



**Management of the risk arising from a potential health hazard
due to exposure to electromagnetic fields (EMF)
Summary of European initiatives**

Orgalime Information Note

(Updated 09/01/2003)

including active links to relevant Web sources

1. What are the EU initiatives to date?

1973: “Low Voltage” [Directive 1973/23/EC](#) is adopted. As stated in its Annex I (safety objectives) §2b: the LVD covers all risks related to the use of electricity, including “radiations”, both ionising and non-ionising although it is not detailed ([see below](#)).

1992: a draft Directive on “minimum health and safety requirements regarding the **exposure of workers** to the risks arising from physical agents (non ionising radiations)” is still under discussion ([Commission Proposal COM\(92\) 560 final](#), Official Journal C 77, 18.03.1993). The legal basis is [Art.137](#) (ex Art.118) of the Treaty, which allows Member states to impose more stringent requirements, therefore challenging the Single Market rules. [See also “2002”developments below](#). The Danish Presidency confirmed in an [Information Note of 30/09/2002](#) that the Council will go ahead in considering the opportunity to adopt a specific draft directive on “minimum health and safety requirements regarding the **exposure of workers** to the risks arising from physical agents (non ionising radiations)”. A **new text** of the was discussed during the meeting of the Social Questions Working Party of the Council on **17/12/2002** (SOC 583).

1999: [Council Recommendation 1999/519/EC](#) gives recommendations for the **exposure of the general public**. It is not a directive but suggest a risk management approach (precautionary approach) to all Member States, in order to deal with growing concerns from the public opinion. Most member states have followed this Recommendation, as reported by DG SANCO in its [Implementation Report of November 2001](#).

1999: [Directive 1999/5/EC](#) on radio equipment and telecommunications terminal equipment (RTTE) take over from the LVD 1973/23/EC for “*the protection of the health and the safety of the user and any other person, including the objectives with respect to safety requirements contained in Directive 73/23/EEC, but with no voltage limit applying*” (Article 3-1.a). This includes the protection from “radiations” ([See above](#)).

2000: [Commission mandates CENELEC](#) to work out standards according to CR 1999/519/EC within the **LVD framework**. Although not mandatory, Cenelec standards provide a harmonised framework for the measurement and application of the recommended reference levels.

2001: the revised [Directive 2001/95/EC](#) on **General Product Safety (GPSD)** is adopted and extends safety requirements for consumer products, and enable the Commission to mandate CEN, CENELEC or ETSI to make standards under the GPSD. This could include electrical risks of consumer products below 50 Volts, which are currently excluded from the scope of the LVD, including those risks arising from exposure to EMF.

The Commission proposes a “**draft Directive on Machinery** amending Directive 95/16/EC” ([COM\(2000\) 899 final, OJEC of 26/01/2001](#)), which has reached the stage of the first reading by the Parliament and the Council. This draft includes in its essential health and safety requirements that “*Machinery must be so designed and constructed that any emission of ionising or **non-ionising radiation** is limited to the extent necessary for its operation and that the effects on exposed persons are non-existent or reduced to non-dangerous proportions.*” It

also provides for an obligation of information of “*operators and exposed persons*”, which “*is mandatory for welding machines, induction heaters, electro-magnets*”.

2002: the **Update of the LVD** is under discussion, including the scope which details all the risks covered, including “*Protection against hazards arising from electric, magnetic, and electromagnetic fields*” ([LVD Update 2, Annex I, §II.6](#)). The borderline with the under-revision Machinery Directive is yet unclear, e.g. for electrical motors. If the scope were definitively extended to all electrical products below 1000 Volts, the updated LVD would then take over from GPSD the cover of all health & safety aspects for all electrical products between 0 V. and 50 V., including for EMF risks (NB: radio and telecom equipment between 0 and 50 volts is already covered, as mentioned above).

2. Definitions

2.1 - EMF EMF stands for “**Electromagnetic fields**”, as referred to in CR 1999/519/EC within the “wave length” or “frequency range” of 0 Hz to 300 GHz. By contrast with “ionising radiations” (wavelength of 100 nanometer or less or a frequency of 3×10^{15} Hertz or more) EMF are not capable of producing directly or indirectly “ions” that damages DNA and could provoke cancer.

