MADRID INTERNATIONAL SCIENTIFIC DECLARATION

The undersigned scientists of this Madrid International Scientific Declaration regarding the present state of research on non-ionizing electromagnetic fields (EMF) and the legal implications that arise from it agree and support the following:

1. Exposure to extremely low-frequency and radiofrequency electromagnetic fields generated by electric and wireless devices may have an unavoidable and indisputable effect on public health and, in particular, on the most vulnerable, such as children, pregnant women, chronically ill patients, as well as the aged. The above-mentioned electric and wireless systems include (albeit not exclusively) radiofrequency radiation (RFR) gadgets, such as mobile phones and other wireless communication devices, as well as their broadcasting systems and base stations, Wi-Fi, transmission antennas, smart meters and baby monitors, as well as electrical utility equipments and their infrastructure which provide electricity that yields extremely low-frequency electromagnetic fields (ELF-EMF), often together with high-frequency disturbances found on today's grid.

   In this respect, we reiterate and undertake the 2017 International EMF Scientist Appeal (1) in its general terms and the following statements in particular,

   > ***"Scientific basis for our common concerns:***
   > *Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on the general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plant and animal life."*

2. **There is a need to take immediate action according to present scientific research; it is not in the interest of the general public to wait. The ICNIRP (International Commission on Non-Ionizing Radiation Protection) as well as the FCC/IEEE guidelines are obsolete and consequently new measures and more restrictive exposure limitations must apply, in line with Resolution 1815 of the Council of Europe of May 27, 2011** (2)**.**

   The WHO supports the International Agency for Research on Cancer's (IARC) cancer classification of extremely low-frequency magnetic fields (ELF-EMF) of 2002, and radiofrequency radiation (RFR) of 2011, as possible human carcinogens (group 2B).

   The ICNIRP, in 1998, set "guidelines to determine exposure limits to electric, magnetic, and electromagnetic fields". These guidelines have been accepted by the WHO and a number of countries, although the guidelines have become obsolete in the face of scientific evidence showing risk to the population at lower exposure levels and over longer exposure time periods.

   Thus, in the Bioinitiative Report it is pointed out:

"While new ELF limits are being developed and implemented, a reasonable approach would be a 1 mG planning limit for habitable space adjacent to all new or upgraded power lines and a 2 mG limit for all other new construction. It is also recommended for that a 1 mG limit be established for existing habitable space for children and/or women who are pregnant (because of the possible link between childhood leukemia and in utero exposure to ELF). This recommendation is based on the assumption that a higher burden of protection is required for children who cannot protect themselves, and who are at risk for childhood leukemia at rates that are traditionally high enough to trigger regulatory action. This situation in particular warrants extending the 1 mG limit to existing occupied space. "Establish" in this case probably means formal public advisories from relevant health agencies". [1]*

We agree with those values and recommend that they immediately be established as maximum exposure limits, which will be reviewed as new scientific evidence comes out.

Therefore, it is relevant to point out that the Council of Europe passed their Resolution 1815 on May 27, 2011, **"Potential dangers of electromagnetic fields and their effect on the environment"** (2). We concur with this Resolution and point out the following statements:

In the previous report, of May 6, 2011 (3) by the Committee on the Environment, Agriculture and Local and Regional Affairs, we subscribe to the conclusion, "*(that) indicates that there is sufficient evidence of potentially harmful effects of electromagnetic fields on fauna, flora and human health to react and to guard against potentially serious environmental and health hazards*", and we agree with the recommendation to apply the "Precautionary Principle" and to review the present limit guidelines because any delay may have high financial and health costs, as asbestos, lead gasoline, and tobacco had in the past.

We particularly emphasize point 8 of the Resolution 1815 of the Council of Europe:

8.1. In general terms:

8.1.1. take all reasonable measures to reduce exposure to electromagnetic fields, especially to radio frequencies from mobile phones, and particularly the exposure to children and young people who seem to be most at risk from head tumours;

8.1.2. reconsider the scientific basis for the present standards on exposure to electromagnetic fields set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations, and apply ALARA principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation;

8.1.3. put in place information and awareness-raising campaigns on the risks of potentially harmful long-term biological effects on the environment and on human health, especially targeting children, teenagers and young people of reproductive age;

8.1.4. pay particular attention to "electrosensitive" people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network;

[1]* 1 mG = 0.1 μT; 2 mG = 0.2 μT

8.1.5. in order to reduce costs, save energy, and protect the environment and human health, step up research on new types of antenna, mobile phone and DECT-type devices, and encourage research to develop telecommunication based on other technologies which are just as efficient but whose effects are less negative on the environment and health;

8.2. Concerning the private use of mobile phones, DECT wireless phones, WiFi, WLAN and WIMAX for computers and other wireless devices such as baby monitors:

8.2.1. set preventive thresholds for levels of long-term exposure to microwaves in all indoor areas, in accordance with the precautionary principle, not exceeding 0.6 volts per metre, and in the medium term to reduce it to 0.2 volts per metre;

8.2.2. undertake appropriate risk-assessment procedures for all new types of device prior to licensing;

8.2.3. introduce clear labelling indicating the presence of microwaves or electromagnetic fields, the transmitting power or the specific absorption rate (SAR) of the device and any health risks connected with its use;

8.2.4. raise awareness on potential health risks of DECT wireless telephones, baby monitors and other domestic appliances which emit continuous pulse waves, if all electrical equipment is left permanently on standby, and instead recommend the use of wired, fixed telephones at home or, failing that, models which do not permanently emit pulse waves;

8.3. Concerning the protection of children:

8.3.1. develop within different ministries (education, environment and health) targeted information campaigns aimed at teachers, parents and children to alert them to the specific risks of early, ill-considered and prolonged use of mobiles and other devices emitting microwaves;

8.3.2. for children in general, and particularly in schools and classrooms, give preference to wired Internet connections, and strictly regulate the use of mobile phones by school children on school premises.

