Precautionary Principle in Health Protection Policies regarding Electromagnetic Fields (EMF)

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Abstract. Fast development of new technologies with application of electromagnetic fields (EMF), their ubiquity and uncertainties about possible health risks pose a big challenge for corresponding protection policies. There is a common consent that the uncertainty considering development and health risks should be covered by precautionary measures, but the questions are what measures are appropriate, how to implement them in the existing legislation and what changes in protection policies and philosophies are needed in order to reach optimal solutions. This paper gives some reflections, analysis, proposals and examples relating to these questions. Different possibilities for precautionary measures in the fields of environmental protection, consumer products and occupational exposure are discussed as well as their implementation in the corresponding protection policies and legislation. The special roles of research and information are illustrated and some examples from Switzerland are given.

KEYWORDS: precautionary principle; electromagnetic fields; health protection.

1. Introduction

Fast development of new technologies with application of electromagnetic fields (EMF), their ubiquity and uncertainties about possible health risks pose a big challenge for corresponding protection policies. There is a common consent that the uncertainty considering development and health risks should be covered by precautionary measures, but the questions are what measures are appropriate, how to implement them in the existing legislation and what changes in protection policies and philosophies are needed in order to reach optimal solutions.

The precautionary principle is only one of the risk management principles. Therefore, it should not be regarded separately, but in more global context in the frame of general concepts and strategies. Precaution applies in situations where there are uncertainties about considered risks. Anyhow, for both situations: whether the considered risk is known or whether there are uncertainties about possible risks, the choice of measures to reduce or avoid the risk (also a hypothetical one) is about the same. The measures focus mainly on limitation, optimization, education or information.

The measures taken might be general or partial (for specific exposures, target population, or specific situations). Further on, measures might be defined in the frame of: legislation (as an obligation), “soft law” (as recommendations, agreements) or voluntary actions.

Precautionary measures are supposed to be temporary. That is why they should be reviewed periodically and perhaps be changed from more “soft” toward “harder” ones, as the risk evidence becomes certain, or they might become superfluous if the risk evidence moves towards no risk.

2. Precautionary Principle in different Areas with specific legal and organisational Structures

It is clear that the precautionary principle comes in where fast development and spreading out of certain applications can not be followed fast enough by the assessment of possible accompanying risks. EMF is a typical example for such an area. In order to be able to invoke and implement precautionary measures, the possibility to do so must be given. In the regulations and risk management documents it should be stated that the precautionary principle might be invoked as a possible risk management concept and that precautionary measures might be enforced. Further on it has to be fixed who is supposed to take decisions, who is responsible for the implementation, for surveillance and for action evaluation.
In the domain of health protection from EMF, four different areas with specific protection philosophies, legal frames and organizational structures can be defined:

- Environmental protection
- Health protection of workers
- Health protection and consumer products
- Medical applications

In the following chapters the characteristics of each area, philosophies regarding precaution and possibilities for taking precautionary measures are outlined. Some implementation examples are given.

2.1 Environmental Protection

In the field of environmental protection, the principle of precaution has already certain tradition - mainly coupled to the question of sustainability. Environmental risks might have global impact which under no circumstances may be underestimated. If there is a potential that certain actions might sustainably and irreversibly change the environment by enhancing certain risks – precautionary measures have to be taken, even if there are large uncertainties about the risk. That is why the possibility to take precautionary measures is very often imbedded in environmental protection strategies. Taking into account that the precautionary principle, just as other measures in environmental protection are of the large scale, the following recommendations should be considered:

- Decisions on precautionary measures should be taken by authorities and preferentially be fixed in a regulation (rather than voluntarily actions).
- Measures should be planned on longer term.
- Measures should be consistent for the whole population and cover larger areas.
- Financing the measures through the polluter pays-principle should be envisaged.