This is why EMF are also called “**non-ionising radiations**” (NIR), as referred to in COM(92)560, including extremely low frequency (ELF), radio-frequency (RF) and microwave (MW) radiations. EMF should be differentiated from “optical radiations”, which designate infra-red (IR), visible and ultra-violet (UV) electromagnetic waves, which are also non-ionising (frequency range of 3 GHzertz to 3×10^{15} Hertz). EMF are often called “low frequency emissions” (LFE) in the US.

2.2 - Risk – A risk is the product of its “**magnitude**” (scale of harm) and its “**probability**” (likelihood of harm), with various degrees in both magnitude and probability. The Commission Joint Research Centre has tried to categorise different classes of risks, in which EMF are included:

(Table 11): A Heuristic Taxonomy of Different Classes of Technological Risk (after Renn and Klinke)

NAME	PROBABILITY	MAGNITUDE	OTHER	EXAMPLES
Medusa	low	low	(high mobilisation)	Electromagnetic fields
Damocles	low	high		dams,nuclear power, large chemical plants
Cassandra	high	high	(high delay)	global ecology, currently committed global warming
Cyclops	uncertain	high		Weapons of mass destruction, AIDS
Pythia	uncertain	uncertain		BSE,GM crops, continued growth in global warming
Pandora	uncertain	uncertain	(high persistence)	POPs, endocrine disrupters

Source: [A.Stirling report for the EC/JRC/IPTS on “Science and precaution in the management of technological risk” May 1999.](#)

2.3 - Risk assessment – The risk assessment should be carried out by scientists, who are sometimes confronted with “uncertainty” on the magnitude and/or probabilities of the considered risk.

- For risks stemming from EMF, the most widely recognised independent scientific body is the International Commission on Non-Ionising Radiation Protection ([ICNIRP](#)). In 1998, ICNIRP has published comprehensive “[Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields \(up to 300 GHz\)](#)”, which have been used as a scientific basis in CR 1999/519/EC.
- At the level of the EU, the [CSTEE](#), an independent group of 8 experts in toxicology, has been requested by the Commission (DG SANCO) to formulate an opinion on whether the ICNIRP guidelines are “*still the appropriate scientific basis for a system of health protection against the risks from non-ionising radiation.*” (See point 3.2).