Thus, the Council of Europe supports resolutions which have been signed by independent scientists of different nationalities over the past 17 years; i.e.: the Copenhagen Resolution of 2010; Resolution of Porto Alegre of 2010; Seletun Statement of 2009; Paris Declaration of 2009; The London Resolution of 2007; Venice Resolution of 2007; Brussels Appeal of 2007; Benevento Resolution of 2006, Bamberg Appeal of 2005; Declaration of Helsinki of 2005; Declaration of Alcalá of 2002; Catania Declaration of 2002; Declaration of Friburg of 2002, Salzburg Resolution of 2000. All of them warn about health risks from exposure to EMF and the need to take preventive measures.

We can state, without any doubt, that continuous exposure to these types of radiation has been shown to be a potential and grave health risk and that efficient measures, such as those set forth by the Council of Europe, must be undertaken to reduce them. It is important to understand that this is not the final, but the first, step towards a healthy environment without damaging effects from artificial electromagnetic fields on any living organisms. The current resolution of the Council of Europe may, thus, have to be revised in the future as further knowledge

arises from science and investigation proving that more stricter protective measures are needed to ensure the public health.

3. **Consequently, we make the following appeal:**

   Public administrations at all levels, state, regional, autonomous, and local, are requested to immediately implement the Council of Europe Resolution, making it a mandatory and minimum part of their rules and regulations.

Madrid, September 28, 2017.

To: His Excellency Ban Ki-moon, Secretary-General of the United Nations
Honorable Dr. Margaret Chan, Director-General of the World Health Organization
U.N. Member States

International Appeal:

Scientists call for Protection from Non-ionizing Electromagnetic Field Exposure

We are scientists engaged in the study of biological and health effects of non-ionizing electromagnetic fields (EMF). Based upon peer-reviewed, published research, we have serious concerns regarding the ubiquitous and increasing exposure to EMF generated by electric and wireless devices. These include– but are not limited to–radiofrequency radiation (RFR) emitting devices, such as cellular and cordless phones and their base stations, Wi-Fi, broadcast antennas, smart meters, and baby monitors as well as electric devices and infra-structures used in the delivery of electricity that generate extremely-low frequency electromagnetic field (ELF EMF).

Scientific basis for our common concerns

Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plant and animal life.

These findings justify our appeal to the United Nations (UN) and, all member States in the world, to encourage the World Health Organization (WHO) to exert strong leadership in fostering the development of more protective EMF guidelines, encouraging precautionary measures, and educating the public about health risks, particularly risk to children and fetal development. By not taking action, the WHO is failing to fulfill its role as the preeminent international public health agency.

Inadequate non-ionizing EMF international guidelines

The various agencies setting safety standards have failed to impose sufficient guidelines to protect the general public, particularly children who are more vulnerable to the effects of EMF.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) established in 1998 the "Guidelines For Limiting Exposure To Time-Varying Electric, Magnetic, and Electromagnetic Fields

(up to 300 GHz)"[1]. These guidelines are accepted by the WHO and numerous countries around the world. The WHO is calling for all nations to adopt the ICNIRP guidelines to encourage international harmonization of standards. In 2009, the ICNIRP released a statement saying that it was reaffirming its 1998 guidelines, as in their opinion, the scientific literature published since that time "has provided no evidence of any adverse effects below the basic restrictions and does not necessitate an immediate revision of its guidance on limiting exposure to high frequency electromagnetic fields[2]. ICNIRP continues to the present day to make these assertions, in spite of growing scientific evidence to the contrary. It is our opinion that, because the ICNIRP guidelines do not cover long-term exposure and low-intensity effects, they are insufficient to protect public health.

The WHO adopted the International Agency for Research on Cancer (IARC) classification of extremely low frequency electromagnetic field (ELF EMF) in 2002[3] and radiofrequency radiation (RFR) in 2011[4]. This classification states that EMF is a *possible human carcinogen (Group 2B).* Despite both IARC findings, the WHO continues to maintain that there is insufficient evidence to justify lowering these quantitative exposure limits.

Since there is controversy about a rationale for setting standards to avoid adverse health effects, we recommend that the United Nations Environmental Programme (UNEP) convene and fund an independent multidisciplinary committee to explore the pros and cons of alternatives to current practices that could substantially lower human exposures to RF and ELF fields. The deliberations of this group should be conducted in a transparent and impartial way. Although it is essential that industry be involved and cooperate in this process, industry should not be allowed to bias its processes or conclusions. This group should provide their analysis to the UN and the WHO to guide precautionary action.

Collectively we also request that:

1. children and pregnant women be protected;
2. guidelines and regulatory standards be strengthened;
3. manufacturers be encouraged to develop safer technology;
4. utilities responsible for the generation, transmission, distribution, and monitoring of electricity maintain adequate power quality and ensure proper electrical wiring to minimize harmful ground current;
5. the public be fully informed about the potential health risks from electromagnetic energy and taught harm reduction strategies;
6. medical professionals be educated about the biological effects of electromagnetic energy and be provided training on treatment of patients with electromagnetic sensitivity;
7. governments fund training and research on electromagnetic fields and health that is independent of industry and mandate industry cooperation with researchers;
8. media disclose experts' financial relationships with industry when citing their opinions regarding health and safety aspects of EMF-emitting technologies; and
9. white-zones (radiation-free areas) be established.

1 http://www.icnirp.org/cms/upload/publications/ICNIRPemfgdl.pdf

2 http://www.icnirp.org/cms/upload/publications/ICNIRPStatementEMF.pdf

3 http://monographs.iarc.fr/ENG/Monographs/vol80

4 http://monographs.iarc.fr/ENG/Monographs/vol102/

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All inquiries, including those from qualified scientists who request that their name be added to the Appeal, may be made by contacting Elizabeth Kelley, M.A., Director, EMFscientist.org, at info@EMFscientist.org.