The “Swiss Federal Law relating to the Protection of the Environment” [1] states already in the very first paragraph that “precaution as defined implies that any effects likely to be harmful or noxious are to be limited early on”. The law specifies further on how to do that (by exposure limitation) and criteria for the limitation: “Exposures which might be harmful or nuisances shall be limited in the sense of precaution as much as technology and operating conditions will allow, provided this is economically acceptable”. These basic principles have been applied in the “Ordinance relating to Protection of the general Population from Non-ionizing Radiation in the Environment” (ONIR) which was put in force by the Swiss government in 1999 [2]. In the Ordinance two types of limits have been fixed. The reference levels of ICNIRP [3] were enforced without modification. They are applicable at all places in the environment accessible to persons, even if exposure is only of short duration. Additionally limits for the exposure produced by a single installation have been introduced in the sense of precautionary measure. This installation limit value is about ten times lower (with respect to field strength) than the ICNIRP exposure limit value. It is only applicable at places where persons stay for prolonged time, so called places of sensitive use.

2.2 Health Protection and Consumer Products

Consumer products, as internationally trading goods, are mostly regulated on the international, rather than a national level. In Europe, the so called “New and Global Approach” has been introduced as a new strategy in the domain of product safety. The New Approach refers to technical harmonisation and the Global Approach to conformity assessment. The main purpose of the Approach was to ensure the free movement of goods and guarantee a high level of protection of the public. At the same time it gives the industry a high level of freedom and a wide choice of how to meet their obligations. Considering the domain of the EMF there are two European Directives based on this approach: “Low-Voltage Directive” [4] that applies for all electrical appliances like for example household apparatus and “R&TEE Directive” that applies for all “Radio and Telecommunication End Equipment” likes mobile phones. “New and global Approach” means that for groups of products, falling under the directives, essential requirements on health protection against EMF are defined, as well as appropriate conformity assessment procedures. If a certain product shows to meet the requirements, the CE mark
can be used. The European standardization bodies have the task of drawing up technical specification for compliance testing.

“Essential requirement” in respect to the EMF exposure is the compliance with the ICNIRP limits [3]. No precautionary measures are foreseen and the precautionary principle is nowhere mentioned. A number of different national authorities and consumer organizations keep requiring some precautionary measures like declaration of EMF, or better consumer information on how to reduce the exposure. None of these requirements have been respected yet.

The lack of precautionary measures fixed in international product standards might be compensated by voluntary actions of the industry, like declaration of SAR values for mobile phones, or by information provided by authorities or consumer organizations on national levels.

As a summary, following points have to be considered by implementing the precautionary principle in the domain of consumer products:

- Measures might be taken only in cooperation between authorities, industry and consumer organizations.
- Involvement of industry is indispensable.
- Measures should be internationally harmonized
- Consumer information is very important

### 2.3 Health Protection of Workers

Risk management in the field of occupational protection of workers has usually a long tradition and correspondingly well defined legal frame and organizational network. This existing frames and networks are also used for the protection from occupational exposure by EMF. Although there are relatively high occupational EMF exposures in some areas, the whole spectrum of protection, prevention, or precaution measures is applicable and feasible. The high exposed areas can easily be identified, the exposure is usually controllable and the exposed workers are easily accessible.

In Switzerland, the precautionary principle is not mentioned explicitly in the legal documents considering protection of workers against EMF. Nevertheless, precautionary measures to minimize exposure are being taken where appropriate by authorities or by employers. The characteristics of these measures can be summarized as follows:

- Decision about precautionary measures might be made by employers or authorities.
- Measures are usually taken for specific working situations.
- The whole spectrum of measures is applicable and feasible: shielding, training, education, information.

### 2.4 Medical Applications

Implementation of precautionary principle in the domain of medical applications is a very delicate process as there are very specific risk-benefit considerations. Usually benefits prevail so that higher risks are taken into account. This is in the first place true for patients. There are two other aspects or points of views in this domain: one of medical devices as specific products and the other one of EMF exposure of medical staff.