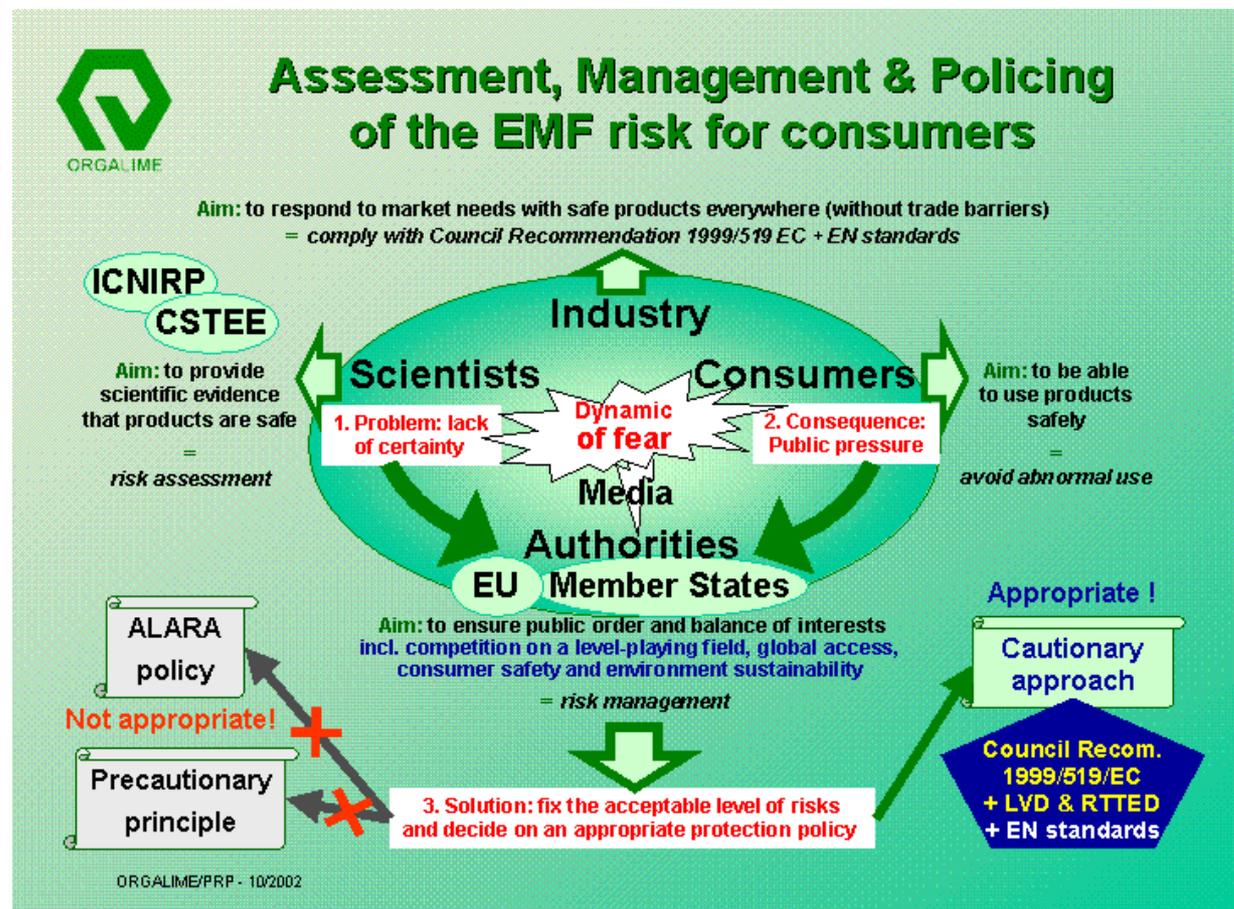
2.4 - Risk management – It is a method up to policy makers to apply; EU institutions and Member States, while implementing EU legislation, have to decide upon the level of “acceptability” of the risk for the society, on the basis of the available risk assessment data and of additional social and economical factors (See [ICNIRP’s “General Approach to Protection Against Non-Ionising Radiations](#)).

3. From risk assessment to risk management arising from the exposure to EMF

3.1 - EMF Risks – With regards to risks arising from the exposure to EMF, scientists to date consider them as **low in magnitude** and **low in probability**, at the “reference levels” recommended by ICNIRP, which form the scientific basis of Council Recommendation 1999/519/EC.

3.2 - CSTE Opinion – In its latest and [3rd Opinion of 24/09/2002](#) on "Effects of electromagnetic fields on health", the CSTE confirmed its [Opinion of 30/10/2001](#) that the ICNIRP Guidelines provide to date an adequate scientific basis for limiting the exposure to EMF as laid down in the technical Annex of CR 1999/519/EC. In its conclusion, CSTEE “*appreciates the high scientific standard of the evaluation of the published literature made by ICNIRP and accepts that the value of 100 mA/m –2 provides a reasonable basis to derive a standard at the present time. However, the CSTE considers that, particularly for ELF [extremely low frequencies] additional concerns may arise at the level of risk management because of the uncertainties stemming from the gaps in the scientific literature.*”

4. What risk management method is applicable to the EMF risk?



The World Health Organisation (WHO), which is conducting an international “EMF research Project”, has published a [fact sheet in 2000](#), which describes the applicable approach to EMF risks. The following are summaries drawn from the fact sheet (direct quotation in *italics*):

4.1 - ALARA

ALARA stands for “as low as reasonably achievable”. **ALARA is not applicable** to the EMF risk management, “*in the absence of any expectation of risk at low exposure levels and given the ubiquity of exposure*”; indeed, exposure to non-ionising radiations (EMF) at low levels, does not bring any evidence of a dose-response effect nor of any known risk (by opposition to

ionising radiations). Therefore, application of this policy to EMF is not appropriate and could give rise to varying interpretation of what is “reasonable” by enforcement authorities.

4.2 - Precautionary Principle

The Precautionary Principle is not applicable either, because it is “*intended for use in drafting provisional responses to potentially serious health threats*”: in the case of exposure to EMF, the probability of risk is low and the magnitude of the risk is not serious”, if it occurs (by opposition to the BSE case, where there is still uncertainty on the probability of the risk, but not on its seriousness if it occurs). This approach is consistent with Commission Communication [COM\(2000\)1 of 2/2/2000](#) on the Precautionary Principle.