Note: the signatories to this appeal have signed as individuals, giving their professional affiliations, but this does not necessarily mean that this represents the views of their employers or the professional organizations they are affiliated with.

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Resolution 1815 (2011)[1]
Final version

The potential dangers of electromagnetic fields and their effect on the environment

Parliamentary Assembly

1. The Parliamentary Assembly has repeatedly stressed the importance of states' commitment to preserving the environment and environmental health, as set out in many charters, conventions, declarations and protocols since the United Nations Conference on the Human Environment and the Stockholm Declaration (Stockholm, 1972). The Assembly refers to its past work in this field, namely Recommendation 1863 (2009) on environment and health: better prevention of environment-related health hazards, Recommendation 1947 (2010) on noise and light pollution, and more generally, Recommendation 1885 (2009) on drafting an additional protocol to the European Convention on Human Rights concerning the right to a healthy environment and Recommendation 1430 (1999) on access to information, public participation in environmental decision-making and access to justice – implementation of the Árhus Convention.

2. The potential health effects of the very low frequency of electromagnetic fields surrounding power lines and electrical devices are the subject of ongoing research and a significant amount of public debate. According to the World Health Organization, electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations are now exposed in varying degrees to electromagnetic fields, the levels of which will continue to increase as technology advances.

3. Mobile telephony has become commonplace around the world. This wireless technology relies upon an extensive network of fixed antennae, or base stations, relaying information with radio-frequency signals. Over 1.4 million base stations exist worldwide and the number is increasing significantly with the introduction of third generation technology. Other wireless networks that allow high-speed Internet access and services, such as wireless local area networks, are also increasingly common in homes, offices and many public areas (airports, schools, residential and urban areas). As the number of base stations and local wireless networks increases, so does the radio-frequency exposure of the population.

4. While electrical and electromagnetic fields in certain frequency bands have wholly beneficial effects which are applied in medicine, other non-ionising frequencies, whether from extremely low frequencies, power lines or certain high frequency waves used in the fields of radar, telecommunications and mobile telephony, appear to have more or less potentially harmful, non-thermal, biological effects on plants, insects and animals as well as the human body, even when exposed to levels that are below the official threshold values.

5. As regards standards or threshold values for emissions of electromagnetic fields of all types and frequencies, the Assembly strongly recommends that the ALARA (as low as reasonably achievable) principle is applied, covering both the so-called thermal effects and the athermic or biological effects of electromagnetic emissions or radiation. Moreover, the precautionary principle should be applied when scientific evaluation does not allow the risk to be determined with sufficient certainty. Given the context of growing exposure of the population, in particular that of vulnerable groups such as young people and children, there could be extremely high human and economic costs if early warnings are neglected.

1. Text adopted by the Standing Committee, acting on behalf of the Assembly, on 27 May 2011 (see Doc. 12608, report of the Committee on the Environment, Agriculture and Local and Regional Affairs, rapporteur: Mr Huss).

6. The Assembly regrets that, despite calls for the respect of the precautionary principle and despite all the recommendations, declarations and a number of statutory and legislative advances, there is still a lack of reaction to known or emerging environmental and health risks and virtually systematic delays in adopting and implementing effective preventive measures. Waiting for high levels of scientific and clinical proof before taking action to prevent well-known risks can lead to very high health and economic costs, as was the case with asbestos, leaded petrol and tobacco.

7. Moreover, the Assembly notes that the problem of electromagnetic fields or waves and their potential consequences for the environment and health has clear parallels with other current issues, such as the licensing of medication, chemicals, pesticides, heavy metals or genetically modified organisms. It therefore highlights that the issue of independence and credibility of scientific expertise is crucial to accomplish a transparent and balanced assessment of potential negative impacts on the environment and human health.

8. In light of the above considerations, the Assembly recommends that the member states of the Council of Europe:

8.1. in general terms:

8.1.1. take all reasonable measures to reduce exposure to electromagnetic fields, especially to radio frequencies from mobile phones, and particularly the exposure to children and young people who seem to be most at risk from head tumours;

8.1.2. reconsider the scientific basis for the present standards on exposure to electromagnetic fields set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations, and apply ALARA principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation;

8.1.3. put in place information and awareness-raising campaigns on the risks of potentially harmful long-term biological effects on the environment and on human health, especially targeting children, teenagers and young people of reproductive age;

8.1.4. pay particular attention to “electrosensitive” people who suffer from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network;

8.1.5. in order to reduce costs, save energy, and protect the environment and human health, step up research on new types of antenna, mobile phone and DECT-type device, and encourage research to develop telecommunication based on other technologies which are just as efficient but whose effects are less negative on the environment and health;

8.2. concerning the private use of mobile phones, DECT wireless phones, WiFi, WLAN and WIMAX for computers and other wireless devices such as baby monitors:

8.2.1. set preventive thresholds for levels of long-term exposure to microwaves in all indoor areas, in accordance with the precautionary principle, not exceeding 0.6 volts per metre, and in the medium term to reduce it to 0.2 volts per metre;

8.2.2. undertake appropriate risk-assessment procedures for all new types of device prior to licensing;

8.2.3. introduce clear labelling indicating the presence of microwaves or electromagnetic fields, the transmitting power or the specific absorption rate (SAR) of the device and any health risks connected with its use;

8.2.4. raise awareness on potential health risks of DECT wireless telephones, baby monitors and other domestic appliances which emit continuous pulse waves, if all electrical equipment is left permanently on standby, and recommend the use of wired, fixed telephones at home or, failing that, models which do not permanently emit pulse waves;

8.3. concerning the protection of children:

8.3.1. develop within different ministries (education, environment and health) targeted information campaigns aimed at teachers, parents and children to alert them to the specific risks of early, ill-considered and prolonged use of mobiles and other devices emitting microwaves;

8.3.2. for children in general, and particularly in schools and classrooms, give preference to wired Internet connections, and strictly regulate the use of mobile phones by schoolchildren on school premises;

8.4. concerning the planning of electric power lines and relay antenna base stations:

8.4.1. introduce town planning measures to keep high-voltage power lines and other electric installations at a safe distance from dwellings;

8.4.2. apply strict safety standards for the health impact of electrical systems in new dwellings;

8.4.3. reduce threshold values for relay antennae in accordance with the ALARA principle and install systems for comprehensive and continuous monitoring of all antennae;

8.4.4. determine the sites of any new GSM, UMTS, WiFi or WIMAX antennae not solely according to the operators' interests but in consultation with local and regional government authorities, local residents and associations of concerned citizens;

8.5. concerning risk assessment and precautions:

8.5.1. make risk assessment more prevention oriented;

8.5.2. improve risk-assessment standards and quality by creating a standard risk scale, making the indication of the risk level mandatory, commissioning several risk hypotheses to be studied and considering compatibility with real-life conditions;

8.5.3. pay heed to and protect "early warning" scientists;

8.5.4. formulate a human-rights-oriented definition of the precautionary and ALARA principles;

8.5.5. increase public funding of independent research, in particular through grants from industry and taxation of products that are the subject of public research studies to evaluate health risks;

8.5.6. create independent commissions for the allocation of public funds;

8.5.7. make the transparency of lobby groups mandatory;

8.5.8. promote pluralist and contradictory debates between all stakeholders, including civil society (Århus Convention).

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Doc. 12608
06 May 2011

The potential dangers of electromagnetic fields and their effect on the environment

Report[1]
Committee on the Environment, Agriculture and Local and Regional Affairs
Rapporteur: Mr Jean HUSS, Luxembourg, Socialist Group (SOC)

Summary

The potential health effects of the very low frequency of electromagnetic fields surrounding power lines and electrical devices are the subject of ongoing research and a significant amount of public debate. While electrical and electromagnetic fields in certain frequency bands have fully beneficial effects which are applied in medicine, other non-ionising frequencies, be they sourced from extremely low frequencies, power lines or certain high frequency waves used in the fields of radar, telecommunications and mobile telephony, appear to have more or less potentially harmful, non-thermal, biological effects on plants, insects and animals, as well as the human body when exposed to levels that are below the official threshold values.

One must respect the precautionary principle and revise the current threshold values; waiting for high levels of scientific and clinical proof can lead to very high health and economic costs, as was the case in the past with asbestos, leaded petrol and tobacco.

1. Reference to the committee: Doc. 11894, Reference 3563 of 29 May 2009.

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A. Draft resolution[2]

1. The Parliamentary Assembly has repeatedly stressed the importance of states' commitment to preserving the environment and environmental health, as set out in many charters, conventions, declarations and protocols since the United Nations Conference on the Human Environment and the Stockholm Declaration (Stockholm, 1972). The Assembly refers to its past work in this field, namely Recommendation 1863 (2009) on environment and health, Recommendation 1947 (2010) on noise and light pollution, and more generally, Recommendation 1885 (2009) on drafting an additional protocol to the European Convention on Human Rights concerning the right to a healthy environment and Recommendation 1430 (1999) on access to information, public participation in environmental decision-making and access to justice – implementation of the Aarhus Convention.

2. The potential health effects of the very low frequency of electromagnetic fields surrounding power lines and electrical devices are the subject of ongoing research and a significant amount of public debate. According to the World Health Organisation, electromagnetic fields of all frequencies represent one of the most common and fastest growing environmental influences, about which anxiety and speculation are spreading. All populations are now exposed to varying degrees of electromagnetic fields, the levels of which will continue to increase as technology advances.

3. Mobile telephony has become commonplace around the world. This wireless technology relies upon an extensive network of fixed antennas, or base stations, relaying information with radio frequency signals. Over 1.4 million base stations exist worldwide and the number is increasing significantly with the introduction of third generation technology. Other wireless networks that allow high-speed internet access and services, such as wireless local area networks, are also increasingly common in homes, offices and many public areas (airports, schools, residential and urban areas). As the number of base stations and local wireless networks increases, so does the radio frequency exposure of the population.

4. While electrical and electromagnetic fields in certain frequency bands have wholly beneficial effects which are applied in medicine, other non-ionising frequencies, be they sourced from extremely low frequencies, power lines or certain high frequency waves used in the fields of radar, telecommunications and mobile telephony, appear to have more or less potentially harmful, non-thermal, biological effects on plants, insects and animals as well as the human body even when exposed to levels that are below the official threshold values.

5. As regards standards or threshold values for emissions of electromagnetic fields of all types and frequencies, the Assembly recommends that the ALARA or "as low as reasonably achievable" principle is applied, covering both the so-called thermal effects and the athermic or biological effects of electromagnetic emissions or radiation. Moreover, the precautionary principle should be applicable when scientific evaluation does not allow the risk to be determined with sufficient certainty, especially given the context of growing exposure of the population, including particularly vulnerable groups such as young people and children, which could lead to extremely high human and economic costs of inaction if early warnings are neglected.

6. The Assembly regrets that, despite calls for the respect of the precautionary principle and despite all the recommendations, declarations and a number of statutory and legislative advances, there is still a lack of reaction to known or emerging environmental and health risks and virtually systematic delays in adopting and implementing effective preventive measures. Waiting for high levels of scientific and clinical proof before taking action to prevent well-known risks can lead to very high health and economic costs, as was the case with asbestos, leaded petrol and tobacco.

