ravnsborg Beierholm <anrb@sis.dk>
Sent: Monday, August 26, 2024 12:34 PM
To: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: [EXT] SV: Review of the publication "Establishing a dialogue on risks from electromagnetic fields"

Dear Emilie,

Thank you for the possibility to comment on the revised draft. I only have a few general and editorial comments (attached).

Best regards,
Anders

_____

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DANISH HEALTH AUTHORITY
Radiation Protection

Fra: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sendt: 31. maj 2024 11:26
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Emne: Review of the publication "Establishing a dialogue on risks from electromagnetic fields"

Dear IAC members

As mentioned last year, we are planning to update the WHO 2002 publication entitled *Establishing a dialogue on risks from electromagnetic fields*. This handbook was published with the intention of aiding policy makers on how to communicate potential health risks from electromagnetic fields (EMF). It has been well received and translated into 14 languages to date. Your feedback last year was that the document stood the test of time but some parts require an update. Therefore over the past year, we have reviewed and revised the document with the help of several collaborating centres.

We now share with you the draft document. We will discuss the salient changes during the IAC meeting, and invite you

1. to have a look at the overall structure and identify missing overarching topic areas or general themes **prior to the IAC meeting** to inform our discussion,
2. to review the document in detail **by 1 September 2024**.

Looking forward to your cooperation.

Kind regards,
Emilie on behalf of the Working Group

Dr Emilie van Deventer
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World Health Organization 75 HEALTH FOR ALL

From: Anders Ravnsborg Beierholm <>
Sent: 26-08-2024 12:34:16 (UTC +01)
To: 'VAN DEVENTER, Tahera Emilie' <vandeventere@who.int>
Subject: SV: Review of the publication "Establishing a dialogue on risks from electromagnetic fields"

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Establishing a Dialogue on Risks frm EMFs - Comments from IAC members

Name	Section	Line	Type of comment	Comments	Proposed change
			G - general T - technical E - editorial		
WHAT ARE THE CONCLUSIONS FROM SCIENTIFIC RESEARCH?	1	116	G	The text states that "handsets transmit RF energy only while a call is being made or data is transmitted". This statement, while being technically correct, might underplay the fact that for modern smart phones, most types of use lead to exposure.	Option 1: "Apart from infrequent signals used to maintain links with nearby base stations, handsets transmit RF energy only while a call is being made or data is transmitted. For modern smart phones, data transmissson occurs during e.g. sending e-mails, web browsing, social media usage, navigation and app usage. Base stations are continuously transmitting..." Option 2: Omit the word "only" in line 117
EXECUTIVE SUMMARY	2	134	E	"approaches. " erroneously pasted between two sentences	Delete "approaches. "
MULTIPLE DETERMINANTS OF THE EMF RISK ISSUE	2	171	E	"Sudden" is spelled with capital S but does not begin the sentence	"sudden"
MULTIPLE DETERMINANTS OF THE EMF RISK ISSUE	2	172	E	No ending parenthesis before ending the sentence	"disasters)."
HOW IS RISK PERCEIVED?	2	260	E	One or more words are missing in the sentence "Thus, even a small possibility of cancer, especially in children, significant public attention."	"Thus, even a small possibility of cancer, especially in children, can result in significant public attention."
WHO DECIDES ON GUIDELINES?	3	809	E	Space before punctuation "...with WHO . ICNIRP evaluates..."	"...with WHO. ICNIRP evaluates..."
Whole document	1,2,3		E	Some figures are missing from the draft. Inconsistent use of "Fig." and "Figure". No figure captions	Assumes that all figures will be updated and available in the final version
Whole document	1,2,3		E	Inconsistent use of "e.g." or "e. g. ". Same for "i.e." and "i. e."	Use "i.e." and "e.g." consistently

From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 31-05-2024 11:26:16 (UTC +01)
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
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ESTABLISHING A DIALOGUE ON RISKS FROM ELECTROMAGNETIC FIELDS

2nd edition

WHO, 2024

This draft is a revised version of the 2002 version

(https://www.who.int/publications-detail-redirect/9241545712)

This draft is for review by the International Advisory Committee of the WHO International EMF Project

Please use the accompanying Excel spreadsheet to record your comments and suggestions.

Note that the graphics and overall design will be reviewed and revised.

Contents

1. ELECTROMAGNETIC FIELDS AND PUBLIC HEALTH: THE PRESENT EVIDENCE

EXECUTIVE SUMMARY (text to be included in the Executive Summary)

Electric, magnetic and electromagnetic fields (EMF) exist as part of nature and artificially as a result of modern technology. These fields surround us in everyday life. In contrast to some optical and all ionizing radiation, their energetic potential is not sufficient for directly damaging the molecules in the cells of the human body. However, high enough levels of EMF above certain biological thresholds can give rise to health effects related to stimulation of nerves and muscles and to heating of body tissues. Taking into account the current scientific evidence, health effects at exposures below these thresholds have not been demonstrated. Over time, an increasing amount of scientific knowledge has confirmed this. At the same time, technological developments continue to raise new research questions and public concern remains.

WHAT ARE ELECTROMAGNETIC FIELDS?

EMF occur in nature and have always been present. However, over the past century to the present, environmental exposure to human-made sources of EMF has steadily increased. Reasons are increasing use of electricity, electrically powered means of transportation, wireless communication technologies based on an increasing number of devices and changes in work practices and social behaviour. Virtually always, most people are exposed to a complex mix of electric and magnetic fields of many different frequencies.

Potential health effects of man-made EMF have been a topic of scientific interest since the late 1800s and have received particular attention since the 1970s. EMF can be broadly divided into static and low-frequency (LF, 0-100 kHz) electric and magnetic fields and high-frequency or radiofrequency fields (RF, 100 kHz-300 GHz). Common sources for LF include power lines and household electrical appliances. Common sources for RF include mobile telephones and their base stations, smart devices, radar, radio and television broadcast facilities as well as microwave kitchen appliances. Applications for inductive charging, heating and cooking operate at an intermediate frequency range (300 Hz – 10 MHz).

Unlike ionizing radiation (such as gamma rays from radioactive materials, cosmic rays and X-rays), EMF are too weak to produce ionization that leads to the breaking of the molecules a cell consists of. This is why EMF are part of the 'non-ionizing radiations' (NIR). Figure 1 displays the relative position of NIR in the wider electromagnetic spectrum. *The energetic difference between EMF and ionizing radiation illustrates that frequencies of EMF are a thousand, million or even more times below the level required to cause ionization. Optical (infrared, visible, ultraviolet) radiation and ionizing radiation will not be considered further in this brochure.*

WHAT HAPPENS WHEN YOU ARE EXPOSED TO ELECTROMAGNETIC FIELDS?

Electrical currents exist naturally in the human body and are an essential part of normal bodily functions. To communicate, the nervous system generates and modulates electrical signals. Most biochemical reactions, from those associated with digestion to those involved in brain activity, involve electrochemical processes.

The effects of external exposure to EMF on the human body depend mainly on the EMF frequency and field strength. The frequency simply describes the number of oscillations or cycles per second. At LF, EMF pass through the body while at RF the fields are absorbed and penetrate only a certain depth into the tissue, the rest is reflected and scattered at the surface. EMF currently used for mobile communication penetrate a few centimetres deep into the body. EMF at higher frequencies (millimetre waves), which are planned to be used more for mobile communication in the future, only penetrate the outer layers of the skin.

LF electric fields influence the distribution of electric charges at the surface of the body and cause the induction of an electric field and a related current to flow in the body (Fig. 2A). LF magnetic fields induce circulating currents within the human body (Fig. 2B). The strength of these induced currents depends on the intensity of the outside electrical or magnetic field. Regardless of the origin, if the current exceeds certain thresholds, it can cause stimulation of nerves and muscles.

At RF, the fields penetrate a certain distance into the body. The energy of these fields is absorbed and transformed into heat which increases the velocity of the molecules in the body. This results in a rise in temperature. This effect is used in domestic applications such as warming up food in microwave ovens, and in industrial applications such as plastic welding. These kinds of applications use RF at high field strengths. The levels of RF fields to which people are exposed in their living environment are in most cases much lower than the RF levels needed to produce noticeable heating of the body.

EMF may also have indirect health effects by interacting with certain medical body implants, such as interferences with pacemakers or heating of metallic prostheses. Doctors or manufacturers may give advice on protective measures.

BIOLOGICAL EFFECTS AND HEALTH EFFECTS

Reacting to changes in the environment is a normal part of life. Biological effects are measurable responses of organisms or cells to a stimulus or to a change in the environment. *Responses, e. g. an increased heart rate during a workout, are not necessarily harmful to health. However, the body might not possess adequate compensation mechanisms to mitigate all environmental changes or stresses. Prolonged exposure to environmental stressors, even if minor, may constitute a health hazard if it results in physiological stress.* In humans, an adverse health effect results from a biological effect that causes detectable impairment in the health or well-being of affected individuals.

Complying with exposure limits recommended in national and international guidelines helps to control risks from exposures to EMF that may be harmful to human health as described in Chapter 3. There has been a debate going on for decades on whether long-term exposure below recommended exposure limits can cause adverse health effects or influence people's wellbeing.

WHAT ARE THE CONCLUSIONS FROM SCIENTIFIC RESEARCH?

Scientific knowledge about the health effects of EMF is substantial and is based on a large number of epidemiological studies on humans and experimental studies on animals and cells. Many health outcomes ranging from reproductive defects to cardiovascular and neurodegenerative diseases and cancer have been examined.

LOW-FREQUENCY FIELDS

In 2001, an expert scientific working group of WHO's International Agency for Research on Cancer (IARC) reviewed studies related to the carcinogenicity of static and extremely low frequency (ELF) electric and magnetic fields. Using the standard IARC classification that weighs human, animal and laboratory evidence, ELF magnetic fields were classified as possibly carcinogenic to humans (IARC category 2B). "Possibly carcinogenic to humans" is a classification used to denote an agent for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence for carcinogenicity in experimental animals*. The classification of ELF magnetic fields is based on consistent evidence from epidemiological studies on childhood leukaemia. This evidence has been judged by the IARC's working group as "limited" because a causal interpretation of the observed association between exposure to the agent and cancer is credible, but other explanations for the observations (technically termed "chance", "bias", or "confounding") could not be ruled out with reasonable confidence.* Up until now, no plausible biological mechanism has been identified by experimental research on animals and cells to explain the reported association between exposure to ELF magnetic fields and childhood leukaemia.

Evidence for all other cancers in children and adults, as well as other types of exposure (i.e. static fields and ELF electric fields) was considered inadequate to classify either due to insufficient or inconsistent scientific information. In 2007, the WHO published a monograph of the series "Environmental Health Criteria" that examined not only cancer, but also all other effects studied so far.

RADIO-FREQUENCY FIELDS

Concerning RF fields, research has been conducted for more than fifty years. The balance of evidence suggests that exposure to low level RF fields, such as those emitted by base stations for broadcasting services and mobile communications or those emitted by mobile phones, does not cause adverse health effects.

Some studies have reported minor effects of mobile phone use, including changes in brain activity, reaction times, and sleep patterns. In so far as these effects have been confirmed, they appear to lie within the normal bounds of human variation.

Some epidemiological studies conducted in the early 2000s indicate a possible increased risk for brain tumours by mobile phone use. Consequently, IARC in 2011 classified RF electromagnetic fields as "possibly carcinogenic to humans". The findings of these observational studies were not supported by experimental animal studies. Ongoing research efforts are concentrated on whether long-term, low level RF exposure, even at levels too low to cause significant temperature rise, can cause adverse health effects. Several recent epidemiological studies on trends in cancer incidence in the general population of mobile phone users found no convincing evidence of increased brain cancer risk. However, monitoring possible long-term effects of the technology is an ongoing process.

Mobile phone handsets and base stations present quite different exposure situations. Depending on factors such as way of usage and mobile phone reception, RF exposure from active handsets close to the body can be much greater than the exposure contribution from mobile phone base stations. Apart from infrequent signals used to maintain links with nearby base stations, handsets transmit RF energy only while a call is being made or data is transmitted. However, base stations are continuously transmitting

signals (the so-called "always-on" signals), although the levels to which the public is exposed are small compared to the maximum levels that can occur, even if the base station is located nearby. For more recent mobile communication standards such as 4G (LTE) and 5G (NR), the percentage of always-on signals is drastically decreased compared to 2G (GSM).

Given the widespread use and rapid development of technology, public concern persists despite increasing scientific evidence showing no health effects at exposures below the biological thresholds of established effects of EMF. Continued research activities and clear communication with the public remain important tasks.

2. EMF RISK COMMUNICATION: DEALING WITH PUBLIC PERCEPTION

EXECUTIVE SUMMARY (text to be included in the Executive Summary)

Protection from exposure to EMF is based on science. However, risk perception may differ from science. Adopting a communication approach taking into account EMF risk perception is one way to address community concerns. Communication advice in this document is only a starting point based on international best practice. approaches. The advice in this section is intended to enhance local communication approaches.

Modern technology offers powerful tools to stimulate a full range of benefits for society, including economic development. However, technological progress in the broadest sense has always been associated with hazards and risks, both perceived and real. Industrial, commercial, and household applications of EMF are no exception. Around the start of the twentieth century people were worried about the possible health effects of light bulbs and the fields emanating from the wires on poles connecting land-based telephone systems. No adverse health effects appeared, and these technologies were gradually accepted as part of normal lifestyle. Understanding and adjusting to newly introduced technologies depends partly on how the new technology is presented and how its risks and benefits are interpreted by an ever more wary public.

Worldwide, some community members have indicated concern that exposure to EMF from sources like high voltage power lines, radar, mobile telephones, and their base stations could lead to adverse health consequences. As a result, the construction of new power lines and wireless technology infrastructure has been met with considerable opposition in some countries. Public worry about new technologies often stems from unfamiliarity and a sense of danger from forces that they cannot sense.

This section aims to provide governments, industry, and members of the public with a framework to establish and maintain effective communication about EMF associated health risks.

DEFINING RISK

In trying to understand people's perception of risk, it is important to distinguish between a health hazard and a health risk. A hazard can be an object, an energy source or a set of circumstances that could potentially harm a person's health. Risk is the likelihood, or probability, that a person will be harmed by a particular hazard.

Box: HAZARD AND RISK

Driving a car is a health hazard and presents a risk depending on speed. The higher the speed, the more risk is associated with driving.

Every activity has an associated risk. It is possible to diminish risks by avoiding specific activities, but one cannot abolish risk entirely. In the real world, there is no such thing as zero risk.

MULTIPLE DETERMINANTS OF THE EMF RISK ISSUE

Scientists assess health risk by weighing and critically evaluating all the available scientific evidence to develop a sound risk assessment (see box below). The public may perform its own assessment of risk by an entirely different process, often not based on quantifiable information. Ultimately this perceived risk could take on an importance as great as a measurable risk in determining government policy.

Some factors that shape risk perception of individuals include basic societal and personal values (e.g., traditions, customs) as well as previous experience with technological projects (e.g., dams, power plants), and Sudden or extra-ordinary events and developments (e.g., base station construction or catastrophes / disasters. These factors may explain local concerns, possible biases or hidden agendas or assumptions.

Careful attention to the social dimensions of any project allows policy makers and managers to make informed decisions as part of a thorough risk management program. Ultimately, risk management must consider both measured and perceived risk to be effective.

The identification of problems and the scientific risk assessment of those problems are key steps to defining a successful risk management program. To respond to that assessment, such a program should incorporate actions and strategies, e.g., finding options, making decisions, implementing those decisions, and evaluating the process. These components are not independent, nor do they occur in a predetermined order. Rather, each element is driven by the urgency of the need for a decision, and the availability of information and resources. While there is a range of risk management options (see Box below), emphasis in this handbook is placed on the second option, namely communication programmes.

Box: BASICS OF RISK ASSESSMENT

Risk assessment is an organized process used to describe and estimate the likelihood of adverse health outcomes from environmental exposures to an agent. The four steps in the process are:

1. Hazard identification: the identification of a potentially hazardous agent or exposure situation (e.g., a particular substance or energy source)
2. Dose-response assessment: the estimation of the relationship between dose or exposure to the agent or situation and the incidence and/or severity of an effect
3. Exposure assessment: the assessment of the extent of exposure or potential exposure in actual situations
4. Risk characterization: the synthesis and summary of information about a potentially hazardous situation in a form useful to decision-makers and stakeholders

Box: RANGE OF RISK MANAGEMENT OPTIONS

DECISION TO TAKE NO FORMAL ACTION is an appropriate response in cases where the risk is considered very small, or the evidence is insufficient to support formal actions. This response is often combined with watchful waiting, i.e., monitoring the results of research and measurements and the decisions being made by standard-setters, regulators, and others.

COMMUNICATION PROGRAMS can be used to help people understand the issues, become involved in the process and make their own choices about what to do.

RESEARCH fills gaps in our knowledge, helps to identify problems, and allows for a better assessment of risk in the future.

CAUTIONARY APPROACHES are policies and actions that individuals, organizations or governments take to minimize or avoid future potential health or environmental impacts. These may include voluntary self-regulation to avoid or reduce exposure, if easily achievable.

REGULATIONS are formal steps taken by government to limit both the occurrence and consequences of potentially risky events. Standards with limits may be imposed with methods to show compliance or they may state objectives to be achieved without being prescriptive.

LIMITING EXPOSURE or banning the source of exposure altogether are options to be used when the degree of certainty of harm is high. The degree of certainty and the severity of harm are two important factors in deciding the type of actions to be taken.

TECHNICAL OPTIONS should be used to reduce risk (or perceived risk). These may include the consideration of burying power lines.