4.3 - (Pre-)cautionary approach

It is the risk management method adopted by the Commission to manage the EMF risk and enshrined in Council Recommendation 1999/519/EC, as explained in its [Implementation Report of November 2001](#): “*Therefore the Commission decided to base its proposal on established health effects only, for which there are thresholds of exposure before the effects occur. However, since there are safety factors of about 50 between the threshold values for acute effects and the basic restrictions this recommendation would cover implicitly possible long-term effects in the whole frequency range. As a result, ICNIRP guidelines provide safe protection thresholds with respect to adverse health effects, which may be caused by EMF exposure.*”

This approach has been adopted by most Member States in the EU, according to Commission report on the implementation of CR 1999/519/EC.

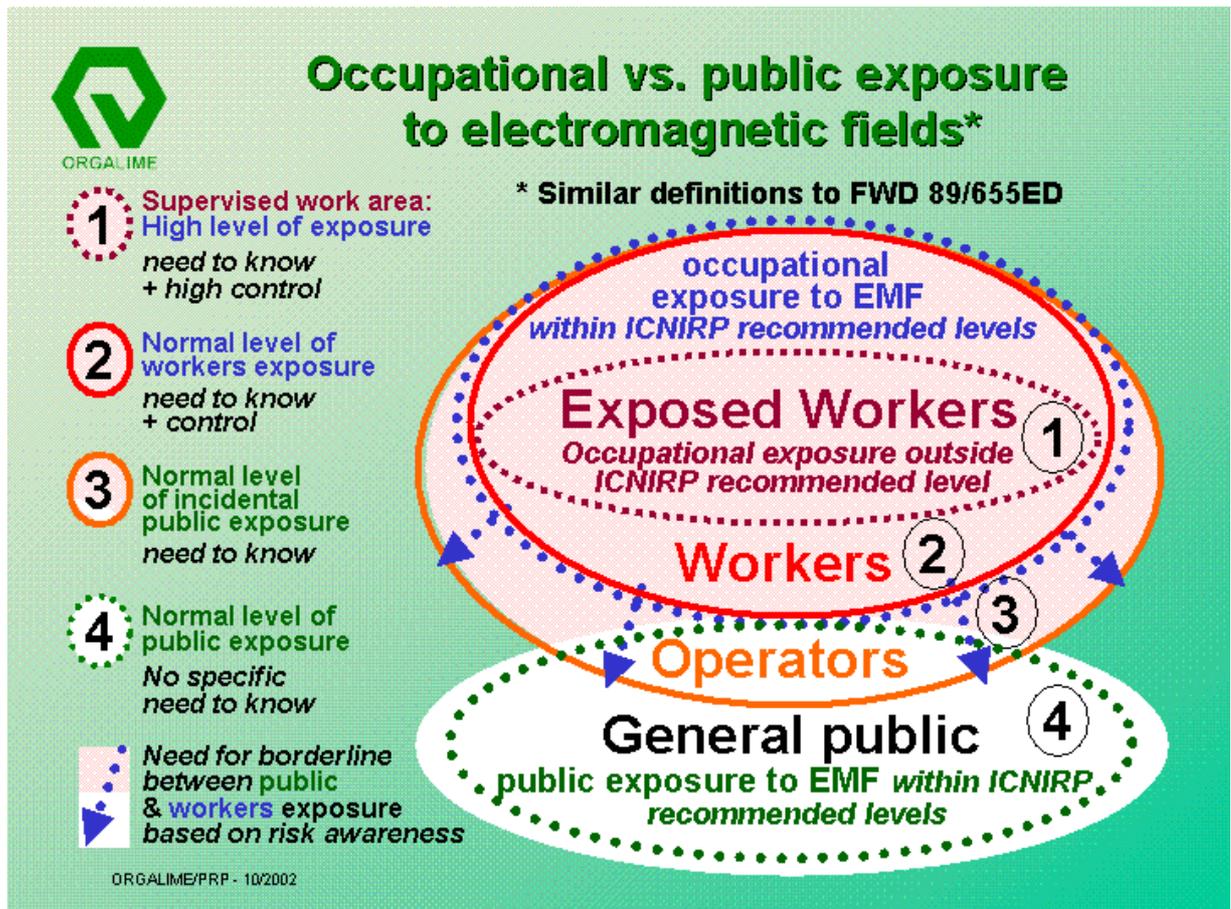
5. How should one deal with occupational exposure? Should it be different from public exposure?