7. Moreover, the Assembly notes that the problem of electromagnetic fields or waves and the potential consequences for the environment and health has clear parallels with other current issues, such as the licensing of medication, chemicals, pesticides, heavy metals or genetically modified organisms. It therefore highlights that the issue of independence and credibility of scientific expertise is crucial to accomplish a transparent and balanced assessment of potential negative impacts on the environment and human health.

2. Draft resolution adopted unanimously by the committee on 11 April 2011.

8. In light of the above considerations, the Assembly recommends that the member states of the Council of Europe:

8.1. in general terms:

8.1.1. take all reasonable measures to reduce exposure to electromagnetic fields, especially to radio frequencies from mobile phones, and particularly the exposure to children and young people who seem to be most at risk from head tumours;

8.1.2. reconsider the scientific basis for the present electromagnetic fields exposure standards set by the International Commission on Non-Ionising Radiation Protection, which have serious limitations and apply "as low as reasonably achievable" (ALARA) principles, covering both thermal effects and the athermic or biological effects of electromagnetic emissions or radiation;

8.1.3. put in place information and awareness-raising campaigns on the risks of potentially harmful long-term biological effects on the environment and on human health, especially targeting children, teenagers and young people of reproductive age;

8.1.4. pay particular attention to "electrosensitive" persons suffering from a syndrome of intolerance to electromagnetic fields and introduce special measures to protect them, including the creation of wave-free areas not covered by the wireless network;

8.1.5. in order to reduce costs, save energy, and protect the environment and human health, step up research on new types of antennas and mobile phone and DECT-type devices, and encourage research to develop telecommunication based on other technologies which are just as efficient but have less negative effects on the environment and health;

8.2. concerning the private use of mobile phones, DECT phones, WiFi, WLAN and WIMAX for computers and other wireless devices such as baby phones:

8.2.1. set preventive thresholds for levels of long-term exposure to microwaves in all indoor areas, in accordance with the precautionary principle, not exceeding 0.6 volts per metre, and in the medium term to reduce it to 0.2 volts per metre;

8.2.2. undertake appropriate risk-assessment procedures for all new types of device prior to licensing;

8.2.3. introduce clear labelling indicating the presence of microwaves or electromagnetic fields, the transmitting power or the specific absorption rate (SAR) of the device and any health risks connected with its use;

8.2.4. raise awareness on potential health risks of DECT-type wireless telephones, baby monitors and other domestic appliances which emit continuous pulse waves, if all electrical equipment is left permanently on standby, and recommend the use of wired, fixed telephones at home or, failing that, models which do not permanently emit pulse waves;

8.3. concerning the protection of children:

8.3.1. develop within different ministries (education, environment and health) targeted information campaigns aimed at teachers, parents and children to alert them to the specific risks of early, ill-considered and prolonged use of mobiles and other devices emitting microwaves;

8.3.2. ban all mobile phones, DECT phones or WiFi or WLAN systems from classrooms and schools, as advocated by some regional authorities, medical associations and civil society organisations;

8.4. concerning the planning of electric power lines and relay antenna base stations:

8.4.1. introduce town planning measures to keep high-voltage power lines and other electric installations at a safe distance from dwellings;

8.4.2. apply strict safety standards for sound electric systems in new dwellings;

8.4.3. reduce threshold values for relay antennas in accordance with the ALARA principle and install systems for comprehensive and continuous monitoring of all antennas;

8.4.4. determine the sites of any new GSM, UMTS, WiFi or WIMAX antennas not solely according to the operators' interests but in consultation with local and regional government officials, local residents and associations of concerned citizens;

8.5. concerning risk assessment and precautions:

8.5.1. make risk assessment more prevention oriented;

8.5.2. improve risk-assessment standards and quality by creating a standard risk scale, making the indication of the risk level mandatory, commissioning several risk hypotheses and considering compatibility with real life conditions;

8.5.3. pay heed to and protect “early warning” scientists;

8.5.4. formulate a human rights oriented definition of the precautionary and ALARA principles;

8.5.5. increase public funding of independent research, *inter alia* through grants from industry and taxation of products which are the subject of public research studies to evaluate health risks;

8.5.6. create independent commissions for the allocation of public funds;

8.5.7. make the transparency of lobby groups mandatory;

8.5.8. promote pluralist and contradictory debates between all stakeholders, including civil society (Aarhus Convention).

B. Explanatory memorandum by Mr Huss, rapporteur

1. Introduction

1. Electromagnetic fields, whether emitted by high-voltage lines, domestic appliances, relay antennas, mobile telephones or other microwave devices, are increasingly present in our techno-industrial environment.

2. Obviously, in evolutionary terms, living or working in artificial electromagnetic extremely low frequency and high frequency fields, on top of the electromagnetic fields naturally occurring in the environment, is still a relatively new experience for human beings, fauna and flora. It goes back no further than fifty years or so, when intensive industrial and domestic exposure began with radars, radio waves and televisions and electromagnetic fields generated by high-voltage lines and household electrical appliances.

3. It was only from the 1990s onwards that the new telephony and wireless mobile communication technologies began to boom ever faster Europe-wide and even worldwide thanks to increasingly diverse and sophisticated applications: mobile telephones, cordless telephones, WiFi, WLAN (wireless local area network), etc.

4. The term "electromagnetic fields" covers all the fields emitted by natural and man-made sources. A distinction is drawn between static fields and alternating fields. In the latter case there is essentially a differentiation between extremely low frequency (ELF) fields, such as domestic electricity, and hyper-frequency (HF) fields, which include mobile telephones. Electrical fields are measured in volts per metre (v/m), whereas magnetic fields are measured in terms of current-induced exposure in microteslas (µt). Since very weak electrical currents are part of human physiology, at the level of communication between cells for example, the question of the possible disruptive effects of present levels of artificial exposure on the human environment and any consequences they might have for health may legitimately be raised.