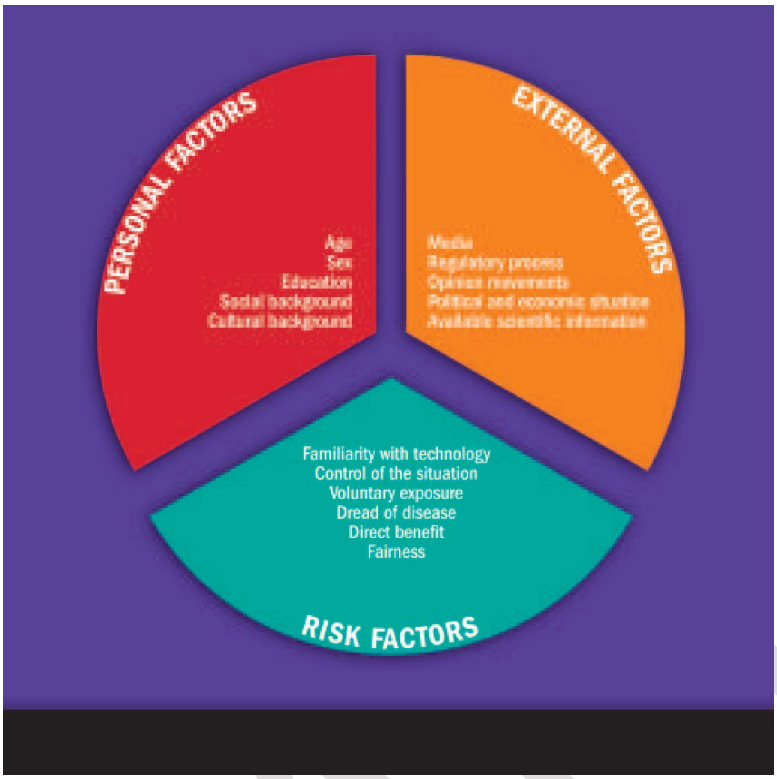
MITIGATION involves making physical changes in the system to reduce exposure and, ultimately, risk. Mitigation may mean redesigning the system, installing shielding or introducing protective equipment.

COMPENSATION is sometimes offered in response to higher exposures in a workplace or environment. People may be willing to accept something of value in exchange for accepting increased exposure.

HOW IS RISK PERCEIVED?

Many factors influence a person's decision to take or reject a risk. People perceive risks as negligible, acceptable, tolerable, or unacceptable, in comparison to perceived benefits. These perceptions depend on personal factors, external factors as well as the nature of the risk. Personal factors include age, sex, and cultural or educational backgrounds. Some people, for example, find the risks associated with sun tanning as acceptable. On the other hand, many people do not. Inherent acceptability in personal risk-taking is the belief in the ability to control it.

However, there are situations where individuals may feel that they do not have control. This is especially true when it comes to exposure to EMF where the fields are invisible, and the degree of exposure is beyond immediate control. This is further exacerbated when individuals do not perceive direct benefit from exposure. In this context, public response will depend on the perception of that risk based on external factors. These include available scientific information, the media and other forms of information dissemination, the economic situation of the individual and community, activism, and the structure of the regulatory process and political decision-making in the community (Figure 4).



The nature of the risk can also lead to different perceptions. The greater the number of factors adding to the public's perception of risk, the greater the potential for concern. Surveys have found that the following pairs of characteristics of a situation generally affect risk perception.

- FAMILIAR VS. UNFAMILIAR TECHNOLOGY.
  Familiarity with a given technology or a situation helps reduce the level of the perceived risk. The perceived risk increases when the technology or situation is new, unfamiliar, or hard-to-comprehend. Perception about the level of risk can be significantly increased if there is an incomplete scientific understanding about potential health effects from a particular situation or technology. As with the introduction of new wireless technologies like Wi-Fi, 5G, smart meters and so on, there is an initial increase in concern when they are first introduced but then the concerns seem to subside once they become more common.

- PERSONAL CONTROL VS. LACK OF CONTROL OVER A SITUATION.
  If people do not have any say about installation of power lines and mobile telephone base stations, especially near their homes, schools or play areas, they tend to perceive the risk from such EMF facilities as being high.

- VOLUNTARY VS. INVOLUNTARY EXPOSURE.
  People feel much less at risk when the choice is theirs. For example, there tends to be opposition to new mobile phone towers partly because of concerns about involuntary exposure to EMF. In this case, the risk from the relatively low RF fields emitted from mobile telephone base stations may be perceived as high. However, people generally perceive as low the risk from the much more intense RF fields from their voluntarily chosen mobile telephones.

- DREADED VS. NOT DREADED OUTCOME.
  Some diseases and health conditions, such as cancer, or severe and lingering pain and disability, are more feared than others. Thus, even a small possibility of cancer, especially in children, significant public attention.

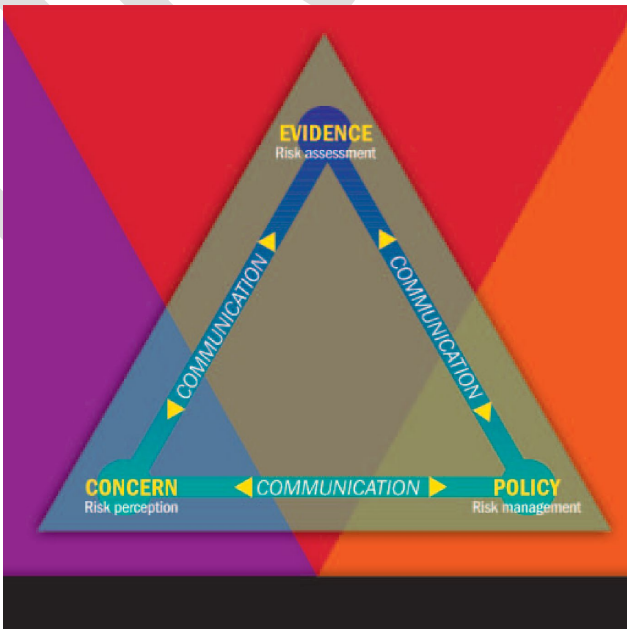
- DIRECT VS. INDIRECT BENEFITS.
  If people are exposed to the electric and magnetic fields from a high voltage transmission line that does not provide power to their community, they may not perceive any direct benefit from the installation and are less likely to accept the associated risk.

- FAIR VS. UNFAIR EXPOSURE.
  Issues of social justice may be raised because of unfair EMF exposure. For example, if facilities were installed in poor neighbourhoods for economic reasons (e.g., cheaper land), the local community would unfairly bear the potential risks.

Reducing perceived risk involves countering the factors associated with personal risk. Communities feel they have a right to know what is proposed and planned with respect to the construction of EMF sources that, in their opinion, might affect their health. They want to have some control and be part of the decision-making process. Unless an effective system of public information and communication among scientists, governments, industry, and the public is established, it is more likely that new EMF technologies will be mistrusted and feared. Careful attention to the social dimensions of any project allows policy makers and managers to make informed decisions as part of a thorough risk management program. Ultimately, risk management must consider both assessed and perceived risks to be effective.

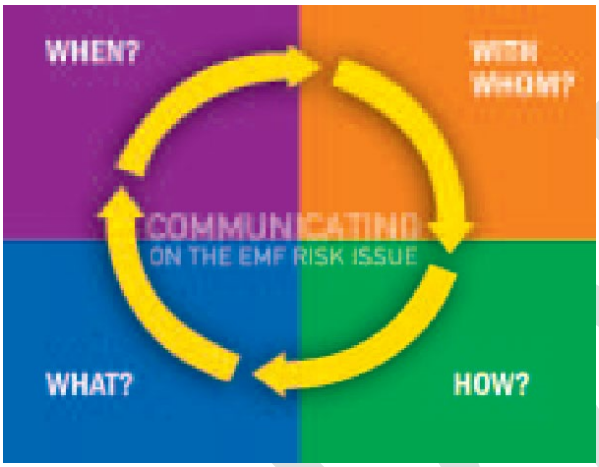
THE NEED FOR RISK COMMUNICATION

Scientists must communicate evidence clearly, and government agencies must inform their citizenry about regulations and policy measures in place. In this process, it is important that communication between these stakeholders be done effectively (Figure 5).



MANAGING EMF RISK COMMUNICATION

A successful approach to planning and evaluating risk communication should consider all aspects and parties involved. As the public becomes increasingly aware of environmental health issues, trust in public officials and technical and scientific experts has declined. Many sections of the public also believe that the pace of scientific and technological change is too fast for governments to manage. Moreover, in politically open societies, people are ready to act. Individuals, community-based organizations, and non-governmental organizations are willing to intervene with action to direct decisions or to disrupt activities if they are excluded from the decision process. Such a societal trend has increased the need for effective communication between all stakeholders. This section introduces communication on the EMF issue through the four-step process described in the following pages.



WHEN TO COMMUNICATE

Key questions:

- *When should you start a dialogue?*
- *Is there sufficient planning time?*
- *Can you quickly research who and what influences community opinions?*
- *When do you include the stakeholders?*
- *When do you plan the process, set the goals, and outline the options?*
- *When are decisions made?*

There can be public anxiety over sources of EMF, such as transmission lines and mobile phone base stations. This anxiety can lead to strong objections to the siting of such facilities. When community opposition builds, it is often because the communication process was not started early enough to ensure public trust and understanding. To counteract this, communication about a project requires planning and skill. It is important to anticipate information needs: know what to share and when to share it.

A challenge with EMF risk communication is timeliness and agility. Governments are not known for acting fast. The speed with which social media users can disseminate information – false, accurate or otherwise - is quick. Governments have been compelled to use social media as the public are increasingly turning to these sites to access news and information. The experience of health protection authorities competing with social media misinformation is that you must communicate early.

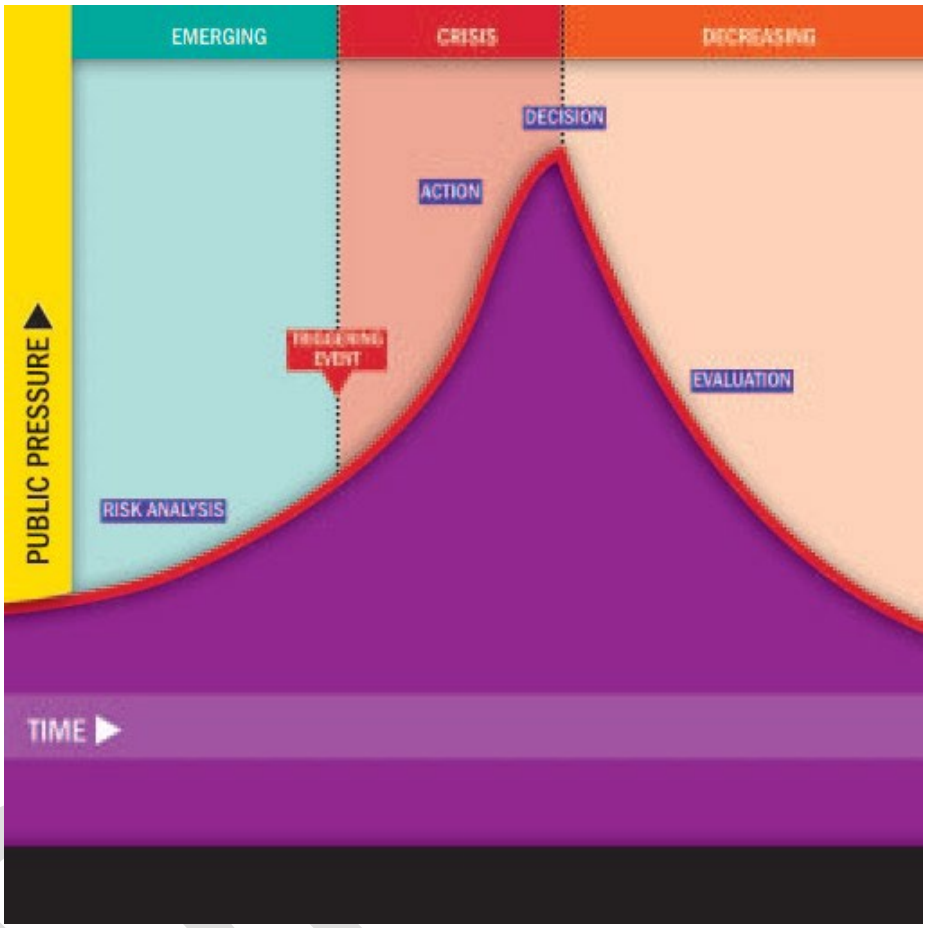
Establishing a dialogue as early as possible is recommended because it provides several benefits. First, the public will see the communicator as acting in a responsible manner and demonstrating concern about the issue. Avoiding delays in providing information and discussion will also dispel controversy and decrease the likelihood of having to rectify misinformation and misunderstandings. Initiating risk communication proves that one is trying to build a relationship with stakeholders, and that can be almost as important as what is communicated.

The communication process passes through various stages. At the beginning of the dialogue, there is a need to provide information and knowledge. This will increase awareness and sometimes concern on the part of the different stakeholders. At this stage, it will become important to continue communication, through an open dialogue, with all parties involved before setting policies. When it comes to planning a new project, for example, building a power line or installing a mobile phone base station, the industry should start immediate communication with regional and local authorities as well as interested stakeholders (landowners, concerned citizens, environmental groups).

Managing time sensitive issues

Public health and environmental health issues have a dynamic life - they evolve with time. The life cycle of an issue illustrates how social pressure on decision-makers develops with time (Figure 6). During the initial stages of the life cycle, when the problem is dormant or just emerging, public pressure is at a minimum. While the problem may not yet be on the research agenda, there can still be ample time to research and analyze potential risks. As the problem bursts into current public awareness, often brought into the forefront by a triggering event (e.g., due to media attention, organized activist intervention, social media, or simple word of mouth), it is important to act in the form of communication with the

public. As the problem reaches crisis proportions, a decision must be taken but a hurried outcome can leave all sides dissatisfied. As the problem begins to diminish in importance on the public agenda, time should be made for a follow-up evaluation of the issue and decisions made. The transition between phases in an issue's life cycle depends on the levels of awareness and pressure from various stakeholders (Figure 6).



Box: SOME DRIVING FORCES OF THE ISSUE LIFE CYCLE

- Lack of trust
- Perception of a “villain” in the story (e.g., industry)
- Dis- and misinformation
- Sense of injustice – not part of the decision-making process with respect to siting
- Media coverage
- Intervention of activist groups and other highly motivated interest groups
- Delay of immediate communication efforts
- Emotional dynamics in the public

The earlier that balanced information is introduced, the more able decision-makers will be to prevent the issue reaching the crisis stage. Missing early opportunities to attempt risk communication can cause

"ripple effects" that may backfire in the future. For example, when decision-makers try to quietly push through a siting project. Once there is a crisis, it is increasingly difficult to conduct effective risk communication and to achieve successful outcomes from the decision-making process since there is less time to consider options and to engage stakeholders in dialogue. Because topics that can generate controversy become even more critical in periods of elections and other political events, it is advisable to prepare strategies and have options at hand for action.

Adapting to a dynamic process

Throughout the issue's life cycle, the communication strategy must be tailored to the groups or individuals concerned on an ad-hoc basis and may take a variety of forms to be most effective. The means of communication and actions should be appropriately modified, as new information becomes available. An opportunity to influence the life cycle can arise from the timely publication of scientific results. While international scientific bodies must respond publicly to technological advances in an unbiased manner, decision-makers can prove to stakeholders that their concerns are taken seriously by adopting a similar strategy. Indeed, risk surveillance is a key component to ensure proper risk management, as continuing information is essential for monitoring and providing feedback to the ongoing risk management process.

WITH WHOM TO COMMUNICATE

Key questions

- *Who will be interested in this issue?*
- *What is known about the interests, fears, concerns, attitudes, and motivation of the stakeholders?*
- *What authorities are responsible for determining and implementing policy?*
- *Are there organizations with whom to form effective partnerships?*
- *Who can provide advice or scientific expertise?*

Developing effective communication about risk depends upon identifying the key stakeholders, those who have the strongest interest or who can play the greatest role toward developing understanding and consensus among the relevant constituency. Identifying these stakeholders and recognizing their role often requires a substantial investment in time and energy. Failure to make this investment may compromise the effectiveness of the message.

Identifying the stakeholders

It is crucial to have a good understanding of the 'playing field' and the key players or stakeholders in the EMF issue. Depending on the situation, the communicator may need to consider several, if not all, of the stakeholders listed in Figure 7 (below).

The roles of some of these key stakeholders are discussed below:

The *scientific community* is an important stakeholder as it provides technical information and is therefore assumed to be independent and apolitical. Scientists can help the public understand the benefits and risks of EMF, and help regulators evaluate risk management options and assess the consequences of different decisions. They have the important role of explaining available scientific information in a way that helps people understand what is known, where more information is needed, what the main sources of uncertainty are, and when better information will become available. In this role, they can also try to anticipate and put boundaries on expectations of the future.

Industry, such as electricity companies and telecommunications providers as well as manufacturers, is a key player and is often seen as the risk producer as much as the service provider. Deregulation of these industries in many countries has increased the number of companies (and, in some cases, the number of EMF sources as companies compete for coverage). In several countries industry players, especially electrical utilities, have taken a proactive and positive approach to managing risks and have emphasized open communication of information to the public. However, profit motive ultimately causes the public to have misgivings about their messages.

Government officials at the national, regional, and local levels have social and economic responsibilities. Because they act in a political environment, the general public does not always trust them. Regulators have a crucial role as they devise standards and guidelines. To that end, they need detailed and complete information from the major stakeholders to decide on policy measures regarding protection from EMF exposure. They must consider any new sound scientific evidence, which would suggest revising the existing exposure measures, while being sensitive to society's demands and constraints.

The *general public*, now better educated and better informed on technology-related issues than ever before, may be the single greatest determinant to the success or failure of a proposed technology project. This is especially true in democratic and highly industrialized societies. Public sentiment often makes itself heard through highly vocal associations or other special interest groups that usually have good access to the media. The media plays an essential role in mass communication, politics, and decision-making in most democratic societies.

Media —newspapers, radio, television, and the Internet—has a major impact on the way an environmental risk is perceived and ultimately on the success of the decision-making process. The media can be an effective tool to increase problem awareness, to broadcast information through clear messages, and to increase individual participation. However, it can be equally effective at disseminating incorrect information, mis- and disinformation, and thereby reducing trust and support of the decision-making process. This is especially true of social media since there is no quality control. The professionalism of presentation does not necessarily reflect in the quality of content. Individuals must establish in their own minds how much they trust a particular source, which is not an easy decision for a layperson to take.

WHAT TO COMMUNICATE

Key questions

- *Do the stakeholders have access to sufficient and impartial information about the technology?*
- *Is the message intelligible or does it contain a large amount of complex information?*
- *Are the messages of all key stakeholders being heard? i.e., is there an effective means of providing feedback?*

Identification of public concerns and potential problems is critical for strategic and pro-active approaches. Once stakeholders become aware of an issue, they will raise questions based on their perceptions and evaluations of the risk. Therefore, the dissemination of information should be done in a way that is sensitive to these preconceived notions, or else the decision-makers risk offending and alienating the stakeholders.

The strategy and rationale to pursue will depend on the audience. The public will also dictate which questions can be expected. To convince the audience, appropriate and credible arguments that appeal not only to reason, but also to emotion and social bonds should be advanced. Diverse types of arguments are described in Figure 8.