The EU has decided to provide workers with a specific protection against exposure to so-called “physical agents”, such as noise, vibrations and now non-ionising radiations. Consequently, there is a **need for a clear definition of workers** with regard to the particular conditions of exposure to EMF in order to apply the relevant risk management framework and **to set a clear borderline** between **the scope** of the new draft Directive COM(92)560 on **workers exposure** and CR 1999/519/EC + Directive 1973/23/EC on **public exposure**.

5.1 - Workers vs. General Public: The scope of draft Directive on the exposure of workers to physical agents (COM (92)560 final) provides that it shall apply to “*activities in which workers are or are likely to be exposed to physical agents [EMF] as a result of their work.*” (Article 3 §1). It refers to the [Framework Directive 89/391 EC](#) of 12/06/1989, which defines workers as “*any person employed by an employer, including trainees and apprentices but excluding domestic servants*” (Article, 3 §a).

A too wide definition of “workers”, for example a working traveller talking on a mobile phone in a train, might be difficult to manage. Therefore, in order to avoid any scope overlapping between the two mentioned legal frameworks, it would be helpful to use similar definitions as provided by Directive [89/655/EEC](#) of 30/11/1989, which implements FWD 89/391/EC on “minimum health and safety requirements for the use of work equipment by workers at work”.

Article 2 of Directive 89/655/EC provides definitions for “work equipment”, “**exposed workers**”, “operators” and for “**supervised area**”, which would mean for workers exposed to EMF: subject to appropriate supervision for the purpose of protection against non-ionising emissions **beyond the recommended values, according to the ICNIRP Guidelines for workers**. See figure below.



Thanks to adequate training, medical supervision, and other appropriate protective measures, the **fitness of workers for work in a specified environment** (supervised area), and their **adequate level of awareness** with regard to their specific work conditions (need to know), and consequently their ability to apply appropriate protective measures (control). See figure.

5.2 - Same scientific basis for different measuring conditions of exposure: This difference in the condition of exposure between the general public and workers does not affect and the risk assessment methods to be applied. **There is a need for a common scientific basis**, which should be **the ICNIRP guidelines**, which provides different “reference levels” (CR 1999/519/EC) or “threshold levels” (draft COM(92)560) for respectively public and occupational exposure.

This was indeed acknowledged by the Danish Presidency: “*On the basis of information from the seminar, combined with the survey of national legislation, the Presidency has concluded that the scientific foundation on which the ICNIRP guidelines are based, could form the basis for continued work on the setting of limit values*” ([Information Note of 30/09/2002](#) to the Council).

5.3 - Appropriate risk management according to the conditions of exposure:

Consequently, given the workers’ awareness of the risk and their fitness for working under specific exposure conditions, should set **appropriate “minimum requirements” for workers**, which **are not the same as for the general public**. According to the normal operating conditions of a workstation or a work equipment, there are various prevention and protective measures that could be implemented at the work place, as detailed by the Commission in its draft proposal COM(92)560 final.

6. Key issues for the European industry

The key issues for the European engineering industry with regard to risks arising from the exposure to electromagnetic fields are **consistency in risk assessment, proportionality in risk management** and **better information of society**, in order to leave stakeholders (e.g. local authorities, employers, workers, citizens) to decide for their constituency, their personnel, or for themselves, how to deal with the exposure to EMF.

[ORGALIME](#) and [WEM](#), the employers organisation of the metal trades in Europe covering the engineering, manufacturing and technology based companies, which represent between them about 200,000 companies employing some 12 million people, have detailed these concerns in a joint position paper: "[Coherence of EU policy with regard to protection from electromagnetic fields \(EMF\)](#)", 13/12/2002.

This position paper has been sent to President Prodi and to Commissioners Busquin, Byrne, Diamantopoulou, Lamy, Liikanen, de Palacio and Wallström.

Orgalime already explained in a [position paper of 4/10/2000](#), why the engineering industry supports the cautionary approach of European Council Recommendation 1999/519/EC of 12 July 1999.

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