5. It should be noted with satisfaction that a major contribution was made by the technological innovations resulting from electrification and new radio-telecommunication techniques to economic growth and the material well-being of the populations of industrialised countries. Domestic appliances, for example, have greatly helped to lighten the load from everyday chores in millions of households and played a not inconsiderable role in the women's liberation movement.

2. Background to the debate

6. Nevertheless, it must be said that, since some of these new technologies were first introduced, environmental or health problems have emerged and become a topic of discussion in certain countries, both in scientific circles and in the field of health and occupational medicine. From the 1930s onwards, radar waves were linked to certain "microwave syndromes" among operators and technicians subjected to intensive and prolonged exposure. The former USSR and Eastern bloc countries adopted very low preventive thresholds aimed at protecting operators' health.

7. In the United States and western Europe, discussion of potential harm to health resulting from electromagnetic fields focused, in the 1970s and 1980s, essentially on the problem of high- or very high-voltage lines and protection in the workplace (for those working on computers, in electrically powered steelworks, etc). As far as the risks from high-voltage lines are concerned, an American epidemiological study (Wertheimer and Leeper, 1979) demonstrated a link between the proximity of high-voltage lines and child leukaemia, corroborated in 2001 by the International Agency for Research on Cancer (IARC), which classified these fields as "possibly carcinogenic to humans" (category 2B). At the same time, from the early 1980s onwards, another issue relating to electromagnetic fields and chemical pollution was raised at international conferences: discomforts due to office computer screens, health effects in the form of headaches, fatigue and eye and skin problems. Regarding the electromagnetic aspect of those effects, stringent preventive standards (TCO standards) were proposed at the beginning of the 1990s by the Swedish Confederation of Employees and then widely adopted.

8. The 1990s saw a boom in mobile telephony and its rapid expansion, first in the industrialised countries and then increasingly in the developing countries of Africa, Asia and Latin America.

9. Mobile telephony and ever more sophisticated wireless telecommunication applications have not only been taken on board in professional spheres but have also quite literally invaded our private life. This affects even very young children, at home, at school, on transport, etc.

3. Growing concerns in Europe

10. However, for a good ten years or so, Europe's populations have begun to show increasing concern over the potential health risks of mobile telephony, with reliable information on these questions in short supply. In a recent Eurobarometer study (European Commission), 48% of Europeans stated that they were concerned or very concerned over the potential health risks posed by mobile telephony. The presumption of risk was noted among 76% of Europeans concerning relay antennas and 73% concerning the potential effects of mobile telephones, respectively.

11. Such concerns over electromagnetic fields or waves have triggered the emergence and growth of a multitude of citizens' initiatives in many countries. These initiatives are mostly directed against the installation of relay antenna stations, above all close to schools, nurseries, hospitals or other institutions caring for children or vulnerable individuals. They also increasingly have challenged other aspects of wireless telecommunication such as WiFi in schools, for example.

12. The Committee on the Environment, Agriculture and Local and Regional Affairs organised two hearings with experts on 17 September 2010 and 25 February 2011.

13. At the first hearing of experts, Mr Ralph Baden of the Occupational Medicine Department of the Ministry of Health of the Grand-Duchy of Luxembourg spoke generally about the issue of very low frequency and high frequency electromagnetic fields and waves and the respective applicable threshold values. He listed the different sources of those electromagnetic fields outside dwellings: relay antennas, high-voltage lines, radio stations, television, radars, etc., but laid special emphasis on the results of measurement readings, on sources of such fields in homes or public buildings and provided concrete examples of simple and practical means of reducing exposure to these "indoor" fields and eliminating certain health problems, such as headaches, insomnia, coughs, depression, etc.

4. Effects on the environment: plants, insects, animals

14. At the same hearing of experts, Dr Ulrich Warnke of the Institute of Technical Biology and Bionics in Saarbrücken described the biological effects of certain microwave frequencies on plants. Depending on the frequencies, their intensity and modulation and the length of exposure, scientific studies demonstrated stress reactions and disruptions of gene expression. Recent studies by the cellular biology laboratory of Clermont-Ferrand University (2007), for example, clearly show the effects of mobile telephony microwaves on plant genes, in particular tomato plants.

15. Other scientific international studies show comparable stress reactions in certain types of beans, as well as deciduous and coniferous trees exposed to various frequencies (relay antennas, TETRA frequency).

16. Dr Warnke highlighted the innate magnetic compass used by certain animals or insects to orient themselves in time and space and which dictates the internal functioning of their organism, before going on to demonstrate how extremely weak artificial fields or waves could adversely affect the sense of direction, navigation and communication of certain animals or insects: migratory birds, pigeons, certain kinds of fish (sharks, whales, rays) or certain insects (ants, butterflies and especially bees). He suggested that malfunctions induced by artificial electromagnetic waves might be one of the major causes – besides problems of exposure to chemicals – of repeated incidents of whales being washed up on beaches or the death or disappearance of bee colonies (colony collapse disorder) observed in past years.

17. The great multitude of scientific studies quoted during the hearing of experts should certainly prompt policymakers to reflect on their decisions and act accordingly. One final aspect mentioned during the hearing concerned the potentially pathogenic effects observed in livestock – calves, cows, horses, geese, etc. – following the installation of mobile telephone masts nearby: unaccountable deformities of new-born calves, cataracts, fertility problems.

18. In the face of fast-growing concerns and opposition in many Council of Europe member states, the response of top executives of electricity companies and mobile telephone operators is to deny that their industrial and commercial activities have any adverse effect on human health. At the hearing in Paris on 25 February 2011, the official representatives of French and European mobile telephone operators passionately argued that the official threshold values applicable in most countries in the world were adequate to protect human beings from the thermal effects of mobile telephones and that any biological effects, if these could be demonstrated, would not have any adverse effects on human health.