Communicating the science

Scientists communicate technical results derived from research through publications of different scientific value (the highest being peer review publications), expert reviews and risk assessments. Through this process, the results of scientific investigation can be incorporated into the development and implementation of policy guidance and standards. Continuous monitoring and review of technical findings is important to ensure that any residual uncertainties are addressed and minimized in the medium to long term, and to provide reassurance to the public.

However, while scientific information has proven to be valuable in making public health decisions, it is not error-free. The contributions of scientists can fail for several reasons. For example, the available information may be presented in a way that is not useful to the decision-makers (either because it is too complex or oversimplified) and leads to incorrect conclusions or decisions (possibly because of the uncertainty inherent in the data or problems in communicating) or is erroneous.

Simplifying the message

Technical experts are faced with the challenge of providing information that is comprehensible by the public at large. This entails simplifying the message. If not, the media, and other stakeholders will take on this task with the danger of mis-communicating the information. This is especially true of EMF, as most people have a very diffuse picture of electromagnetism, perceiving these invisible and pervasive waves as potentially harmful.

Explaining scientific uncertainty

When it comes to risk assessment, the available information for decision-making is based on science. However, scientific evaluation of the biological responses from environmental exposures rarely leads to definitive conclusions. Epidemiological studies are prone to bias, and the validity of extrapolation from animal studies to humans is often questionable. The “weight-of-evidence” determines the degree to which available results support or refute a given hypothesis. For estimates of small risks in complex areas of science, no single study can provide a definitive answer. Strengths and weaknesses of each study should be evaluated, and results of each study should be interpreted as to how it alters the “weight-of-evidence”. Uncertainty is therefore inherent in the process and should be an integral part of planning any risk management or communication task. Indeed, the public is not always aware of the inherent role of uncertainty in scientific knowledge. The public can interpret scientific uncertainty as a declaration of the lack of adequate studies, and of an underestimation of the EMF issue.

Presenting all the evidence

The public will often base its preconceptions on publicized scientific results that have shown a possible association with a health effect. It is important for the scientist to present all the available evidence when disseminating scientific information even if research is showing opposing results. Only then can scientists be seen to be truly independent. Scientific reasoning can always be used to argue against a particular finding.

Box: SOME RULES OF THUMB TO POPULARIZE TECHNICAL INFORMATION.

- Determine and classify the key messages that you want to pass on, i.e., define your information goals
- Explain concepts in simple language
- Avoid oversimplifying, as you may seem to be ill-informed or hiding the truth.
- Acknowledge that you are simplifying and provide references to supporting documents.

Understanding the audience

It is important to discern what type of information the public wants and to address that need head on, acknowledging when necessary that science is incomplete. Restricting communication to those issues about which there is scientific certainty may leave the public, and sometimes policy makers, with the feeling that their information needs are not being met. Understanding the motivations of the stakeholders will help to finetune the message. For example, a resident facing the possibility of construction of a nearby power line or mobile phone base station may be worried by unforeseen depressed property values or the impact on landscape or environmental damage, while a potential home buyer in the vicinity of an existing power line may be mostly worried about health.

Distorting scientific information

Science is a powerful tool and has earned its credibility by being predictive. However, its usefulness depends on the quality of the data, which is related to the quality and credibility of the scientists. It is important to verify the knowledge and integrity of so-called “experts”, who may look and sound extremely convincing but hold unorthodox views that the media feel justified in airing “in the interests of balance”. In fact, giving weight to these unorthodox views can disproportionately influence public opinion. For the public, often the best sources of information are from panels of independent experts who periodically provide summaries of the current state of knowledge.

Box: TIPS TO BUILD EFFECTIVE RISK COMMUNICATION STRATEGIES

- Do research to answer these questions:
  - What are the sources of information?
  - What are the key journals or magazines?
  - What are the relevant websites?
  - Are there other similar issues you could learn from?
  - Who can explain scientific research to lay people?
- Make yourself available in both formal and informal settings to improve communication. Private meetings can destroy trust if access is not balanced among all stakeholders.
- Acknowledge uncertainty, describe why it exists, and place it in a context of what is already known.
- Acknowledge that risk communication skills are important for all levels of the decision-making organization, from inception to project management.
- Avoid unnecessary conflict but understand that a personal or policy decision is by nature a dichotomy; e.g., a person will decide to buy or not to buy a home near a power line.
- Recognize that even if you communicate well, you may not reach an agreement.

- Remember that in most societies, even though it may take a long time, communities ultimately decide what is an acceptable risk, not governmental agencies, or corporations.

Putting the EMF risk in perspective

Even though the scientific evidence does not indicate health risks from EMF, the public remains concerned about facilities that produce EMF. This discrepancy in viewpoint is mostly based on differing approaches to risk issues on the part of the experts and the public. On one hand, the experts will have to evaluate the scientific evidence of the risk (risk assessment) using objective and well-defined criteria. Their findings will then be used to draft responses through public policies. On the other hand, the public evaluates the risk incurred by EMF technologies at the individual level (risk perception). The differences in approach are further detailed in the Box below. Quantifying risk is of limited utility in communication with the public who may not possess a technical background.

Box: DIFFERENCES IN RISK EVALUATION AMONG STAKEHOLDERS

Expert evaluation (risk assessment)

- Scientific approach to quantify risk
- Uses probabilistic concepts (deals in averages, distributions…)
- Depends on technical information transmitted through well-defined channels (scientific studies)
- Product of scientific teams
- Importance given to objective scientific facts
- Focused on benefits versus costs of technology
- Seeks to validate information

Layperson's evaluation (risk perception)

- Intuitive approach to quantify risk
- Uses local, situation-specific information or anecdotal evidence
- Depends on information from multiple channels (media, general considerations, and impressions)
- Individual or peer-bound social group-filtered process
- Importance of emotions and subjective perceptions
- Focused on safety
- Seeks to deal with individual circumstances and preferences

When quantitative information is used, it may be most useful when compared with readily understood quantities. This has been used effectively to explain the risk associated with commercial air travel by comparing it with familiar activities such as driving, or to explain the risk of radiation exposure from routine diagnostic X-rays by comparing the exposure to that coming from natural background radiation. However, care must be taken when using risk comparison (see Box below). It is indeed important to quantify different risks to health in a comparable framework, particularly for setting policy agendas and research priorities.

Box: COMPARISON: A TOOL FOR COMMUNICATION

Risk comparison can be used to raise awareness and be educational in a neutral way. It is an advanced tool that requires careful planning and experience. While a comparison puts facts into an understandable context, be careful not to use it to gain acceptance or trust. Inappropriate use of risk comparison may lower the effectiveness of your communication and even damage your credibility in the short-term.

NOTE: *Never compare voluntary exposure (such as smoking or driving) to involuntary exposure. For a mother with three children who lives close to a mobile phone base station, the risk she is taking is not voluntary. If you were to compare her exposure to EMF with her choice to drive on the freeway at 140 km/h, you may offend her.*

- Consider the social and cultural characteristics of the audience and make your comparison relevant to what they know
- Do not use comparisons in situations where trust is low
- Make sure that your comparisons do not trivialize peoples' fears or questions
- Do not use comparisons to convince a person about the correctness of a position
- Remember that a comparison of exposure data is less emotional than a comparison of risks
- Be aware that the way you present risks may affect how you are perceived
- Use a pre-test to learn if the comparisons you plan to use cause the response you hope to elicit
- Acknowledge that the comparison in itself does not dispose of the issue
- Recognize that if your comparison creates more questions than it answers, you need to find another example
- Be prepared for others to use comparisons to emotionalize or to dramatize

EXAMPLE: To illustrate the power level of an EMF emission source, you could:

- Show emission data before and after a similar facility went into operation
- Compare with guidelines limits, but acknowledge that people concern might be about levels well below the guidelines

Explaining policy measures

When discussing policy measures with the public, the communicator should be ready to explain what the guidelines on exposure limits cover (e.g. frequencies, reduction factors…) and how they were established, i.e. what scientific facts were used, what assumptions were made, what administrative resources are needed to implement them, and what mechanisms are in place to ensure compliance by product manufacturers (e.g. mobile phones) or utilities providers (e.g. electricity or telecommunications supplier). It is also of interest to let the public know if there are procedures and timetables for updating the guidelines as scientific research advances. Indeed, decision-makers often rely on preliminary results or insufficient data, and their decisions should be reviewed as soon as an assessment is completed. In the case of precautionary policies, it is important to explain the meaning of "precaution", explicitly recognizing that a risk may not exist. Where not-science based exposure limits are enforced, it is necessary to explain that these exposure limits do not represent either safe or hazardous exposure levels.

606

607 Box: EXPLAINING EXPOSURE LIMITS TO THE PUBLIC

608 Using EMF exposure limits as a formal policy argument requires good scientific understanding on the
609 part of the decision-maker and the communicator – please refer to the third chapter of this document,
610 *The Present Situation.* From a communications perspective, it is important to stress to the public that:

611 • The determination of field levels at a certain location: If possible, it is useful to show data from field
612 measurement surveys at selected sites and compare them with numerical calculations and with
613 accepted exposure guidelines.
614 • The field strength is dependent on distance from the EMF source, and normally decreases rapidly
615 away from it: To ensure human safety, fences, barriers, or other protective measures are used for
616 some facilities to preclude unauthorized access to areas where exposure limits may be exceeded.
617 • Often, but not in all standards, the exposure limits are lower for the public than for workers

618

HOW TO COMMUNICATE

Key questions

- *What type of participation tool do you employ to address your audience (social media, traditional media, public engagement …)?*
- *Where, when and under what circumstances does the discussion take place?*
- *What tone prevails?*
- *How formally is the situation handled?*

Effective risk communication relies on the message's content and the context. In other words, the way that something is said is as important as what is said. Stakeholders will receive information at various stages of the issue. This will come from a wide range of sources with differing perspectives. This diversity influences how stakeholders perceive risks and what they would like to see happen.

Setting the tone

When dealing with an emotive issue such as the potential health effect from EMF, one of the most important communication skills is the ability to build and sustain a relationship of trust with the other parties involved in the process. To that end, one will need to create a non-threatening atmosphere and set the tone for a candid, respectful and supportive approach to resolving issues. Such behaviour should ideally be embraced by all stakeholders.

How to work with distrust

Communities with concerns about involuntary exposure to EMF are largely likely to be distrustful of official views and sources of information. Considerable effort may then be required to encourage stakeholders to suspend that distrust. Decision-makers need to ensure that all individuals involved in communicating with the public are kept up to date with developments in the debate and are prepared to discuss, rather than dismiss, public fears.

Some of the necessary components of communication under conditions of distrust are:

- Acknowledge the lack of trust
- Recognize uncertainty, where it exists
- Point out what is different this time (e.g., disclosure of information, earlier involvement of stakeholders, clear goals, and roles, etc.)
- Ask what would help to dispel distrust
- Be patient—it takes time to earn trust
- Never hold a closed meeting
- Admit when you honestly do not know the answer to a question
- Be accountable in ways the stakeholders value

BOX: BUILDING EFFECTIVE COMMUNICATION SKILLS

INSPIRE TRUST

- Be competent
- Be calm and respectful
- Be honest and open
- Show your human side, personalize
- Use understandable language, and be careful not to sound or be condescending
- Explain the consequences of the assumptions used
- Demonstrate your own values

BE ATTENTIVE

- Choose your words carefully
- Watch emotions, yours and those of your audience
- Be an attentive listener
- Be attentive to body language

MAINTAIN AN OPEN DIALOGUE

- Seek input from all
- Share information
- Provide means for frequent communication,
- e.g., publication of findings on the Web with opportunity to comment

Selecting tools and techniques

Members of a community where construction of a new facility is proposed will want to be a part of the decision-making process. Therefore, it is important to structure a process that involves the stakeholders in a meaningful way, to seek out and facilitate their involvement when addressing this decision and eventually create optimal conditions for feelings of procedural justice. The process usually will be carried out in three stages: planning, implementation, and evaluation.

The first stage is crucial, because stimulating public interest and involvement can be counter-productive if the communicator is not fully prepared for the public's participation, questions, and concerns.

In the second stage, when it is time to engage the public, the communicator will have to choose the setting to discuss the issue with them. The choice will depend on the type, number, and interest of the stakeholders.

In the last stage, it will be important to evaluate the outcome of the process, take follow-up actions, arrange for documentation of what was said and what agreements were reached, and share these summaries with those who participated.

Individual queries may be handled on an ad-hoc basis through, for example, phone, email, or social media. Communication with groups of stakeholders requires more planning. For a small group of stakeholders, it may be feasible to involve them in sessions devoted to changing undesirable aspects of the project. One could encourage creativity, but always be up front about the limits for change and how

the suggestions will be used to influence the final decision. Proponents will have clear views about the extent to which they have room to manoeuvre.

It may be useful to employ individuals from local community organizations to take advantage of existing networks and enhance credibility, but one should make sure that the individual is qualified, and to establish his or her role, responsibilities and limitations at the start. It is important to identify the stakeholder group that represents the opposition and determine what they specifically want. On key issues it may be possible to use advisory committees to build consensus on specific project decisions to encourage compromise, provide structure, and focus on solving identified problems.

BOX: Key steps to engaging stakeholders

1. Planning

- Design the program: Define or anticipate the role of the public and other stakeholders and tailor the program to enhance stakeholders' involvement.
- Seek comments on the program plan: Test your proposed program internally and externally to ensure that it will work as intended.
- Prepare for implementation: Obtain the necessary resources, choose and train your personnel, develop contingencies, assess your strengths and weaknesses, explain the program internally, find and work with appropriate community partners, develop a communication plan, and prepare the most critical materials.
- Be prepared for managing requests for information and involvement as they arise.
- Co-ordinate within your organization: Even small inconsistencies give an impression of internal confusion and ineptness. The goal is to avoid giving mixed messages. Do all you can to keep the same staff in place throughout the process: They become more proficient and more trusted in the community over time.

2. Implementing

- Implement the stakeholder involvement program: Act on your plan. Use the tools and techniques appropriate to the community and the issue.
- Provide information that meets your stakeholders' needs:
- Determine what they want to know now and anticipate what they will need to know in the future. Develop a list of problems, issues and needs, with responses to each. Address, where possible, specific concerns of different individuals or groups.
- Cooperate with other organizations: Co-ordinate messages, while openly acknowledging any differences. Mixed messages confuse and create distrust.
- Enlist the help of others who have community credibility: Local groups or residents (e.g., local researchers, medical doctors) that have credibility can be helpful to the outsider, but they cannot substitute for a forthright approach and extensive community involvement.

3. Evaluating

- Use feedback from stakeholders for continuous evaluation: As you implement the program, listen carefully to what others are telling you and follow-up with action.
- Evaluate the success of the program: If stakeholders are not informally telling you how your process is working and what would improve it, formally ask their advice with a questionnaire or other method. Ask again at the end of the process so their ideas can assist you to design and implement

the next steps.

For a large group of stakeholders, one could circulate response sheets to gain information on public concerns and preferences. It may also be useful to conduct surveys, questionnaires and polls via email, social media, and the internet to sample the population for attitudes towards specific aspects of the project. Surveys and polls done on the Internet will provide useful information but may not represent a statistically valid sample. They will only be that part of the group that uses the Internet. A much more efficient method of performing surveys, albeit much more expensive, is to use a trained professional or a specialized polling organization.

Box: EXAMPLES OF ALTERNATIVES

PASSIVE ENGAGEMENT TECHNIQUES

- Printed materials (fact sheets, brochures, reports)
- Website
- Newspaper advertisement, insertions or solicited stories
- Press releases
- Radio or television reporter interviews
- Social media posts

ACTIVE ENGAGEMENT TECHNIQUES

- Talk to people about the process
    - Hold “open houses” e.g., with posters
    - Do radio or television “phone-in” dialogue
    - Use third-party networks (do briefings at community group meetings)
    - Provide a staffed information hotline or “drop-in” centre
    - Arrange for tours of successful similar projects
    - Sponsor telephone, internet, or mail surveys
    - Respond to personal enquiries
    - Respond to social media comments and messages
- Conduct small meetings
    - Stakeholder sessions – in person and online
    - Focus groups
    - Citizen advisory councils
- Conduct large meetings
    - Public hearings – in-person and online
    - Professionally facilitated meetings

There are many ways to exchange information with your audience. Different methods will be appropriate for different stakeholders at various times. If stakeholders are engaged early in the process, more passive (one-way) forms of engagement may be the appropriate place to start. If the issue is in a crisis stage, an active form of dialogue that will quickly define and help solve the conflict is a better

780 choice. Stakeholders will be involved to varying degrees. Some may sit quietly through a meeting, while
781 others will be quite vocal. Some may come to only one meeting, while others will never miss one. Some
782 may choose to communicate through written correspondence, AI, wanting to speak with stakeholders or
783 by posting information using traditional media or social media. Each level of participation is valuable and
784 requires an appropriate response.

3. EMF EXPOSURE GUIDELINES AND POLICIES: THE PRESENT SITUATION

EXECUTIVE SUMMARY (text to be included in the Executive Summary)

Exposure limits are developed by organizations such as ICNIRP, IEEE/ICES or directly by several national authorities. The exposure limits recommended by ICNIRP form the basis for regulations within most countries in the world. While ICNIRP evaluates scientific evidence about both short-term and long-term effects, its exposure limits are set just for short-term effects that are the only established health effects. To derive the exposure limits ICNIRP applies reduction factors to threshold levels to take into account uncertainties in scientific evidence. There is international scientific consensus that there is no substantial evidence that exposure below ICNIRP's limits cause harm.

When there are uncertainties regarding the actual existence of a health effect, as in the case of long-term effects, precautionary policies can be an option, as long as it is explicitly recognized that a risk may not exist. However, the adoption of precautionary exposure limits could undermine the credibility of science-based exposure limits and raise public worries instead of decreasing them.

WHO DECIDES ON GUIDELINES?

Countries set their own national standards for exposure to electromagnetic fields, directly or on the basis of standards developed by scientifical and technical organizations as the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronic Engineers/ International Committee on Electromagnetic Safety (IEEE/ICES). ICNIRP and IEEE/ICES have similar approaches in defining exposure limits and, even if the latter still have some differences, they aim towards harmonization of their standards.