The regulations and the implementation of precautionary principle regarding medical staff should not differ from the protection of workers in other areas. Considering medical devices, they are regulated in the similar way as other products – on the base of “New and Global Approach”. Precautionary principle is in no way considered in the product standards. There are also no requirements for prudent reduction of patient exposure as it is considered to be time-limited and the benefits are prevailing. Anyhow, a good patient information as well as information for medical doctors are important.
3. Role of Research in the Implementation of Precautionary Principle

It is self evident, that research plays the central role in assessing and managing risks of any kind. This is also true for precautionary actions. The base for decision, evaluation of actions and for monitoring should be evidence-based and base on profound research. Precautionary measures address gaps and uncertainties in our knowledge about health risks from EMF as well as foreseen development of EMF technologies. The following recommendations concerning EMF research area are of special interest for implementation of precautionary measures:

- Set research priorities in order to get fast answers on most important questions (potential risks with the highest impacts on public health).
- Coordinate research in different disciplines in order to better overlook complex situations.
- Look ahead to be able to follow development.
- Install monitoring to get early warnings.

4. Role of Information in the Implementation of Precautionary Principle

In the context of uncertainty in the field of EMF, information of the public is an important issue. A well informed public is able to act in a self-responsible way and apply precautionary measures. In order to be able to use information as a precautionary measure following points have to be considered:

- Responsibilities for information should be defined in the very early stage of implementation of precautionary principle.
- Necessary resources should be allocated.
- Information has to be very professional in order not to be counter productive.
- Information should be prepared in advance: “proactive” rather than “reactive”.

In Switzerland the Federal Office of Public Health (FOPH) is one of the Federal Offices appointed to take care of information of public regarding health risks from EMF. The internet has been chosen by the FOPH as the main medium for the direct information of the general public about EMF. The internet being a very flexible and dynamic medium gives the possibility to provide multilayered information and links to other information sources and allows updating the information regularly. In addition, it is the best solution given the minimal available resources.

On the FOPH internet page http://www.bag.admin.ch/emf-e different devices are presented as source of EMF (Table 1). For each device a separate fact-sheet is provided. The fact-sheet is split into two parts: The first part gives brief information on the radiation of the device, compared to the ICNIRP restrictions, and advices for a precautionary handling of the device. The second part of the fact-sheet gives more detailed information on technical aspects, exposure data, health effects and legal regulations.

Even though not all target groups can be reached via the internet, it is a versatile medium by which a great part of the public could be reached. It allows providing up to date information with an economically reasonable effort. In order to reach a bigger part of the population, it is aimed for also providing more specialized information to multiples as general practitioners and consumer organizations.
Table 1: Fact sheets on different EMF sources, which are published, or planned for publishing on the website of the Federal Office of Public health in Switzerland (http://www.bag.admin.ch/emf-e)

<table>
<thead>
<tr>
<th>Published fact-sheets</th>
<th>Device</th>
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<tr>
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<td>DECT phone</td>
<td>May 2006</td>
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<td></td>
<td>Babyphone</td>
<td>September 2006</td>
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<td>Induction cooker</td>
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<td>WLAN</td>
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<td>Bluetooth</td>
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<td>Microwave oven</td>
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<td></td>
<td>Car</td>
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<td></td>
<td>Mobile phone</td>
<td>November 2007</td>
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<th>Future fact-sheets</th>
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<td></td>
<td>Household appliances</td>
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<td>Sun beds</td>
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5. Action Evaluation
Dealing with precautionary measures as options in the area of scientific uncertainty is dynamic process. Therefore the implemented precaution measures should be considered as being temporary and have to be periodically evaluated. These evaluations should be a part of the implementation process. The aim of the evaluation should be not only to prove success of the action, but first of all to check whether and how the conditions (scientific evidence), that had led to the action, have changed.

REFERENCES

[3] INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION (ICNIRP), Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz), Health Physics (1998), 54, 115-123