19. To back up their argument, the experts quoted the scientific assessments carried out by associations such as the International Committee on Non-Ionisation Radiation Protection (ICNIRP), a small private NGO near Munich, or by official organisations: the World Health Organization, the European Commission and a number of national protection agencies. It appears that these European and national organisations or international bodies have based their thinking on the threshold values and recommendations advocated by the ICNIRP when that private association was set up near Munich at the beginning of the 1990s.

20. Yet, at the same hearing, leaders of associations of citizens and representatives of the NGOs, such as *Robin des toits*, laid heavy emphasis on the numerous risks and harmful biological effects and related health problems which they believed to be linked to electromagnetic fields or waves from mobile telephony, relay antennas, high-voltage lines and other artificially generated electromagnetic fields, even at very low levels that were well below the officially applicable threshold values.

21. The representative of the European Environment Agency in Copenhagen, an official advisory body to the European Union, stressed the importance of the precautionary principle written into the European treaties and accordingly pointed to the need for effective preventive measures to protect human health and avoid painful health issues or scandals of the kind already experienced over asbestos, tobacco smoking, lead and PCBs (polychlorobiphenyls), to name but a few. He presented a convincing analysis of the scientific assessment methods currently used and the different levels of evidence to conclude, on the basis of the "Bioinitiative" scientific report and other more recent studies by the Ramazzini Institute in Bologna, that the indices or levels of proof were sufficient at this stage to prompt action by governments and international bodies.

22. Finally, another expert specialising in clinical medicine and oncology confirmed, on the basis of the findings of biological and clinical analysis of several hundred French patients describing themselves as "electrosensitive", that a syndrome of intolerance to electromagnetic fields (SIEMF) does exist and that those people are not feigning illness or suffering from psychiatric disorders.

5. Biological effects of electromagnetic fields in medicine

23. It has been established since the beginning of the 20th century that electromagnetic fields operating at various frequencies can have useful and beneficial effects in clinical medicine, whether for diagnosis or treatment.

24. Scientific developments since the Second World War have revealed that the human organism does not function solely on the basis of biological or biochemical cellular reactions but that humans also function using electromagnetic forces. It is now well known that nerve cells communicate between one another using electrical impulses. The most powerful electrical signals detected in humans are those generated by nervous and muscular activity. In the case of the heart, which is the most important muscle group in the body, an electrocardiogram (ECG) diagnoses cardiac function by recording the electrical signals emitted by it–. Again at the level of diagnosis, electroencephalography (EEG) allows non-invasive monitoring of the brain's electrical activity. The EEG has been widely used in the clinical areas of brain disorders, sleep pattern monitoring and confirmation of clinical death.

6. Therapeutic use of electric currents or electromagnetic waves

25. Without going into detail, the rapporteur wishes to point out that certain electrical currents or electromagnetic waves used at certain frequencies may have a perfectly beneficial effect in medical terms. There are a number of examples illustrating the therapeutic benefits of electrotherapy: clinical effects of direct electric currents (electrolysis), clinical effects of external electrical impulses on the cardiac muscle (defibrillators, pacemakers), clinical effects of micro-currents generated by pulsed magnetic fields to improve healing in tissue repair and bone fractures, to mention only the best known of these non-ionising frequency band applications.

26. But while electrical and electromagnetic fields in certain frequency bands have fully beneficial effects, other non-ionising frequencies, be they sourced from extremely low frequencies, power lines or certain high frequency waves used in the fields of radar, telecommunications and mobile telephony, appear to have more or less potentially harmful biological effects on plants, insects and animals as well as the human body even when exposed to levels that are below the official threshold values.

7. Technological progress and economic growth at the expense of environment and health protection

27. It should be noted that the problem of electromagnetic fields or waves and the potential consequences for the environment and health has clear parallels with other current issues, such as the licensing of chemicals, pesticides, heavy metals or genetically modified organisms (GMOs), to mention only the best known examples. It is certain that one cause of public anxiety and mistrust of the communication efforts of official safety agencies and governments lies in the fact that a number of past health crises or scandals, such those involving asbestos, contaminated blood, PCBs or dioxins, lead, tobacco smoking and more recently H1N1 flu, were able to happen despite the work or even with the complicity of national or international agencies nominally responsible for environmental or health safety.

28. Indeed, it is in this connection that the Committee on the Environment, Agriculture and Local and Regional Affairs is currently working on the question of conflicts of interest and the urgent need for real independence of scientists involved in the official agencies tasked with evaluating the risks of products prior to licensing.

29. The rapporteur underlines in this context that it is most curious, to say the least, that the applicable official threshold values for limiting the health impact of extremely low frequency electromagnetic fields and high frequency waves were drawn up and proposed to international political institutions (WHO, European Commission, governments) by the ICNIRP, an NGO whose origin and structure are none too clear and which is furthermore suspected of having rather close links with the industries whose expansion is shaped by recommendations for maximum threshold values for the different frequencies of electromagnetic fields.

30. If most governments and safety agencies have merely contented themselves with replicating and adopting the safety recommendations advocated by the ICNIRP, this has essentially been for two reasons:

– in order not to impede the expansion of these new technologies with their promise of economic growth, technological progress and job creation;

– and also because the political decision-makers unfortunately still have little involvement in matters of assessing technological risks for the environment and health.

31. With regard to the frequently inconclusive if not contradictory findings of scientific research and studies on the possible risks of products, medicines or, in this case, electromagnetic fields, a number of comparative studies do seem to suggest a fairly strong correlation between the origin of their funding – private or public – and the findings of risk assessments, a manifestly unacceptable situation pointing to conflicts of interest which undermine the integrity, the genuine independence and the objectivity of scientific research.