The majority of national standards are based on the guidelines set by ICNIRP. *This commission is a non-governmental, non-profit organization, whose members are scientific experts without any commercial or other vested interests, and in official relations with WHO . ICNIRP evaluates all the available scientific evidence relevant to the effects of non-ionizing radiation (NIR) on human health. ICNIRP produces guidelines recommending limits of exposure, which are reviewed periodically and updated when scientific developments make it necessary.*

WHAT ARE GUIDELINES BASED ON?

ICNIRP guidelines developed for EMF exposure cover the frequency range from 0 to 300 GHz*. They are based on comprehensive reviews of the published peer-reviewed literature relevant to adverse health effects from both short- and long-term exposures to EMFs.*

According to ICNIRP, its exposure limits are based on scientifically established health effects, which at the present time are only those related to short-term acute exposures. On the contrary, exposure limits are not based on long-term effects of low-level chronic exposure, because, according to ICNIRP, the available scientific information on these effects is insufficient to consider them as established.

The ICNIRP process of setting exposure limits begins with the identification of the threshold levels, i. e. the lowest exposure levels known to cause the health effects. To allow for uncertainties in science, such as biological and environmental variabilities, these threshold levels are reduced to derive limit values for

human exposure. For example, in order to prevent an excessive whole-body heating due to the absorption of radiofrequency energy, ICNIRP uses a reduction factor of 10 to derive occupational limits for workers and a factor of 50 to derive exposure limits for the general public. The limits vary with frequency, and are therefore different for low frequency fields, e. g. power lines, and high frequency fields, e. g. mobile phones **(Figure to be updated).**

WHY IS A HIGHER REDUCTION FACTOR APPLIED FOR GENERAL PUBLIC EXPOSURE GUIDELINES?

The occupationally exposed population consists of adult workers who are generally aware of their exposure to electromagnetic fields and of their effects. Workers are trained to be aware of potential risk and to take appropriate protective measures and are under medical surveillance. By contrast, the general public consists of individuals of all ages and of varying health status who, in many cases, are unaware of their exposure to EMF. This may include more vulnerable groups or individuals who, in many cases, are unaware of their exposure to EMF. These are the underlying considerations that lead to more stringent exposure restrictions for the general public than for the occupationally exposed population (Figure 9).

Box: PRESENT EXPOSURE GUIDELINES

- In general, standards for low frequency electromagnetic fields are set to avoid adverse health effects due to the electrical stimulation of nerve and muscle tissues by induced electric fields within the body, while standards for radiofrequency fields prevent health effects caused by localised or whole-body heating by absorption of electromagnetic energy in body tissues and its conversion in heat
- Maximum exposure levels in everyday life are typically below guideline limits
- Exposure guidelines are not intended to protect against electromagnetic interference (EMI) with electromedical devices. The EMI issue is in the scope of technical standards that are continuously evolving with the progress of technology

WHAT ARE PRECAUTIONARY APPROACHES?

Throughout the world there are debates inside and outside of government about the adoption of "precautionary approaches" for management of potential health risks in the face of scientific uncertainty. The range of actions taken depends on the severity of harm and the degree of uncertainty surrounding the issue. If the harm associated with a potential risk is small and its occurrence uncertain, it makes sense to do little, if anything. Conversely, if the potential harm is great and there is little uncertainty about its occurrence, significant action, such as a ban, is called for (Figure 10). However, if scientific uncertainty is low (i.e. if there is sufficient scientific evidence), it would be more proper to call measures "prevention" rather than "precaution". *The Precautionary Principle is usually applied when there is a high degree of scientific uncertainty and there is a need to take action for a potentially serious risk without awaiting the results of more scientific research. It was defined in the Treaty of Maastricht as "taking prudent action when there is sufficient scientific evidence (but not necessarily absolute proof) that inaction could lead to harm and where action can be justified on reasonable judgements of cost-effectiveness". There have been many different interpretations and applications of the precautionary principle, which has recently led to insights into its dual role as a safeguard (legal principle to protect people) and a compass (policy principle to trigger debates and research). In 2000 the European*

Commission defined several rules for the application of this principle (see Box), including cost-benefit analyses.

SCIENCE-BASED AND PRECAUTIONARY APPROACHES FOR EMF: WHAT ARE THE DIFFERENCES?

Science-based evaluations of the potential hazards from EMF exposure form the basis of risk assessment and are also an essential part of an appropriate public policy response. The recommendations of ICNIRP guidelines follow rigorous scientific reviews of relevant published scientific papers including those in the fields of medicine, epidemiology, biology and dosimetry. *Science-based judgements on exposure levels that will prevent identified adverse health effects are then made. Here, caution is exercised both with respect to the magnitude of reduction factors (based on uncertainties in the scientific data and on possible differences in susceptibility of certain groups or individuals) and in the cautious assumptions made about the efficiency with which EMF interact with people.*

Box: THE PRECAUTIONARY PRINCIPLE ACCORDING TO THE EUROPEAN COMMISSION (2000)

Where action is deemed necessary, measures based on the precautionary principle should be:

- proportional to the chosen level of protection,
- non-discriminatory in their application,
- consistent with similar measures already taken,
- based on an examination of the potential benefits and costs of action or lack of action (including where appropriate and feasible, an economic cost/benefit analysis),
- subject of review, in the light of new scientific data, and
- capable of assigning responsibility for producing the scientific evidence necessary for a more comprehensive risk assessment.

Precautionary approaches, such as the Precautionary Principle, address additional uncertainties as to possible but unproven adverse health effects. Such risk management policies provide an opportunity to take incremental steps with respect to emerging issues. They should include cost-benefit considerations and should be seen as an addition to, and not as a substitute for, science-based approaches in assisting decision-makers to develop public policy.

In the context of the EMF issue, some national and local governments have adopted "prudent avoidance", a variant of the precautionary principle, as a policy option. It was originally used for ELF fields and is described as using simple, easily achievable, low to modest (prudent) cost measures to reduce individual or public EMF exposure, even in the absence of certainty that the measures would reduce risk.

If regulatory authorities react to public pressure by introducing precautionary limits in addition to the already existing science-based limits, they should be aware that this may undermine the credibility of science and of the exposure limits.

The explicit recognition that a risk may not exist is a key element of precautionary approaches. If the scientific community concludes that there is no risk from EMF exposure or that the possibility of a risk is too speculative, then the appropriate response to public concern should be an effective education programme. If a risk for EMF were to be established, it would then be appropriate to rely on the

scientific community to recommend specific protective measures using established public health risk assessment/risk management criteria. If large uncertainties remain, then more research will be needed.

In some countries, precautionary limits lower than the science-based limit have been introduced in response to public pressure by the most alarmed parts of the population. Contrary to expectations, the public perception of the risk has not diminished, probably because the introduction of measures against possible long-term effects has been regarded as an admission of the existence of these effects, neglecting the meaning of “precaution”.

Moreover, findings from communication research show that precautionary recommendations in risk communication about EMF can have unintended consequences, e. g. an increase in risk perception “triggered” by precautionary messages. The term “precaution” has a switching effect and is understood differently in different social contexts, varying over time. These complex societal dynamics make it difficult to provide adequate cost-benefit-estimates for applying the precautionary principle on EMF and should be taken into account when considering precautionary measures.

GLOSSARY

FURTHER READING

Establishing a Dialogue on Risks frm EMFs - Comments from IAC members

Name	Section	Line	Type of comment	Comments	Proposed change
			G - general T - technical E - editorial		

From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 01-07-2024 09:20:19 (UTC +01)
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: RE: WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH

****** 2024 International Advisory Committee (IAC) Meeting on Non-Ionizing Radiation- 11-13 June 2024 – Geneva, Switzerland ******

Dear IAC representatives,

It was a great pleasure to connect with you at the IAC meeting a couple of weeks ago.

As promised, please find enclosed

- the link to the survey eliciting your interest in receiving the presentations and gathering feedback on the meeting
- the final agenda of the meeting

If you have taken photos which you would like to share with the group, please send them to me.

Kind regards,
Emilie van Deventer

From: VAN DEVENTER, Tahera Emilie
Sent: Thursday, June 6, 2024 4:14 PM
Cc: GEBREGZIABHER, Roman <gebregziabherr@who.int>; VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: RE: WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH

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Please find enclosed the

- Draft agenda of next week's meeting.
- Draft minutes from the 2022 IAC meeting, kindly written by Martin Gledhill from New Zealand. You are invited to review the minutes and bring up any changes/comments at the upcoming meeting in Geneva.

For all participants

- Thanks to those who have already sent the **annual national reports** on EMF and optical radiation activities. If you have not yet done so, please send your reports.
- Several Member States have signed up to give short **statements/presentations in the "open mike" sessions** during both the EMF session and the Optical session. If you would like to contribute, please let me know what you wish to present at your earliest convenience.

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- **Reception**: Please note that the reception has been moved from Tuesday 11 June to **Wednesday 12 June at 5pm**.

We look forward to your participation in next week's WHO IAC meeting on Non-Ionizing Radiation.

Kind regards,
Emilie

Dr Emilie van Deventer
Head, Radiation and Health Unit
Department of Environment, Climate Change and Health
Division of Universal Health Coverage/Healthier Populations
20, avenue Appia
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Tel Office:+ (41) (22) 791 3950
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Web: www.who.int
Follow WHO on Facebook | Twitter | YouTube | Instagram

World Health Organization 75 HEALTH FOR ALL

From: VAN DEVENTER, Tahera Emilie
Sent: Friday, May 3, 2024 3:33 PM
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>; GEBREGZIABHER, Roman <gebregziabherr@who.int>
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Dear IAC representatives,

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This will be the 29th Meeting of the International EMF Project and the 13th Meeting of the Optical Radiation Programme.

Meeting details

The working language of the meeting will be English and there will be no simultaneous interpretation. Physical participation is encouraged (at least one per country). While the option of connecting online will be provided, please note that it will not be possible for remote participants to partake in break-out group discussions. We understand that all expenses incurred in connection with your participation in this event will be paid by your Organization. Should you wish/need a formal invitation letter, please let us know at your earliest convenience.
The agenda will be sent to you shortly.

We would appreciate if you can inform us **by May 10** through this **form** if you will (i) join the IAC meeting in person, (ii) join online or (iii) not be available.

IMPORTANT: Note that the responses to this survey will **serve to update our distribution list**. We will also use it to send information about onsite registration for those attending in-person, and to send the Zoom information for those attending online

Reports
As usual, we ask you to prepare short reports on national activities related to (i) EMF and/or (ii) optical radiation (each 2 pages maximum) to be sent by **25 May**, highlighting the following issues:

- Research activities related to [EMF/optical radiation] and health
- New relevant policies and legislations
- New communication activities

Schedule

- The topic of EMF is tabled for 11 June (PM) and 12 June (AM), then a session on NIR topics (common to EMF and optical) on 12 June (PM), and the topic of optical radiation is scheduled for 13 June.
- **"Open mike" sessions** are scheduled during both the EMF session and the Optical session when Member States are invited to give short statements/presentations (max 5 minutes/5 slides) regarding new activities/reports from their country. Please let me know if and what you wish to present at your earliest convenience.

Access to WHO Campus and badges
A separate email will be sent very soon to those of you who have informed us of your physical participation in the meeting. In this email will be a link to the UN's INDICO web site where you will be asked to complete your details. This is a mandatory action as without registering in **INDICO** you will not receive your visitors badge and you will not be permitted access to the WHO campus.

We sincerely hope to meet you in Geneva this coming June.

Kind regards,
Emilie

Dr Emilie van Deventer
Head, Radiation and Health Unit
Department of Environment, Climate Change and Health
Division of Universal Health Coverage/Healthier Populations
20, avenue Appia
1211 Geneva 27, Switzerland
Tel Office:+ (41) (22) 791 3950
e-mail: vandeventere@who.int
Web: www.who.int
Follow WHO on Facebook | Twitter | YouTube | Instagram

From: VAN DEVENTER, Tahera Emilie
Sent: Monday, March 11, 2024 12:18 PM
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH

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Since the COVID-19 pandemic in 2020, the participation has been increasing thanks to online connectivity. While this is cost-effective, it is not as conducive to in-depth discussions and networking. Therefore physical participation is encouraged (at least one per country). While the option of connecting online will be provided, note that it will not be possible for remote participants to partake in break-out group discussions.

For ease of communication, we would like to develop a list of national representatives (heads of delegation for each country on EMF and on optical radiation) through whom we can channel further information. To that end, please fill in the enclosed short form to be completed by 29 March.

Kind regards,
Emilie

Dr Emilie van Deventer
Head, Radiation and Health Unit
Department of Environment, Climate Change and Health
Division of Universal Health Coverage/Healthier Populations
20, avenue Appia
1211 Geneva 27, Switzerland
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World Health Organization

2024 INTERNATIONAL ADVISORY COMMITTEE MEETING ON NON-IONIZING RADIATION

Salle V, SS1 level, B building
World Health Organization, Geneva, Switzerland
11-13 June 2024

AGENDA

29th Meeting of the International EMF Project

Tuesday 11 June 2024

13.00 ***Registration***

13.30 **Opening of the meeting**
Welcome — *M. Neira (R)*
Election of Chair and Vice-Chair
Adoption of the agenda
Approval of the minutes of the 28th EMF IAC meeting
Introduction of participants

13.50 **Update on WHO electromagnetic fields activities**
International Agency for Research on Cancer (IARC) — *M. Schubauer-Berigan (R), J. Schuz*
WHO International EMF Project — *E. van Deventer*

14.20 **Updates from international organizations**
International Telecommunications Union (ITU) — *R. Ubeda, F. Lewicki, W. Mathlouthi*
European Commission DG Santé: Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) opinion on EMF — *T. Samaras (R)*
European Commission DG Research: Update on EU framework programs for research and innovation in Environment & Health relevant to EMF — *R. Araujo (R)*
EC-funded research projects: Update on EC EMF-related projects CLUE-H — *N. Petroulakis (R), A. Huss (R)*
Discussion

15.00 **Coffee Break (Group photo)**

15:30 **Surveillance of the EMF scientific literature: national experiences**
EMF Portal — *S. Drießen (R)*
The new BfS Spotlight initiative — *J. Kuhne*
Panel discussion: Switzerland, Canada, Australia, Germany

16:30 **Review of recent health research activities**
Update of epidemiology on mobile phones and brain tumours — *J. Schüz*
Research review of laboratory studies — *M-R. Scarfi (R)*
Discussion

17.00 **Updates from NGOs**
International Commission on Occupational Health (ICOH) — *A. Modenese (R)*
International Union of Radio Science (URSI) - Commission K — *F. Apollonio (R)*
International Radiation Protection Association (IRPA) — *J. Modolo/A. Legros (R)*
IEEE/ICES exposure limits, IEC product compliance standards — *J. Keshvari*

17:30 **Close of day**

(R) remote participation through internet

Wednesday 12 June

Session on EMF topics (cont'd)

9.00 Updates from NGOs (cont'd)
International Commission on Non-Ionizing Radiation Protection (ICNIRP) *A. Hirata (R)*
BioEM Society *L. Martens (R)*

9:10 WHO Radiofrequency fields activities
Update on the RF scientific review *WHO Secretariat*
Survey on RF national policies and practices *S. Loughran*
Discussion

9:45 Open mike from international and national EMF experiences*
** please sign up in advance for a time slot (max 5'-5 slides)*

10:30 Coffee break

11:00 Open mike from international and national EMF experiences (cont'd)

11:30 Risk perception and risk communication
EMF risk perception – a comparative international study *C. Raupach*
Update on the revision of the Dialogue handbook *Working Group*
Discussion

12:25 Closing of the EMF Session

12.30 Lunch

Session on Non-Ionizing Radiation

13.30 Welcome
Introduction of participants
Election of Chair and Vice-Chair
Adoption of the agenda

13.45 Updates from international organizations
Update on WHO activities *E. van Deventer*

14.00 Non-ionizing radiation protection
Ultrasound cosmetic devices *M. Schultz (R)*
Surveillance tool for controlled apparatus (NIR) listed on e-commerce sites *Y.M. Chan*
Brain stimulation technologies and possible regulatory concerns *J. Modolo, A. Legros (R)*
Exemption to UK Regulations for Transcranial Magnetic Stimulation *K. Fuller*
Discussion

15.00 Coffee break

15.30 Session on social media *A. Kuzmanovic*

17:00 Wrap-up

17.00 Reception in WHO cafeteria

(R) remote participation through internet

Session on Optical Radiation (14th Meeting of the Optical Radiation Programme)

Thursday 13 June

9.00 Opening of the meeting
Introduction of participants
Adoption of the agenda
Approval of the minutes of the 13th meeting of the optical programme

9.10 Updates from international organizations
WHO activities on optical radiation — *E. van Deventer*
Update from the World Meteorological Organization — *L. Dulguerov*

9.30 Balancing the harms and benefits of sun exposure: a new position statement for Australia — *R. Neale (R)*
6th International Conference on UV Radiation and Skin Cancer Prevention — *D. Whiteman (R)*
Discussion

10:00 Updates from NGOs
International Commission on Non-Ionizing Radiation Protection (ICNIRP) — *K Karipidis (R)*
International Commission on Occupational Health (ICOH) — *A. Modenese (R)*
International League of Dermatological Societies (ILDS) — *S. John (R)*
International Electrotechnical Commission (IEC) — *J. Keshvari*
International Commission on Illumination (CIE) — *P. Blattner*
Global Albinism Alliance (GAA) — *A. Gliksohn (R)*

10:40 Coffee break (Group photo)

11.00 Special topics
Physiological and behavioural responses to light exposure: Mechanisms and field studies — *M. Spitschan*
A snapshot of WHO's work on vision and eye care — *S. Keel*
Eye health and the world of work: an ILO report — *B. Náfrádi*
WHO/ILO Joint Estimates of the Work-related Burden of Disease & Injury: occupational exposure to solar ultraviolet radiation and the attributable burden of non-melanoma skin cancer — *N. Momen (R)*
Draft guidance for the implementation of UV index — *C. Sinclair, S. Henderson*

12.30 Lunch

13.30 Vision 2030: where do we want to be?
- Relevant research topics — *C. Balderman*
- Protection of workers — *E. Stempfel*
- Risk communication — *C. Sinclair*

14.30 Vision 2030: where do we want to be? (cont'd)
Feedback in plenary

15.00 Coffee break

15:15 Open mike from international and national experiences*
** please sign up in advance for a time slot (max 5'-5 slides)*

15.50 Next steps
16.00 Close of meeting

(R) remote participation through internet

From: Anders Ravnsborg Beierholm <>
Sent: 13-06-2024 12:06:47 (UTC +01)
To: 'VAN DEVENTER, Tahera Emilie' <vandeventere@who.int>; BIJOTAT-COMBE, Sandrine Sylvie <bijotatcombes@who.int>
Subject: SV: [EXT] WHO International Advisory Committee: Update needed on country page of Denmark

Perfect, thank you so much

Best regards,
Anders

Fra: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sendt: 13. juni 2024 12:03
Til: BIJOTAT-COMBE, Sandrine Sylvie <bijotatcombes@who.int>
Cc: Anders Ravnsborg Beierholm <anrb@sis.dk>
Emne: RE: [EXT] WHO International Advisory Committee: Update needed on country page of Denmark

Thanks Sandrine!!!

From: BIJOTAT-COMBE, Sandrine Sylvie <bijotatcombes@who.int>
Sent: Thursday, June 13, 2024 12:00 PM
To: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: Re: [EXT] WHO International Advisory Committee: Update needed on country page of Denmark

Corrected
https://www.who.int/initiatives/the-international-emf-project/participating-countries-entities/denmark

> Denmark
>
> Find information on contact details and activities relating to EMF in your area.
>
> www.who.int

Best,

Sandrine

From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: Wednesday, June 12, 2024 11:08
To: BIJOTAT-COMBE, Sandrine Sylvie <bijotatcombes@who.int>

Subject: FW: [EXT] WHO International Advisory Committee: Update needed on country page of Denmark

Thanks in advance Sandrine….
Emilie

From: Anders Ravnsborg Beierholm <anrb@sis.dk>
Sent: Wednesday, June 12, 2024 11:04 AM
To: emfproject <emfproject@who.int>
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: [EXT] WHO International Advisory Committee: Update needed on country page of Denmark

Dear EMF Project,

By looking at the country page of Denmark (https://www.who.int/initiatives/the-international-emf-project/participating-countries-entities/denmark), it is evident that Christoffer Johansen is still erroneously listed as contact person.

Could you please replace this with the following updated contact details:

Danish Health Authority, Radiation Protection (SIS)

Knapholm 7
2730 Herlev
Denmark

Tel: +45 44 54 34 54
Email: sis@sis.dk
Web site: www.sis.dk

Many thanks in advance.

Best regards

_____

Anders Ravnsborg Beierholm
Special Advisor
T (dir.) +45 4454 3455
anrb@sis.dk

Danish Health Authority
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DANISH HEALTH AUTHORITY
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Learn more about how Danish Health Authority processes personal data here.

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DANISH HEALTH AUTHORITY
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From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 06-06-2024 16:13:30 (UTC +01)
Cc: GEBREGZIABHER, Roman <gebregziabherr@who.int>; VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: RE: WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH

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Schedule

- The topic of EMF is tabled for 11 June (PM) and 12 June (AM), then a session on NIR topics (common to EMF and optical) on 12 June (PM), and the topic of optical radiation is scheduled for 13 June.
- **"Open mike" sessions** are scheduled during both the EMF session and the Optical session when Member States are invited to give short statements/presentations (max 5 minutes/5 slides) regarding new activities/reports from their country. Please let me know if and what you wish to present at your earliest convenience.

Access to WHO Campus and badges

A separate email will be sent very soon to those of you who have informed us of your physical participation in the meeting. In this email will be a link to the UN's INDICO web site where you will be asked to complete your details. This is a mandatory action as without registering in **INDICO** you will not receive your visitors badge and you will not be permitted access to the WHO campus.

We sincerely hope to meet you in Geneva this coming June.

Kind regards,
Emilie

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World Health Organization 75 HEALTH FOR ALL

From: VAN DEVENTER, Tahera Emilie
Sent: Monday, March 11, 2024 12:18 PM
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH

****** 2024 International Advisory Committee (IAC) Meeting on Non-Ionizing Radiation- 11-13 June 2024 – Geneva, Switzerland ******

Dear IAC representatives,

I am pleased to inform you that the 2024 IAC meeting will be held from **Tuesday 11 June at 13:30 until Thursday 13 June at 16:00** at the World Health Organization's headquarters. This will be the 29th Meeting of the International EMF Project and the 13th Meeting of the Optical Radiation Programme.

Since the COVID-19 pandemic in 2020, the participation has been increasing thanks to online connectivity. While this is cost-effective, it is not as conducive to in-depth discussions and

networking. Therefore physical participation is encouraged (at least one per country). While the option of connecting online will be provided, note that it will not be possible for remote participants to partake in break-out group discussions.

For ease of communication, we would like to develop a list of national representatives (heads of delegation for each country on EMF and on optical radiation) through whom we can channel further information. To that end, please fill in the enclosed short form to be completed by 29 March.

Kind regards,
Emilie

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World Health Organization 75 HEALTH FOR ALL

DRAFT – 6 June 2024

2024 INTERNATIONAL ADVISORY COMMITTEE MEETING ON NON-IONIZING RADIATION

Salle V, SS1 level, B building
World Health Organization, Geneva, Switzerland
11-13 June 2024

AGENDA

29th Meeting of the International EMF Project

Tuesday 11 June 2024

13.00 ***Registration***

13.30 **Opening of the meeting**
Welcome — *M. Neira (R)*
Election of Chair and Vice-Chair
Adoption of the agenda
Approval of the minutes of the 28th EMF IAC meeting
Introduction of participants

13.50 **Update on WHO electromagnetic fields activities**
International Agency for Research on Cancer (IARC) — *M. Schubauer-Berigan (R), J. Schuz*
WHO International EMF Project — *E. van Deventer*

14.20 **Updates from international organizations**
International Telecommunications Union (ITU) — *TBD*
European Commission
- DG Santé: Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) opinion on EMF — *T. Samaras (R)*
- DG Research: Update on EU framework programs for research and innovation in Environment & Health relevant to EMF (EC) — *R. Araujo (R)*
- EC-funded research projects: Update on EC EMF-related projects CLUE-H — *N. Petroulakis (R), A. Huss (R)*

Discussion

15.00 **Coffee Break (Group photo)**

15:30 **Surveillance of the EMF scientific literature: national experiences**
EMF Portal — *S. Drießen*
The new BfS Spotlight initiative — *J. Kuhne*
Panel discussion: Switzerland, Canada, Australia, Germany

16:30 **Review of recent health research activities**
Update of epidemiology on mobile phones and brain tumours — *J. Schüz*
Research review of laboratory studies — *M-R. Scarfi (R)*
Discussion

17.00 **Updates from NGOs**
International Commission on Occupational Health (ICOH) — *A. Modenese (R)*
International Union of Radio Science (URSI) - Commission K — *F. Apollonio (R)*
International Radiation Protection Association (IRPA) — *J. Modolo/A. Legros (R)*
IEEE/ICES exposure limits, IEC product compliance standards — *J. Keshvari*

17:30 **Close of day**

(R) remote participation through internet

DRAFT – 6 June 2024

Wednesday 12 June

Session on EMF topics (cont'd)

9.00 Updates from NGOs (cont'd)
International Commission on Non-Ionizing Radiation Protection (ICNIRP) *A. Hirata (R)*

9:10 WHO Radiofrequency fields activities
Update on the RF scientific review *WHO Secretariat*
Survey on RF national policies and practices *S. Loughran*
Discussion

9:45 Open mike from international and national EMF experiences*
** please sign up in advance for a time slot (max 5'-5 slides)*

10:30 Coffee break

11:00 Open mike from international and national EMF experiences (cont'd)

11:30 Risk perception and risk communication
EMF risk perception – a comparative international study *C. Raupach*
Update on the revision of the Dialogue handbook *Working Group*
Discussion

12:25 Closing of the EMF Session

12.30 Lunch

Session on Non-Ionizing Radiation

13.30 Welcome
Introduction of participants
Election of Chair and Vice-Chair
Adoption of the agenda

13.45 Updates from international organizations
Update on WHO activities *E. van Deventer*

14.00 Non-ionizing radiation protection
Ultrasound cosmetic devices *M. Schultz (R)*
Surveillance tool for controlled apparatus (NIR) listed on e-commerce sites *CY Ming*
Brain stimulation technologies and possible regulatory concerns *J. Modolo, A. Legros (R)*
Exemption to UK Regulations for Transcranial Magnetic Stimulation *K. Fuller*
Discussion

15.00 Coffee break

15.30 Session on social media *A. Kuzmanovic*

17:00 Wrap-up

17.00 Reception in WHO cafeteria

(R) remote participation through internet

DRAFT – 6 June 2024

Thursday 13 June

Session on Optical Radiation (14th Meeting of the Optical Radiation Programme)

9.00 Opening of the meeting
Introduction of participants
Adoption of the agenda
Approval of the minutes of the 13th meeting of the optical programme

9.10 Updates from international organizations
WHO activities on optical radiation — *E. van Deventer*
Update from the World Meteorological Organization — *L. Dulguerov*

9.30 Balancing the harms and benefits of sun exposure: a new position statement for Australia — *R. Neale (R)*
6th International Conference on UV Radiation and Skin Cancer Prevention — *D. Whiteman (R)*
Discussion

10:00 Updates from NGOs
International Commission on Non-Ionizing Radiation Protection (ICNIRP) — *K Karipidis (R)*
International Commission on Occupational Health (ICOH) — *A. Modenese (R)*
International League of Dermatological Societies (ILDS) — *S. John (R)*
International Electrotechnical Commission (IEC) — *J. Keshvari*
International Commission on Illumination (CIE) — *P. Blattner*

10:30 Coffee break (Group photo)

11.00 Special topics
Physiological and behavioural responses to light exposure: Mechanisms and field studies — *M. Spitschan*
A snapshot of WHO's work on vision and eye care — *S. Keel*
Eye health and the world of work: an ILO report — *B. Náfrádi*
WHO/ILO Joint Estimates of the Work-related Burden of Disease & Injury: occupational exposure to solar ultraviolet radiation and the attributable burden of non-melanoma skin cancer — *N. Momen (R)*
Draft guidance for the implementation of UV index — *C. Sinclair, S. Henderson*
Discussion

12.30 Lunch

13.30 Vision 2030: where do we want to be?
Break-out groups:

14.30 Vision 2030: where do we want to be? (cont'd)
Feedback in plenary

15.00 Coffee break

15:15 Open mike from international and national experiences*
** please sign up in advance for a time slot (max 5'-5 slides)*

15.50 Next steps

16.00 Close of meeting

(R) remote participation through internet

INTERNATIONAL EMF PROJECT

28th International Advisory Committee Meeting

World Health Organization
Salle T, Geneva, Switzerland
6-7 June 2023

Rapporteur – Martin Gledhill, representative of the Ministry of Health of New Zealand

Tuesday 6 June

Electromagnetic Fields (EMF) session

Opening of the meeting

Emilie van Deventer welcomed participants and introduced ***Maria Neira***, Director of the WHO Department of Environment, Climate Change and Health. Maria also welcomed participants and thanked them for attending this first in-person meeting since the Covid pandemic. She noted that radiation is an important part of environmental health, and primary prevention of disease is an important factor. WHO celebrates its 75th anniversary in 2023.

Simon Mann was elected chair of the meeting, with Chiyoji Ohkubo as vice-chair. The meeting adopted the agenda and approved the minutes of the 27th meeting.

Update on WHO electromagnetic fields activities

The International EMF Project (*Emilie van Deventer, WHO, Switzerland)*

Emilie van Deventer gave an overview of the history, objectives and activities of the EMF Project, and the roles of the IAC and WHO. She noted financial contributions from Australia, Ireland, Israel, New Zealand and Switzerland, and in-kind contributions from the Netherlands and others who had hosted meetings and translated documents.

The EMF Project works with a wide variety of people, organisations, and national governments. Collaborating Centres have set up work plans, available at https://apps.who.int/whocc/, to further the aims of the EMF Project.

The current EMF work plan includes various topics, including:

- The RF fields monograph
- The RF fields scoping report
- Systematic reviews (that will feed into the RF monograph)
- Update of the EMF Dialogue handbook (being undertaken with BfS and ARPANSA)
- Framework for NIR protection
- Reviewing the EMF model legislation (first published in 2006).

Updating the EMF sections of the WHO website is still in progress. There will be a section that lists participating countries, which is where country reports will be posted. Country representatives are invited to update this section. Countries are also invited to update the Global Health Observatory pages on EMF legislation.

WHO list servers have been suspended due to security concerns. Items of interest can now be sent to emfproject@who.int with the subject line FOR POSTING.

News from IARC's Monograph section (*Mary Schubauer-Berigan, IARC, France)*
Mary Schubauer-Berigan described the IARC five step process to evaluate the carcinogenicity of chemical and physical agents. In 2019 the IARC advisory group on priorities noted that there was significant new evidence available relevant to RF fields, with further studies due to be published soon, so tentatively scheduled a re-evaluation for the coming five-year period. The re-evaluation meeting will be announced one year beforehand.

In response to questions, Mary noted that:

- The IARC process is separate to the WHO RF monograph process. IARC is simply a hazard evaluation, whereas WHO will be undertaking a risk assessment.
- The IARC classification will cover all RF, and not be specific to particular frequencies or technologies.

News from IARC's Environmental Division (*Isabelle Deltour, IARC, France)*
Isabelle Deltour provided an overview of recent epidemiological research into the carcinogenicity of EMFs. This included:

- An update of the million-women study, which supports the accumulating evidence that cellphone use does not increase the risk of brain tumours.
- A registry study covering four Nordic countries. Analysis of time trends showed no observable effects of mobile phones on brain tumour incidence.
- A review of fifty-nine papers investigating environmental risk factors for childhood leukemia. Overall there is good evidence for an effect of ionizing radiation and pesticides, and some level of evidence for ELF fields. However, ELF exposures are rare, and the results should be interpreted cautiously.
- The Inter-Cal study which investigated, through Monte Carlo modelling, whether the positive association seen between heavy mobile phone use and glioma risk of the Interphone study is compatible with recall errors in the absence of any real effect. The study concluded that the association found in the Interphone study is probably an artefact.

Updates from international organizations
ITU (*F. Lewicki, ITU-T, Switzerland)*

- ITU is very active in sharing knowledge and tools concerning the assessment of human exposure to RF-EMF
- Raising awareness and communication campaigns with the general public and relevant stakeholders is important.
- ITU collaborates with WHO, ICNIRP, IEEE and IEC on RF-EMF matters.
- Efficient deployment of wireless infrastructure reduces the RF EMF exposure from networks and devices
- The full list of the ITU-T Recommendations and Supplements concerning EMF is available in the presentation, and all documents are freely available on the ITU-T website.

ITU (*W. Mathlouthi, ITU-D, Switzerland)*
All ITU sectors follow the ICNIRP 2020 RF Guidelines. EMF activities are separated amongst

ITU-D/R/T as follows:

- ITU-D – strategies and policies regarding human exposure to EMF
- ITU-R – EMF measurements from base stations to assess exposures
- ITU-D – simulation to assess exposures, and 5G.

The Q7/2 group has just published its final report. It focuses on science-based policies guidelines, regulations, and assessments about EMF exposures and includes a conclusion that the best practise for administrations that choose to use international RF-EMF exposure limits is to limit the exposure levels to the thresholds specified in the ICNIRP 2020 guidelines.

ITU-R has recently updated its handbook on spectrum monitoring. This includes a section on EMF measurements, covering limits, instrumentation, measurement procedures and reporting.

European Commission Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) opinion on EMF (*T. Samaras)*
In 2021 SCHEER was asked whether European Commission guidance on EMF limits should be updated, and to update the 2015 opinion on ELF and IF fields. Because there had been so many publications since 2015 the updated opinion on RF was based on recent meta-analyses and systematic reviews. A preliminary opinion was published in August 2020. This received over 700 comments, all of which were addressed. The final opinion was adopted in April 2023. The opinion notes an uncertain weight of evidence for in vitro studies and could not identify moderate or strong evidence for adverse effects from chronic or acute EMF exposures at levels below the ICNIRP 1999 limits. It also noted that new applications could have high exposures over short times. The ICNIRP 2020 guidelines respond to these new exposures. SCHEER does not say that the ICNIRP 2020 limits should be adopted but does recommend that new dosimetric quantities are required for protection of the public and workers.

A consultation draft of the updated ELF/IF Opinion should be published later in 2023.

Review of recent health research activities
Research review of epidemiological studies (*Isabelle Deltour, IARC, France)*
Isabelle Deltour provided a summary of some recent ELF and RF studies. In a Nordic cohort study, Jalilian et al did not find an association between occupational exposure to ELF magnetic fields, or electric shocks, and risk of lymphoma. Zagar et al investigated childhood leukemias near power lines in Slovenia, using a method that allowed fast calculation of exposures from the lines. There was no significant association, but as there were small numbers of exposed children results should be interpreted cautiously.

Registry studies in New Zealand and the Nordic countries found no changes in glioma incidence consistent with a risk caused by mobile phones. Eeftens et al did not find effects of short-term RF exposures on cognitive performance of adults.

Research review of laboratory studies (*Maria-Rosaria Scarfi, National Research Council, Italy)*
Maria-Rosaria Scarfi summarized the findings of static, ELF and RF laboratory studies. As in previous years, there were few IF studies. Overall, most research has been in vivo and at RF. 35% of papers (mostly RF) could not be considered due to poor scientific methods.

Systematic reviews are becoming increasingly important to synthesize findings, and several

have been published in the past year (in addition to those commissioned by WHO). Publications by Pinto and Bodewein both concluded that there was inadequate evidence to draw conclusions on exposure-related effects.

The EMF and Health cluster CLUE-H, set up under the European Horizon programme, has been launched. The objective is to optimize synergies, avoid overlaps and increase the impact of the EMF projects funded under Horizon.

Japan-Korea Collaborative NTP Validation Animal Study on the Carcinogenicity of Mobile Phone RFR: A Brief Report from Korea (*Y-H. Ahn)*
The Japan-Korea study was set up to further investigate some of the findings in the NTP study. The same exposure system and research protocol has been used in both countries.

A 28-day toxicity study was carried out in mid-2020. This showed that the exposure system worked well. Results have yet to be finalised, but there were significant small decreases in body temperature of the RF exposed F0 dams and F1 pups.

The two-year exposure study finished at the end of 2022 and a full analysis of the data is in progress. Survival of cage control, sham exposed and RF exposed F1 males were very similar, which contrasts with the NTP finding that unexposed rats had poorer survival. Overall, in-life observation findings on body weight and food consumption were very similar for the Japanese and Korean centres.

Low and intermediate frequency fields
Review of studies on health and environmental effects from static fields (*O. Merckel, ANSES, France)*
Concerns about static fields near a proposed DC line in France (providing an interconnection with Spain) prompted a review of the science and evaluation of likely field levels. There is limited research on humans, mostly limited to high exposures, and reviews have concluded that there are no health effects, even at high levels. There is also little research on effects on the environment, but some studies have looked at the marine environment. There is confusion in the community between static and ELF fields, and the limits that apply to each. Some in the community consider that lack of knowledge should result in a precautionary approach.

Update on the ELF and IF research activities in Germany (*G. Ziegelberger, BfS, Germany)*
The questions about ELF fields and childhood leukemia remain unresolved. Recent epidemiological studies suggest that the relative risks found have decreased over time, and studies with a genetically modified mouse have not shown a statistically significant effect. A research project is carrying out a meta-analysis of studies of ELF magnetic field exposure, electric shocks, and ALS. Other projects are investigating whether any effect of magnetic fields on Alzheimer's Disease may be mediated by sleep.

An AC transmission line is programmed to become a hybrid AC/DC line. Research in this area is focused on how electric field perception is modified by hybrid AC/DC fields, and how to improve risk communication.

It is known that honeybees can perceive electric and magnetic fields, but there a few indications of adverse effects. A field study is investigating effects on honeybee vital

parameters.

Other studies are looking at interaction mechanisms, oxidative stress (which will be the subject of a systematic review) and effects of IF fields (especially with respect to high exposure from article surveillance and wireless power transfer, and animal behaviour).

Updates from NGOs

International Commission on Occupational Health (*Alberto Modenese)*

ICOH holds a world Congress every three years and the next will be in 2024. The previous Congress had sessions on the prevention of EMF effects in the workplace, and abstracts are available online. There will be a session on "Radiation and work" at the 2024 Congress.

ICOH has collaborated with Italian organisations to develop guidelines for health surveillance of workers exposed to EMFs, and other publications. They have also contributed to the forthcoming publication "Electromagnetic Ergonomics".

International Commission on Non-Ionising Radiation Protection (ICNIRP) (*Gunde Ziegelberger, ICNIRP)*

ICNIRP are updating guidelines on static fields and EMFs at frequencies below 10 MHz, to prepare a single publication covering these ranges. A lot of new research has been published since 2010. The work will follow the same approach as for the 2020 RF update, with a focus on transparency. Data on nerve stimulation and contact currents will be re-evaluated, and a review of low frequency dosimetry is in progress. Timing is uncertain but will not be before 2025.

A statement on RF knowledge gaps and research recommendations is being prepared and should be published in the next few months.

Research on the effects of RF fields on the environment is being evaluated, to determine whether human protection guidelines also protect flora and fauna in their natural environment.

A call for nominations to ICNIRP for the 2024-28 term will be made shortly.

IEEE/ICES exposure limits and IEC product compliance Standards (*J Keshvari)*

Jafar Keshvari gave an overview of the IEEE/ICES and current work of the various subcommittees. One focus is reviewing the low frequency limits, and another is looking ahead to increased use of frequencies above 300 GHz, and what guidance and limits might be appropriate. Extending the scope of C95.1 to include animal safety is also under consideration.

There is considerable cooperation with the IEC in the assessment of product compliance, especially around 5G. Work is needed on measurement of absorbed power density. The SAR measurement standard is being revised.

The IEC is preparing a guide for all project committees dealing with EMF compliance assessment standards, and how this work should be approached.

Wednesday 7 June

Session on EMF topics (continued)

WHO Radiofrequency fields activities

Understanding the WHO scientific review process (E. van Deventer, WHO)

Emily van de Venter reviewed the background and history to the RF EHC monograph. The monograph is targeted at policy makers bodies involved in setting standards professional societies and academia.

In 2016, in response to new WHO guidelines, the process leading to publication of the EHC was amended. It was decided that the work carried out since then would be published as a scoping review coma but that 10 systematic reviews would be commissioned to form the basis of the EHC publication. Protocols for the systematic reviews have been published and the reviews themselves should be published over the next few months.

The EHC will be prepared by a task group whose membership has been published earlier this year. There were no objections to the membership. The task group will draw up conclusions on health effects, formulate a health risk assessment and identify research gaps. They will also identify good practise for future research. As well as the EHC there will also be an RF research agenda.

The upcoming WHO survey on RF national policies and practices (*S. Loughran, ARPANSA; Australia)*

An initial survey of national policies on RF was prepared in 2012. This looked at risk management practises for personal, environmental, and occupational exposures, and at national regulations. Findings from the survey were published in 2015. Amongst the findings were that international guidelines were very helpful for national authorities when setting limits, but that political pressure sometimes led to deviation from science-based limits.

In 2023 there are still concerns about RF exposures, although the types of concern have changed since 2012 due, for example, to changes in technology and infrastructure. For this reason there will be a new global policy survey to compile current policies and see what has changed since 2012. The IAC was invited to the review previous the survey and note anything that was felt to be missing or could be added. Feedback is required by the end of June 2023 and the survey will be sent out in the second half of 2023.

Risk communication

Communicating about EMF and health (*C. Raupach, BfS, Germany)*

Christian Raupach discussed EMF concerns, how they are addressed currently and how we might change approaches in future. Surveys have shown that most people are concerned about RF fields and then ELF fields, but this can vary from place to place. Concerns are often brought about by changes in technology such as the digital transformation and energy transition. Unfortunately there is a lot of poor science, or interpretations of good science may be unsound. People often have no sound scientific understanding of EMF risks.

EMF risks are “switching” risks - people only think about them when they are brought to mind, for example by a proposal for a new cellsite nearby. This poses difficulties for risk communication: normally you would like to inform people early but if you convey the information before the switch goes on people are not interested. It is important to find the right time to do the risk communication, just after people have become aware of possible changes.

Currently risk communication uses various channels: most organisations provide information through the internet and use social media and mass media. Different channels should be used to achieve different aims. Internet based information has the disadvantage that no one feels as though it specifically addresses them and their concerns.

Policymakers should be given sound information on which to base decisions, but the information must not be so complex that policy makers do not understand the nuances that we take for granted.

Face to face events where people see the person, they are engaging with mostly serve to build trust. Person to person communications help answer specific questions. Social media can be used to address narrow target groups.

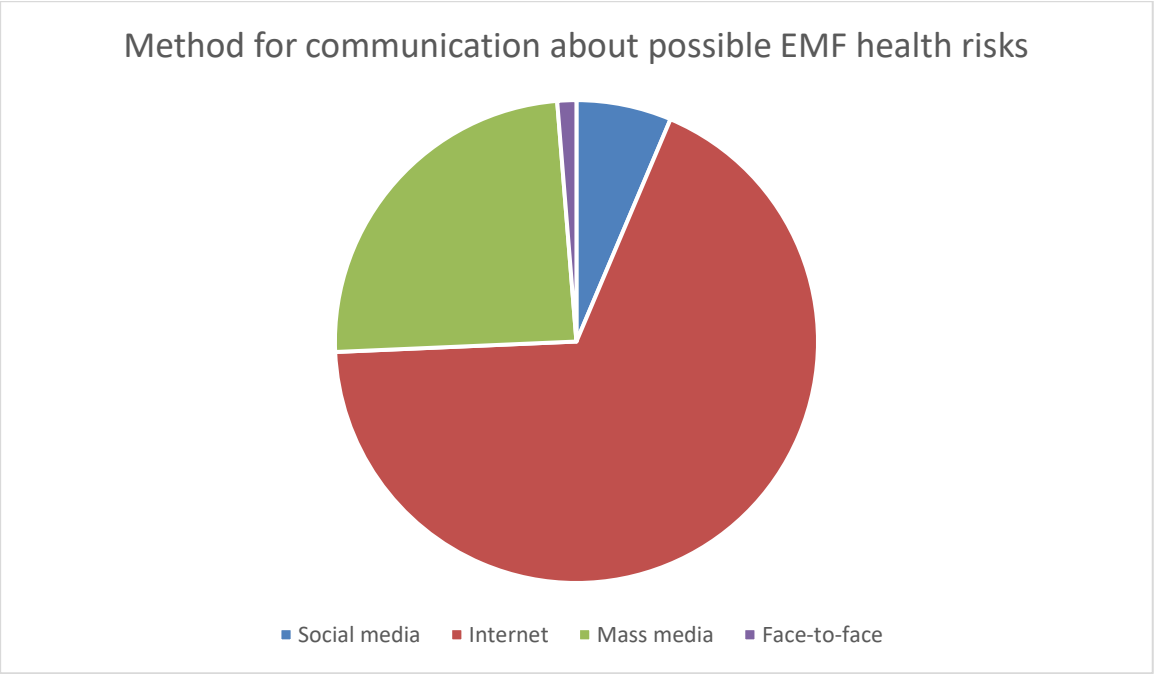
There is often a big gap between the findings of risk communication research and risk communication practise. It is important not to try and rely on a magic bullet (that is, a message that addresses everybody's interests). This is often what we strive for, but it does not work. We should not address an ideal audience of scientifically literate people but build a cascade of depth for the topic and address each group with the level of information that they will understand. In addition we should understand and use the switch that triggers people's interest.

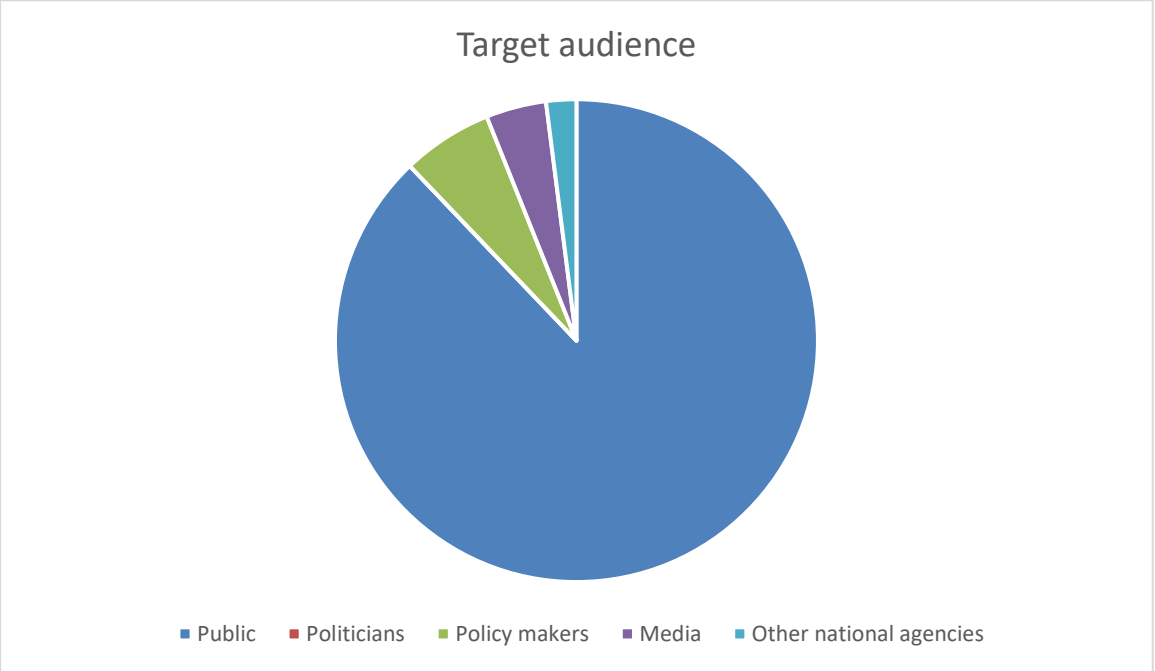
Risk communication activities in Japan (*C Ohkubo, JEIC, Japan*)
The JEIC (Japan EMF Information Centre https://www.jeic-emf.jp/english/index.html) was founded in 2008. Translation of English terms into Japanese creates some difficulties: “precaution” and “prevention” are usually translated as the same word, and the translations of “probable” and “possible” in Japanese have very little difference.

People usually want simple “yes” or “no” answers, have difficulty dealing with uncertainty and do not make a distinction between hazard identification and risk evaluation. Social media creates a lot of confusion. Information from international organisations is seen as more reliable than that from the government so the JEIC has translated all the WHO information sheets.

The JEIC has a rapid response group that provides fast analysis of new research. Recent examples include the NTP study and the Havana Embassy “syndrome”.

Panel discussion
Findings from a poll taken at the meeting are summarized below.





Question	Yes	No
Is there a national risk communication strategy?	43%	57%
If yes, does it involve different ministries?	40%	60%
If yes, does it involve different stakeholders (eg NGOs, industry, citizen groups)	30%	70%

Comments arising from the discussion:

- A national strategy could be difficult to implement and take a long time. It may not be a good way to go if there is a need to go to the public quickly.
- In some countries there are different leaders in different jurisdictions, and the local leaders and politics should be respected. For example, Scotland has a separate statement on 5G than the rest of the UK.

- In Australia there is no national strategy, but part of the national programme addresses risk communication. This covers all groups including politicians. A key finding is that having ARPANSA lead engagement is important and reduces enquiries. It is very good that all government bodies give the same response (whereas previously there was no coordination, and different agencies may have given different answers).
- It is difficult for the public to distinguish between high- and low-quality research and there is a need to clarify which articles are more reliable than others. It was noted that junk science is referenced more often than good science and the probable reason is that the findings are more interesting to discuss.
- Rather than searching for a magic bullet, communication should be thought of as a social practise. The question to bear in mind is: ***what does it mean for someone who is concerned to abandon that concern***? For example, someone who was previously concerned but is now no longer worried may lose friends who believed the concerns were valid, so what are the consequences of the change in belief for that person?

Open mike from international and national EMF experiences*

Australia (*S. Loughran, ARPANSA; Australia)*
Highlights of recent Australian EMF activities include:

- Australia's RF exposure standard has recently been updated.
- Several studies on environmental exposures are in progress. A paper on exposures in Melbourne has just been published and that work will be repeated in Oxford and London.
- There are internal and external research programmes.
- Communication on EMF is directed towards a variety of audiences from public to government and uses several channels such as face to face communication, participation in science week and visits to schools.
- AARPANSA is taking an active role with international engagements and is represented on several international organisation
- An anechoic chamber is now operating and will be used for calibrations and research.

Flanders *(Tine Van Hoof, Dept of Environment and Health, Flanders, Belgium)*
In Belgium, regional governments are responsible for the electromagnetic policy of their territory and this presentation was prepared by the Flemish Department of Environment & Spatial Development authorized for the electromagnetic policy in Flanders, the northern region of Belgium. It highlights the policy in Flanders regarding RF (adopted in 2022) and ELF (in preparation). Since 2010 Flanders has been investing in EMF research resulting in a close relationship between knowledge institutions and the Department of Environment & Spatial Development. Current projects include sensor units for ELF and RF, an inventory and critical review of international reports on health effects of ELF fields and the use of our own linked open data which contains information about antennas to complement other research. There are also several communication activities, such as an online knowledge and learning platform about 5G, a website giving science-based knowledge on ELF and health and a newsletter sent to cities and municipalities when there is new information to report (eg changes in policy).

Singapore *(Y M Ng, National Environment Agency (NEA), Singapore)*
The presentation shared Singapore's experience in developing measures to reduce exposure to ELF magnetic fields. Studies were conducted with ELF baseline measurements carried out at

electrical substations (22kV, 66kV, 230kV and 400kV) where underground high voltage cables are present and where an electrical switch room was located adjacent to a residential unit. For the studies conducted, the ELF levels were found comply with the 1998 ICNIRP guideline of 100 µT. The findings will be published soon.

To align with WHO's recommendation to implement low-cost precautionary approaches to reduce exposure, advisories were issued to housing developers to encourage them to explore the implementation of cost-effective measures The National Environment Agency (NEA) worked with developers to develop and implement practical precautionary measures.

The planned next step is to develop specific recommendations and requirements for precautionary measures to reduce ELF exposure, and subsequently to include these in local standards and guidelines. To do so, more concrete data and in-depth studies are required. There are plans to send out an online survey to request information from member states to aid in the development of these recommendations and requirements.

Tunisia *(M. El Hani, ANCSEP, Tunisia)*
In Tunisia there are 3 mobile phone operators, and more than 7500 base stations installed. In February 2023 the mobile phone penetration rate was 135.5 %. Licenses for 5G will be provided in 2024.

People living near BTS are often considered as the population with the highest risk of exposure. Every year, ANCSEP receives a number of complaints from neighbours of BTS stations. Between 2020 and 2022, 67 cases were treated. The precautionary principle is usually applied which means that BTS antenna "should not" be sited less than 100 m from sensitive institutions (schools, kindergartens, hospitals).

The National Agency of Frequencies (ANF) oversees controlling the levels of exposure on BTS sites, around the country. Since 2008, more than 1000 measurements have been made. All measurements are below the ICNIRP 1998 exposure limits (adopted in Tunisia). The measurements cover all radiofrequencies between 30 MHz and 3 GHz (HF, FM, PMR, TV, Radar, GSM 900, DCS, DECT, and UMTS). Between 2020 and 2022, ANF carried out 405 in-situ measurements, of which 84% were below 2 V/m. The maximum level was 5.7 V/m.

In February 2022 ANF installed 16 fixed monitoring stations in 9 departments (out of 24) to monitor EMF exposure continuously in many towns in Tunisia (results can be found at http://www.tunisia-emf.tn/fr/public/observatoire-cem/)

ANCSEP, as a health risk assessment agency, organized a seminar in October 2022 on "5G mobile networks and health". The main objective was to promote knowledge and awareness. We discussed 5G technologies and the differences with other technologies, the potential health risks, and the national procedure of to treat complaints and the activities to control exposure. There were over 100 participants from different stakeholders (municipalities, regional departments of health, different ministries, researchers, universities, etc…) and NGOs.

Future activities include the development of a regulatory framework for all NIR and the promotion of our capacities and our communication activities.

There are also new NIR challenges and concerns on the use and potential health risks of ultrasound devices to repulse animals and insects, and the use of UVC devices for disinfection and sterilization.

There is concern about exposure trends after the introduction of the 26 GHz frequency band for 5G.

Switzerland *(E. Stempfel, FOPH, Switzerland)*
Following the introduction of 5G, three different federal offices have collaborated to produce a website on 5G and mobile phones www.5g-info.ch. The website gives people the opportunity to e-mail questions. The Federal Office of the Environment has created an EMF monitoring system that will track exposures in different parts of Switzerland over time. The first report was published in August 2022 and a second is in preparation. There is a pilot study for an environmental medicine consultation centre, intended to help people who consider themselves EHS.

The IT'IS Foundation was commissioned to measure four induction hobs, using 19 different pots. A final report will be published in 2023. Exposures to the hand did not comply with ICNIRP 2010 or 1998, or C95.1.

Six EMF research projects on a variety of topics are being funded for the next few years.

France *(A. Cadene, ANSES, France)*
Following reports of animal behaviour problems near wind turbines (such as reduced milk production and behaviour problems) ANSES made an investigation. The agents of interest were EMFs, parasitic currents, infrasound, and vibrations. The investigation evaluated exposures to these agents and considered other possible causes and whether the agents might be responsible for the effects. The report concluded that the wind turbines were unlikely to be responsible.

5G and beyond
European Research Cluster on EMF and Health (CLUE-H) (*R. Araujo, DG Research, Brussels, Belgium)*
CLUE-H is a research cluster on EMF and health and is part of the EU Environment and Health programme. There are five working groups covering science translation for policy and practise, data management and exchange, communication and dissemination, experimental studies, and exposure assessment. There are four main research programmes:

- GOLIAT - to characterise and monitor RF exposures, especially from 5G. It will also investigate risk perception and focus on young people and workers.
- ETAIN - this project takes a citizen science approach and will investigate dosimetry through an app, undertake lab research and look at dosimetry and effects on insects.
- SEAWAVE - is focused on filling knowledge gaps on exposure two RF fields. There are exposure measurement campaigns in four countries.
- NextGEM - monitors exposure to RF sources and studies the effects of RF fields on health. There are several case studies, such as indoor exposures and the health effects of millimetre waves.

6G technology (*M. Matti Latva-aho, University of Oulu, Finland)*

The continuing automation of society requires more than 5G can offer. 6G is intended to merge the physical, digital, and biological worlds and will require a radical transformation. 6G standards should be ready in 2028 with introduction in 2030. 6G will provide value in vertical applications (such as logistics, agriculture, and health) and introduce new possibilities.

The emerging requirements are for high data rates, reliability, security, zero latency, position accuracy to centimetres, automated networks and using all the human senses. 6G will need a higher density of base stations and more open base station deployment. The required spectrum will be discussed in 2023.

A number of white papers are available at 6gflagship.com/white papers.

In response to questions, Matti provided the following answers:

- The public concerns over 5G introduction will be borne in mind when introducing 6G.
- At the high frequencies to be used by 6G there will be more antennas in arrays. Propagation is difficult at these frequencies, but exposures will always comply with limits.
- Base stations will be brought closer to users, so they will require lower power and result in lower exposures.
- Some work is being undertaken on the social effects of 6G.

<u>The THz-Infrared Transition</u> (*D. Sliney, ACGIH, USA)*
The traditional dividing line between RF and optical exposures is taken to be 1 mm wavelength/300 GHz. However, there is a discontinuity in exposure limits at this point, with different approaches taken to deriving limits on either side.

People are familiar with radiant heating and the fact that high exposure to long wavelength infrared (IR-C) can cause heat stress. It is important to remember that temperature is a physiological factor not a toxic agent. Core temperature is affected by infrared, but air velocity and other factors are also important factors. If the same approach were taken to infrared limits as for RF fields, we would use the same reduction factors and not use infrared heaters. People accept optical radiation but dislike RF radiation - optical radiation is familiar, RF radiation is considered industrial.

To date there have been no exposure limits recommended for IR-C except for lasers. There are several reasons for this: there are few sources at these wavelengths, it is hard to measure, and the background level is low. If IR-C is a significant stressor, then heat stress guidelines should be used and not a permissible irradiance. The environmental temperature affects what is considered uncomfortable.

Overall, there is no justification for reduction factors for a physical physiological variable such as temperature. There is also no justification for a reduction factor when normal thermoregulatory effects dwarf the basic limit. There is little if any uncertainty about biological effects if the penetration depth is very shallow, as it is for IR-C.

Wednesday 7 June (afternoon)

Joint optical radiation/EMF session

Opening of the meeting

Emilie van Deventer welcomed participants and chaired the afternoon session. New participants introduced themselves.

Updates from international organizations

Update on WHO NIR activities (*E. van Deventer, WHO)*

Emilie van Deventer gave a review of WHO (noting the WHO 75th anniversary) and the Radiation and Health programme. The recent WHA agreed a resolution on diagnostics, including imaging that uses NIR.

The Radiation and Health programme has been working on the framework for NIR protection. This work was motivated by a lack of harmonisation between countries, sparse legislation, and rapidly evolving applications. The general protection philosophy is similar to that published by ICNIRP in 2020. There has not been much progress on the framework over the past year.

Later in June there will be a meeting with the ICRP and ICNIRP on international systems of ionising and non-ionising radiation protection, and what can be learned from them. This will also be linked to the Sustainable Development Goals.

Update on relevant ILO activities (*Shengli Niu, ILO)*

Physical agents causing disease include optical and UV radiation. These are included in the diagnostic and exposure criteria for occupational diseases published by the ILO in 2022. Codes of practice for mining, construction and textile industries include consideration of NIR. The ILO is currently revising the global occupational safety and health strategy and plan of action.

Non-ionizing radiation protection

ICNIRP - Ultrasound in air (*Ken Karipidis, ICNIRP)*

Ken Karipidis provided an update on ICNIRP's work on airborne ultrasound (noting also that ICNIRP had published statements on diagnostic ultrasound in 2017 and cosmetic applications of NIR in 2020).

The IRPA published guidelines on airborne ultrasound in 1984, and the current ICNIRP project, which started in 2020, is investigating whether the same effects considered in 1984 are still valid, whether the limits are still valid and whether there is evidence of new effects.
To date, the project has found that the 1984 limits were based on limited evidence, and there is not much new evidence. Nevertheless, some improvements could be considered, but more research is needed. New haptic technologies may be of concern.

A statement on the validity of the 1984 guidelines has been drafted, which will cover developments since 1984, knowledge gaps and research recommendations.

Medical Devices Regulation & radiation (*Gabriele Calligaro, European Commission, DG Santé)*

The EU introduced Medical Device Regulations (MDR) in 2017 (Regulation (EU) 2017/745). This covers both devices with an intended medical purpose, and products without an intended medical purpose (eg products that have cosmetic uses). Some products could be dual purpose. Groups of products without a medical purpose are listed in Annex XVI of the Regulation and include equipment emitting high intensity EMR intended to be used on the body, for example, for skin resurfacing or tattoo removal. Equipment for brain stimulation that applies electric currents or EMFs that penetrate the cranium to modify nerve activity are also included in Annex XVI.

The MDR establishes classes of products (I, IIa, IIb and III). Classification depends on the intended purposes and inherent risks. For example, MRI is Class IIa, retinal lasers Class IIb, hair removal devices IIa, lasers for hair and tattoo removal IIb.

As Annex XVI products have no medical benefits, risks must be eliminated or reduced as far as possible. A risk-benefit trade-off is not allowed. There are consumer safety and labelling requirements.

High intensity radiation emitting devices fall under group 5 of Annex XVI. Some products are excluded, such as sunbeds.

The MDR fully enters into force in June 2023.
In response to questions, the following answers were provided:

- Ultrasound devices are not explicitly included in Annex XVI, but not excluded either.
- Hair loss devices are included in Class IIa (not IIb) as they have a specific purpose and so can be included in a group with lower risk profile.
- After much discussion sunbeds and IR heating devices were excluded because they do not have analogous medical devices.
- Brain stimulators intended for home use are Class III. The manufacturer has to prove that they attain the performance claimed for them.

Session on risk communication (*V. Gupta-Smith, WHO Department of Communications)*
The presentation focussed on the need to have a Single Overarching Communication Outcome (SOCO – the change you want to see in the audience as a result of the communication. For example: “The change I want to see is that the public is convinced about vaccine safety and gets vaccinated.”

It is important to understand the audience and focus on what they need to know (and not what we know). They must see a benefit from the change you want to see. Messaging depends on the audience but should be a simple unexpected concrete credible emotional story (Succes):
SIMPLE. Decide on the core message - one thing you want audience to remember and one thing you want people to do - and keep it simple.

UNEXPECTED. Get audience to pay attention by generating curiosity or saying something surprising.
CONCRETE. Provide concrete examples to make message understandable. Talk about people, paint mental pictures, and use similes. Give examples e.g. “there are 9 teaspoons of sugar in a can of Coke.”
CREDIBLE. You need to be believed. Use your own experience or borrow someone else’s

credibility. Tell stories of real people and use evidence.
EMOTIONAL – Talk about people, and make them care, and see what is in it for them. Connect the audience to how they are affected by topic.
STORY-TELLING. Paint a picture, express emotion, and talk about people.
You must hook people in first 30 seconds. Put the key message first.

Emotions attached to a risk (eg outrage, fear, apathy) accentuate it. Perceptions are affected by cultural, personal, and subjective factors (often in the subconscious, and not necessarily logical).

The risk communication strategy to adopt depends on the magnitude of the hazard and the emotional response of the at-risk population. For example:

- High hazard but low emotional response (vehicle accidents) – attach emotion to the risk eg show pictures of bad accidents.
- Low hazard but high emotion - outrage management – listen and acknowledge, build trust - give facts about why no danger, maybe try to transfer emotions to something more deserving of them (eg UV – but be careful of comparisons).
- High hazard and high emotion – crisis communication – clear communication that takes root. (People listen to those that give clear messages eg “drink bleach”).
- Low hazard and emotion – surveillance and watch out for any change in either hazard or emotion.

World Health Organization

OPTICAL RADIATION PROJECT

12th International Advisory Committee Meeting

World Health Organization
Salle T, Geneva, Switzerland
7-8 June 2023

Rapporteur – Martin Gledhill, representative of the Ministry of Health of New Zealand

Thursday 8 June

Opening of the meeting

Emilie van Deventer welcomed participants, of whom most represented a government agency and came from the European region. Craig Sinclair was appointed chair.

The meeting adopted the agenda and approved the minutes of the 11th meeting held in June 2022.

Upcoming conference in Brisbane *(D. Whiteman, QIMR Berghofer, Australia (R))*

David Whiteman alerted participants to two skin cancer conferences occurring in Brisbane in September 2024. The first of these covers UV and Skin Cancer Prevention and covers monitoring and preventing exposure etc, and the second Global Advances and Controversies in Skin Cancer and has more of a clinical focus.

Updates from international organizations

UNEP: 2022 Quadrennial Assessment Environmental Effects Assessment Panel (*J. Bornman, UNEP (R))*

In 2022 UNEP published its 4-yearly assessment of "Environmental effects of stratospheric ozone depletion, UV radiation, and interactions with climate change". This covered the interactive effects of stratospheric ozone and climate change on various topics, including solar UV, human health, terrestrial and aquatic ecosystems and microplastics in the environment.

Changes in UV-B during the last 25 years have been low, with some small increases and some small decreases. Outside the polar regions changes are mainly governed by variations in clouds, aerosols, and surface reflectivity. Ice melt caused by increased warming will result in higher UV radiation.

Many of the substances phased out under the Montreal Protocol also happen to be greenhouse gases and this has likely avoided warming of 0.5 to 1°C. It is estimated that about 11 million melanoma cases have been avoided. Nevertheless, other factors have caused increases in melanoma incidence over the past 40 to 50 years. The incidence is stabilising in Australia and New Zealand.

As well as melanoma, solar UV causes or worsens some inflammatory skin disorders and can

cause photosensitivity with some drugs. UV in the troposphere acts as a cleaning agent that can remove some pollutants.

Update from the World Meteorological Organization (*R. von Borries, L. Dulguerov, WMO)*
The WMO has a "Global Atmosphere Watch UV-Ozone Group". It will shortly be publishing an Ozone-UV Bulletin, that will include material on the SunSmart UV App, and updates on the Antarctic Ozone hole and scientific assessments of Ozone depletion.

There will be training courses on Ozone and UV measurement techniques, and data intercomparisons.

The WMO and WHO have a joint global knowledge platform for climate and health (Climahealth.info). This includes many resources and identifies expert teams working in particular areas. There are also country pages.

Points arising from the discussion and questions included:

- The Antarctic Ozone hole is decreasing, and will may be closed in about 50 years. There may even be more ozone than previously – which could lead to less vitamin-D.
- Some young people are vitamin-D deficient because they spend too much time indoors. Many Australians are vitamin-D deficient.

WHO Optical Radiation programme activities *(E. van Deventer, WHO, C. Sinclair, Victoria Cancer Control)*
The WHO Optical Radiation Programme has only received a contribution from Australia. While this is very helpful, it does not allow for major activities. The workplan includes an optical research agenda, and guidance and tools on optical radiation.

WHO has published a report on occupational exposure to solar UV.

The WHO Global Health Observatory includes data on sunbed legislation. Participants were invited to send updates to WHO.

The UV list server has been discontinued. As an alternative, people can send information to uvinfo@who.int with "FOR POSTING" in the subject line.

The SunSmart Global UV app for smart phones was launched globally by WHO in June 2022, providing localised information on ultraviolet (UV) radiation levels through a five-day forecast. The app seeks to bring worldwide consistency to UV reporting and public health messaging, to tackle the worldwide burden of skin cancer and UV-related eye damage. It does this by bringing sun protection advice to anyone with the app on their mobile phone, based on their selected location.

The app is a partnership with the World Health Organization (WHO), the World Meteorological Organization (WMO), the United Nations Environment Programme (UNEP) and the International Labour Organization (ILO).

The SunSmart Global UV app utilises forecast UV data from the European Centre for Medium-

Range Weather Forecasts (ECMWF) and weather information from the Hong Kong Observatory. The app also has the capacity to draw on live UV data when available. Since its launch, there have been 200,000 downloads of the app. Poll data suggested 93% of the WHO meeting participants would like to assist with promoting the app.

Updates from NGOs

International Commission on non-Ionizing Radiation Protection (ICNIRP) (*R. Croft, ICNIRP (R))*
ICNIRP have three current projects on optical radiation:

- Lasers – The 2000 statement on laser pointers and 2013 Laser guidelines are being revised. Both are currently on hold due to changes in ICNIRP membership.
- UV – ICNIRP are reviewing the evidence on effects of chronic UV exposure on the skin and eyes. Revision is hampered by the lack of new data on the spectral effectiveness of short wavelength UV on the cornea.
- Short wavelength light (380-550 nm) – The current (2013) statement on incoherent visible and IR radiation does not address effects on circadian rhythm, and this will be addressed by a new statement. Most of the research to date suffers from poor dosimetry and unblinded studies, so high quality research is needed before any need for guidelines can be assessed. ICNIRP will make recommendations on how to improve experimental and epidemiological studies.

International League of Dermatological Societies (ILDS) (*S. John, ILDS)*
ILDS has 202 Member Societies in 98 countries worldwide, representing over 200,000 dermatologists. Its vision is “The best possible skin health for all people around the world” by improving patient care, prevention, education, and research.

ILDS activities according to the workplan with WHO related to the IAC:
Fighting the global skin cancer epidemic by:

- Clinical presentation of the most frequent skin cancers (BCC, SCC);
- UV-Dosimeter measurement campaigns;
- ILDS survey on national regulations on workers’ protection from UV radiation;
- Systematic review of economic impact of occupational UV radiation;
- Supply material on UV risk communication when requested by WHO;
- Technical input to support the development of registries for melanoma and keratinocyte skin cancers (=non-melanoma skin cancers).
- Multi-stakeholder summit 2019 (Paris) with resulting Global Call to Action (JEADV 2021, 35:1278-1284).

A follow-up high level multi-stakeholder summit “Occupational and Non-occupational Skin Cancer: A Persisting Global Burden” will be co-hosted by ILDS on Thursday 12 Oct 2023 in Berlin, with patient organizations (including Global Skin and the Global Albinism Alliance), social partners, representatives of the EU Commission, MEPs, social insurances, ICOH, EADV and EADO. All IAC participants are invited to this hybrid event!

International Commission on Occupational Health (ICOH) (*A. Modenese, ICOH (R))*
The 2024 ICOH Congress will have sessions on solar UV risks, health surveillance for radiation induced diseases and interventions to reduce the risk of UV-induced skin cancers.

A job-exposure matrix for solar UV exposure is being prepared.

A project in Lisbon is measuring solar UV exposure of outdoor workers using a personal dosimeter. The data will be integrated with a skin cancer prevention programme in a digital healthcare platform and used to estimate seasonal skin cancer risks.

International Electrotechnical Commission (IEC) *(J. Keshvari, IEC)*
IEC Technical Committee (TC) 76 covers optical radiation and laser equipment. There are 41 participating countries. Various working groups cover laser safety. A joint working group is preparing a standard on the photobiological safety of light sources. This group will provide advice to other committees.

Virtual reality and head-mounted displays may need attention in the future. The main health effect reported so far is nausea, but only short-term use has been considered.

Special topics
Albinism and the Global Albinism Alliance (*A. Gliksohn, GAA)*
Albinism is a rare genetic disorder with lack of pigmentation and some visual impairment. The prevalence is about 1 in 12,000 to 1 in 17,000 in Europe and North America, but higher in Africa (1 in 1,500 to 1 in 10,000) and higher still in some specific populations. It can be diagnosed at birth in populations with dark skins, or by an ophthalmologist in light skinned populations.

Lack of pigmentation gives a higher risk of skin cancer, mostly non melanoma skin cancers. They are mainly seen in tropical and subtropical areas where there is often no access to treatment. This is a major public health concern: while the skin cancers are preventable and curable many people do not realise this and access to sunscreen is difficult in sub-Saharan countries as is access to treatment.

Albinism also causes less protection of the retina. Sunglasses are essential to prevent harm but in poor countries may not be available. There might also be visual impairment and misrouting of optic nerves.

People with albinism face other challenges as well such as stigmatisation, discrimination, and exclusion They are often the subject of deep-rooted myths and superstitions.

300 organisations serve albinism around the world, many of them in Africa. The Global Albinism Alliance aims to be multicultural and multilingual and collaborates with the UN, the WHO, and other organisations. It aims to have a scientific conference on albinism every two years. Albinism has been added to the list of neglected tropical diseases and an application has been made to have sunscreen added to the WHO list of essential medicines.

The right light at the right time (*O. Stefani, University of Applied Sciences Lucerne (R))*
Light has some non-visual effects, and daylight has beneficial effects that are not produced by artificial light. The right sort of light is needed at the right time to maintain circadian rhythms.

Many people spend much time indoors under artificial light, and there is evidence that lack of daylight can be bad for health. Disturbance of the circadian system can affect diseases, such as depression, cardiovascular problems, immune defects, and cancer. Shift work has been

classified as a probable human carcinogen.

Illuminance and colour temperature are not the only factors that affect the human response to LED lights, the exact spectrum also makes a difference. The melanopic equivalent daylight illuminance (mEDI), which weights the visible spectrum at the blue end, is a good predictor of the non-visual effects of light, such as suppression of melatonin. There is good evidence that mEDI should be reduced in the evening and at night and increased during the day.

IARC: data and registries (*I. Soerjomataram, IARC (R))*
IARC maintains data in its global cancer observatory. This mostly comes from population-based cancer registries. Data is collected every five years and used to estimate global statistics. The data is published in "Cancer incidence in five continents".

IARC checks the quality of the data, the extent to which coding and registration procedures meet established standards, and the completeness of the data.

There are 325,000 new melanoma cases per year, and 57,000 deaths. For non-melanoma skin cancers (NMSC) there are 1.2 million cases, and 64,000 deaths. The incidence of melanoma varies widely around the world, as does the mortality. Incidence is low in Asia and Africa. About half of new NMSC cases are in North America, but deaths are concentrated in Asia. Mostly light skinned populations are affected.

Overall skin cancers are largely preventable and public health measures can have an important effect.

UV-C
Far UV-C: an overview (*Paul O'Mahoney, UK HSA, United Kingdom)*
UV-C covers the wavelength range 100-280 nm. It is very effective at causing photochemical reactions and produces random non-replicable changes to viruses and bacterial DNA. UV-C has been used for disinfection since 1945, especially to reduce the spread of measles and TB.

254 nm UV-C penetrates far enough into the skin to cause erythema and DNA damage. 222 nm UV-C, on the other hand, is absorbed in the upper layers and does not contribute to skin cancer risk. This suggests that 222 nm UV-C (e.g. from a KrCl lamp) could be used in downward-facing lights to disinfect a whole room.

Experiments show that there is very little DNA damage at 222 nm and no erythema. 6 J/cm^2 causes a slight yellowing of skin (noting the ICNIRP limit of 0.023 J/cm^2). There were no effects on mice skin after one year of exposure. The eye's tear layer absorbs most UV-C. When UV-C lamps were installed in the ceiling and people exposed at the ICNIRP limit and at 10 times the ICNIRP limit there were no differences in reports of discomfort in the eye.

222 nm inactivates a high percentage of airborne viruses. However, it also generates ozone. Mork work is needed to understand the practical consequences of this, as rooms should anyway be well-ventilated.

There is still more work to do to determine whether 222 nm could be of use in pandemic control. There is a need for more real-world studies and results must show reduced

transmission of disease for it to be useful. Non-DNA damage effects also need investigating.

Open mike session

Sweden (*Tove Sandberg Liljendahl, SSM, Sweden*)

SSM is involved in skin cancer prevention campaigns. Keratinocytic cancers are the third most prevalent cancer in Sweden. The UV dose varies a lot over the country and over the seasons. There is an app that can be used to recommend protection, depending on the location of the user.

Messaging on skin cancer prevention is coordinated with other Swedish organisations and tailored to different audiences.

Netherlands (*Arjan van Dijk, RIVM, The Netherlands*)

There are two platforms in the Netherlands for UV and health. One is the government "UV index action platform" and the other is from an independent steering group on skin cancer care in the Netherlands. The government maintains a knowledge base and relies on evidence-based medicine. It has adopted a German guideline for skin cancer. The independent group has many of the same partners as the government and collaborates with it.

It has been proposed that labelling of sunscreens be changed to replace SPF by categories originally proposed in 2006 (strong, medium, and weak). Advice will be modified to take Vitamin-D into account, with a message "Expose as much as possible for a short time".

There is no screening programme for skin cancer but in 2023 a skin cancer prevention campaign was started. Solar UV trends over time are being monitored.

Australia (*S. Loughran, ARPANSA; Australia)*

There is work in Australia to find an alternative to testing sunscreen on humans, which may have ethical issues. A recent study has looked at the effectiveness of applying sunscreen. The Australian sunscreen standard has recently been updated, especially in respect of testing methods. ARPANSA has a UV monitoring network with a website providing access to live and historical data.

ARPANSA was involved with the media during a solar eclipse to ensure that people viewed it safely.

There has been some work on the safety of laser cosmetic treatments. This may lead to regulation.

There has been engagement with eBay over the past year to try and ensure that laser pointers comply with regulations.

New Zealand *(Martin Gledhill, MoH, NZ)*

Since 2012 public health staff in New Zealand have made yearly visits to sunbed operators to assess how well they comply with aspects of recommended practices to minimise risks set out in AS/NZS 2635:2008.

Over that time, some areas of operation, such as use of consent forms and maintaining client

records, have show good improvements. Others, such as correct use of a timer, have not. In 2014 the city of Auckland introduced a local bylaw mandating compliance with the standard, and since then compliance in Auckland has been markedly better than the rest of the country, highlighting the effectiveness of regulation.

Since 2012 the number of operators offering sunbed services has decreased by about two thirds. Of the remaining operators, most offer sunbeds as a sideline to activities such as hairdressing or a beauty salon. However, specialist sunbed operators provide most of the sunbed sessions.

Switzerland *(E. Stempfel, FOPH, Switzerland)*
A sunbed measurement campaign has checked 865 beds for compliance with the limit of 0.3 W/m^2. Over half did not meet this requirement. Subsequent follow-up checks showed 84% compliance.

Almost all laser pointers except Class 1 are now banned in Switzerland. Pointers intercepted at the border have been checked and most fell into Class 3B. Customs have recently introduced new technology to detect pointers.

There will be a thirds conference on UV radiation in April 2024. The focus will be on eye protection and structural prevention measures.

Norway *(Lill Tove Nilsen, Norwegian Radiation and Nuclear Safety Authority (DSA), Norway)*
The Norwegian Experience highlighted three areas: 1) implementation of the National UV- and skin cancer strategy, evaluation of it and proposal for revised strategy from 2024, 2) importance of the 2022 national sunbed inspection campaign to initiate further restrictions in regulations, and 3) challenges regarding approvals for lasers to be used to scare birds in open fields.

Break-out groups
The meeting broke into four groups covering:

- Special populations (workers, sensitive populations) – S. M. John
- Public health interventions, C. Sinclair
- Sunbeds and other cosmetic devices, E. Stempfel
- Climate change and UV radiation, M. Khazova

Each group was asked to consider the following questions:
1. In your chosen area, what are the top 1-2 issues that you need support with?
2. After listening to your colleagues, do you see any opportunities for collaboration?
3. If you had a magic wand, what areas would you like WHO to lead on or provide assistance?

Feedback from the groups:

Special populations

Top issues	• Acknowledgement of skin cancer as occupational. • Sunscreen available to all at low cost – essential medicine.

Collaboration	• Exchange of experiences re regulations to protect people from sunbeds. • Have patient groups involved in these activities.
Magic wand	• Global consensus on daily threshold of UV exposure. • WHO put pressure on state govts to reduce frequency of skin cancer, especially addressing high risk groups. • Guideline for cancer registries to ensure they report all sin cancer.

Public health interventions

Top issues	• Laser pointers – lack of controls and guidance, different rules in each country so easy for them to cross borders. • Increase sun protection in young people.
Collaboration	• Guidance note so consistency on how to control pointers
Magic wand	

Sunbeds and other cosmetic devices

Top issues	• More minors using sunbeds, with poor awareness of risk. Increase awareness for all users. • Marketing of sunbeds. • Poor competence amongst those offering cosmetic treatments.
Collaboration	• Good to exchange information between countries.
Magic wand	• Database of optical regulations. • WHO provision of information on risks and benefits of cosmetic treatments.

Climate change and UV radiation

Top issues	• The issues differ around the world, for example, in some areas sea level rises cause flooding. As temperature increases there will be different recommendations for different areas. • Heat is an issue with climate change, not UV. Poor weather forecasts in some parts of the world need to be improved.
Collaboration	• Good to exchange information and experiences between countries, especially with mitigation measures. • Share training programmes for sunbed operators.
Magic wand	• Commission a review of health effects of lighting that covers more than skin cancer and UV. • List what research needed. People often don't have enough light. • Support to continue the awareness of UV protection in Argentina and Latin America. • Projects to measure effective irradiance in different regions.

From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 02-06-2024 12:06:15 (UTC +01)
To: Anders Ravnsborg Beierholm <anrb@sis.dk>
Subject: RE: [EXT] National reports from Denmark, 2024

Dear Anders,

The annual repots have been well received. Looking forward to meeting you in Geneva soon.

Kind regards,
Emilie

From: Anders Ravnsborg Beierholm <anrb@sis.dk>
Sent: Wednesday, May 22, 2024 7:44 PM
To: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Subject: [EXT] National reports from Denmark, 2024

Dear Emilie,

We have prepared the requested national reports concerning EMF and optical/UV. Both documents are attached.

I will attend the upcoming WHO IAC meeting in person, and I have completed the form accordingly. See you in Geneva in a couple of weeks.

Best regards,
Anders

_____

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Fra: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sendt: 3. maj 2024 15:33
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>; GEBREGZIABHER, Roman <gebregziabherr@who.int>
Emne: RE: WHO International Advisory Committee Meeting on Non-Ionizing Radiation - 11-13 June 2024 – Geneva, CH

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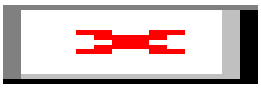

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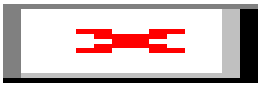

From: noreply@un.org <noreply@un.org>
Sent: 28-05-2024 12:29:53 (UTC +01)
To: Anders Ravnsborg Beierholm <anrb@sis.dk>
Subject: [Indico] Registration approved for Annual WHO Meeting of the International Advisory Committee (IAC) on Non-Ionizing Radiation

World Health Organization

English

Dear Mr. Anders Beierholm,

Your registration for the meeting

Annual WHO Meeting of the International Advisory Committee (IAC) on Non-Ionizing Radiation - WHO Headquarters - 11 Jun 2024, 09:00 (Europe/Zurich)

has been **approved**.

Thank you and best regards,

The Secretariat

Any participant at a WHO event is expected to take note of the Organization's standards of conduct. As such the requirements in the Code of Conduct to prevent harassment including sexual harassment at WHO events and the WHO's Policy Framework, including the WHO Policy on Preventing and Addressing Sexual Misconduct, apply. By accepting the invitation to this meeting, it is understood that you agree to read, understand how it applies to you and your participation in this event and to abide by this code of conduct. Report any concerns or suspicions about misconduct that may occur during the course of this event directly to investigation@who.int or through WHO's integrity hotline.

Français

Cher(e) Mr. Anders Beierholm,

votre inscription à la conférence

Annual WHO Meeting of the International Advisory Committee (IAC) on Non-Ionizing Radiation - WHO Headquarters - 11 Jun 2024, 09:00 (Europe/Zurich)

a été **approuvée**.

Merci et meilleures salutations,

Le Secrétariat

Il est attendu de toute personne participant à une manifestation de l'OMS qu'elle prenne note des normes de conduites de l'Organisation. Dans ce contexte, les exigences du Code de conduite visant à prévenir le harcèlement, y compris le harcèlement sexuel, lors des manifestations de l'OMS et du cadre stratégique de l'OMS, y compris la Politique de l'OMS sur la prévention de l'inconduite sexuelle et les mesures destinées à y remédier, s'appliquent. En acceptant une invitation à la présente réunion, il est entendu que vous acceptez de lire ce code de conduite, que vous comprenez en quoi il s'applique à vous et à votre participation à cette manifestation et que vous acceptez de vous y conformer. Si vous avez des inquiétudes ou des soupçons à propos d'une inconduite qui pourrait avoir lieu lors de cet événement, veuillez le signaler directement en envoyant un message à l'adresse investigation@who.int ou par le Service de signalement des problèmes d'intégrité.

Español

Estimado Mr. Anders Beierholm,

Su inscripción para la reunión

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ha sido aprobada.

Atentamente,

La secretaría

Se espera que todo participante en un evento de la OMS tome nota de las normas de conducta de la Organización. En este contexto son aplicables los requisitos del Código de conducta para prevenir el acoso, incluido el acoso sexual, en eventos de la OMS y el marco de políticas de la OMS, incluida la Política de la OMS de Prevención y Lucha contra las Conductas Sexuales Indebidas. Al aceptar la invitación a la presente reunión, se entiende que usted acepta leer este código de conducta, que comprende la forma en que se aplica a usted y a su participación en este evento y que lo acata. Si tiene inquietudes o sospechas sobre conductas indebidas que puedan producirse en el transcurso de este evento, comuníquelas directamente a través de la dirección investigation@who.int o de la línea directa de la OMS para la protección de la integridad.

From: Anders Ravnsborg Beierholm <>
Sent: 22-05-2024 19:43:31 (UTC +01)
To: 'VAN DEVENTER, Tahera Emilie' <vandeventere@who.int>
Subject: National reports from Denmark, 2024

Dear Emilie,

We have prepared the requested national reports concerning EMF and optical/UV. Both documents are attached.

I will attend the upcoming WHO IAC meeting in person, and I have completed the form accordingly. See you in Geneva in a couple of weeks.

Best regards,
Anders

_____

Anders Ravnsborg Beierholm
Special Advisor
T (dir.) +45 4454 3455
anrb@sis.dk

Danish Health Authority
Radiation Protection
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DANISH HEALTH AUTHORITY
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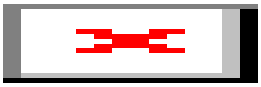

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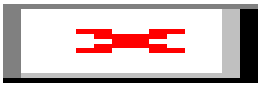

DANISH HEALTH AUTHORITY
Radiation Protection

22nd May 2024

Report on EMF Activities in Denmark

29th International Advisory Committee Meeting on EMF

Policies and legislation

Occupational and public exposures to radiofrequency EMF are limited in accordance with internationally harmonized CENELEC standards, where reference levels are based on the 1999/519/EC recommendation. Similarly, for low-frequency magnetic fields, exposures are limited in accordance with ICNIRP guidelines as recommended by the EU.

The responsibility for regulation regarding public radiofrequency EMF exposure lies with the Agency for Data Supply and Infrastructure (SDFI). Product safety and conformance to limit values for e.g. cell phones is regulated by the Danish Safety Technology Authority (SIK). Work Environment in Denmark (AT) is the responsible authority for regulating EMF exposure of workers.

The responsibility for health risk assessment of EMF exposures lies with the Danish Health Authority (SST). SST follows recommendations from WHO and EU. SST also works closely with the radiation protection authorities in the other Nordic countries. SST does not conduct studies, measurements or research on non-ionizing radiation.

Communication

SST answers citizen inquiries and health-related questions from the Ministry of Health and other public authorities. SST provides information related to exposures and health issues on its website, www.sst.dk.

Public concern primarily regards 5G rollout, telecommunications in general and low-frequency magnetic fields from power lines, transformers and underground cables.

Although the 5G pioneer bands 700 MHz, 3,5 GHz and 26 GHz were auctioned in 2019 and 2021, only the 700 MHz and 3,5 GHz bands are in use. Public concern of 5G seems to have settled on a low level which is comparable to the concern of exposures from telecommunications in general and exposures from low-frequency magnetic fields.

The general assessment of SST remains that no health consequences are anticipated if exposures are below reference levels, in line with reports from the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), the Health Council of the Netherlands and the Scientific Council of the Swedish Radiation Safety Authority (SSM).

SST maintains periodic meetings with SDFI to ensure that sufficient information is made available concerning 5G and exposures from telecommunications in general. SST also has occasional meetings with the Magnetic Field Committee of the Electricity Industry regarding risk assessment when planning new high-voltage cable installations.

Anders Ravnsborg Beierholm
Special Advisor
anrb@sis.dk

Danish Health Authority
Radiation Protection
mailto:sis@sis.dk

DANISH HEALTH AUTHORITY
Radiation Protection

22nd May 2024

Report on Optical Radiation Activities in Denmark

13th Meeting of the Optical Radiation Programme

Policies and legislation

The responsibility for regulating medical and cosmetic use of optical radiation lies with the Danish Patient Safety Authority. Product safety and conformance to limit values for e.g. sunbeds is regulated by the Danish Safety Technology Authority. Work Environment in Denmark is the responsible authority for regulating exposure of workers.

The responsibility for health risk assessment of exposures to optical radiation lies with the Danish Health Authority (SST). SST follows recommendations from WHO and EU. SST also works closely with the radiation protection authorities in the other Nordic countries. SST does not conduct studies, measurements or research on non-ionizing radiation.

In Denmark, the use of sunbeds is regulated in Act No. 718 enacted in 2014. The Act set requirements for the technical standard of sunbeds, including the maximum radiation. The act also introduced a mandatory registration scheme for tanning centers, as well as a requirement that a tanning center must be staffed if UV-1 and UV-2 type sunbeds are present in the tanning salon. In addition, a requirement was introduced that a poster with health advice on sunbed use, supplied by SST, must be visibly displayed in the tanning salon. The Danish Safety Technology Authority monitors compliance with the provisions.

Denmark is still one of the only countries in Northern Europe where sunbed use is allowed for persons under 18 years of age. Due to the high incidence of skin cancer, SST promotes further regulatory restrictions on the use of sunbeds.

Communication

SST provides information related to exposures and health issues related to sun and UV exposure on its website, www.sst.dk.

SST participates in the so-called Sun Group, together with The Danish Safety Technology Authority, the Danish Society of Dermatology, the Danish Ministry of the Environment, the Danish Meteorological Institute and the Danish Cancer Society. The purpose of the Sun Group is to ensure aligned and coordinated professional announcements from the participating institutions in the sun and solarium area. In addition, the Sun Group must ensure the exchange of experience and information regarding new research, treatment systems, relevant registers and registrations, upcoming/planned campaigns and press activities, etc.

The Sun Group has prepared and regularly updates fact sheets with short and precise information for citizens about various matters of UV exposure, such as skin cancer, sun protection of children, vitamin C and sunbeds.

Anders Ravnsborg Beierholm
Special Advisor
anrb@sis.dk

Danish Health Authority
Radiation Protection
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Sent: 03-05-2024 15:33:15 (UTC +01)
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World Health Organization 75 HEALTH FOR ALL

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From: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
Sent: 11-03-2024 12:18:20 (UTC +01)
Cc: VAN DEVENTER, Tahera Emilie <vandeventere@who.int>
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World Health Organization 75 HEALTH FOR ALL