32. Concerning the assessment of health risks resulting from mobile telephone radio frequencies, for example, in 2006 Swiss researchers from Bern University presented the findings of a systematic analysis of all research results and concluded that there was a strong correlation between how the research was funded and the results obtained: 33% of studies funded by industrial concerns conclude that exposure to mobile telephone radio frequencies has an effect on our organism. That figure rises to over 80% in studies carried out with public funding.

33. Accordingly, in this field and in others, one should call for genuine independence on the part of the expert appraisal agencies and for independent, multidisciplinary and properly balanced expert input. There must no longer be situations where whistleblowers are discriminated against and renowned scientists with critical opinions are excluded when experts are selected to sit on expert committees or no longer receive funding for their research.

8. Contending forces and arguments: the dispute over the incidence of biological effects and over threshold values

34. It seems obvious that economic and financial parameters such as profits and market shares are the prime considerations for societies dependent on electricity, mobile telephony and telecommunication. Understandably, in this context more stringent regulations and threshold values which ostensibly inhibit their business dealings are viewed with disfavour and forcefully resisted – as could be seen from the irritated and sometimes emotional statements of a representative of French mobile telephony at our committee's hearing for contrastive expert opinion.

35. The representatives of mobile telephony have for years espoused the same paradigm and the same line of argument, in which they invoke the soothing discourse of most international agencies and institutions. For example, the threshold values of 100 microtesla for low or high frequency electromagnetic fields and

41/42 volts/metre for the very high frequencies of mobile telephony on 900 megahertz (MHz) are claimed to be quite adequate for protecting the public against thermal effects. At very high levels, the radio frequency fields are plainly liable to produce harmful thermal effects on the human body, in the estimation of all parties moreover.

36. Of course there remains the vexing question whether there are non-thermal or athermic, hence biological, consequences for the environment and the human body. The operators' representatives totally deny the existence of nefarious long-term biological effects for electromagnetic fields below the threshold values in force. To illustrate the nature and extent of these threshold values, let us mention by way of an example Article 5.1 of Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 concerning the minimum standards for protecting workers: "… However, the long-term effects, including possible carcinogenic effects due to exposure to time-varying electric, magnetic and electromagnetic fields for which there is no conclusive scientific evidence establishing a causal relationship, are not addressed in this Directive. …" (Introduction, paragraph 4).

37. So the protection of workers is only valid for averting thermal effects, and only in the short term!

38. Any potentially harmful biological effects are disregarded by the operators, agencies and official regulations, and to justify this attitude they abide by the contention that firstly, the ascertainment of a biological effect need not signify its being of a pathological character dangerous to the human constitution. Furthermore, they discern no absolutely conclusive scientific evidence of a cause and effect relationship between electromagnetic fields and radio frequencies and long-term pathological consequences of their non-thermal or athermic effects. And to emphasise these statements they invoke numerous scientific publications said to indicate no significant biological effect.

39. The operators' arguments on the whole can be summed up as follows:

– the threshold values recommended by the ICNIRP are values ensuring health security;

– child mobile phone users are no more sensitive than adults;

– there are no significant biological effects apart from thermal effects;

– if there were any possibly harmful biological effects, moreover, there would be no scientifically acceptable mechanism of action to account for them.

9. Scientific studies and arguments pursued by associations and NGOs, by groupings of scientists, by the European Environment Agency and by the European Parliament

40. Serious scientific and medical studies revealing biological effects of a pathological nature have existed since the 1930s concerning radio frequencies and microwaves from radar installations. Studies in the late 1970s also pointed out the harmful effects of protracted exposure to the low or very low frequency electromagnetic fields of electrical transmission lines or computer screens. .The WHO's IARC (International Agency for Research on Cancer) classified these fields as "possibly carcinogenic" for humans (Group 2B) in 2001.

41. The rapporteur recalls the proven positive biological effects of certain medical applications (electrotherapies) of electromagnetic fields and microwaves at very low intensity. If there are such beneficial effects in certain frequency bands, then adverse biological effects on the human body should be just as much in the realm of plausibility or possibility.

42. Scientific studies concerning the negative effects of certain microwave frequencies on plants, insects and wildlife or farm animals are disturbing in more than one respect and the scientific studies disclosing potentially pathogenic biological effects on the human body are also important and not to be merely brushed aside.

43. These studies are very numerous indeed: the 2007 "Bioinitiative" report analysed over 2 000 of them, and more were added by an important monograph published in 2010 by the Ramazzini Institute, the national institute for study and control of cancer and environmental diseases in Bologna, Italy.

44. A significant number of top scientists and researchers have banded together in a dedicated international body entitled ICEMS, "International Commission for Electromagnetic Safety", in order to carry out independent research and recommend that the precautionary principle be applied in the matter. In 2006 (Benevento Resolution) and 2008 (Venice Resolution), these scientists published instructive resolutions calling for the adoption of far tougher new safety standards and rules.

45. Scientific studies disclose athermic or biological effects of electromagnetic fields or waves on cells, the nervous system, genetics, etc., which essentially fall into three categories: biological effects influencing the metabolism, sleep, the electrocardiogram profile; effects observed in experimentation on animals or in cell cultures (in vitro); effects emerging from epidemiological studies on prolonged use of mobile telephones or on living near high voltage power lines or base stations of relay antennas.

46. The term "biological effect" is used to refer to a physiological, biochemical or behavioural change brought about in a tissue or a cell in response to an external stimulus. Not every biological effect necessarily poses a serious threat to health; it may simply show the normal response of the cell, tissue or organism to that stimulus.

47. A medical or pathological biological effect, on the other hand, is an effect that may imperil the organism's normal functioning by causing more or less severe symptoms or pathologies. Precisely, a growing number of scientific studies made by teams of high-level academic researchers demonstrate the existence of potentially or definitely pathological biological effects.

48. The rapporteur acknowledges that it is not possible within the compass of this report to analyse and summarise the findings of all these studies. A synopsis of the greater number of them (some 2 000) was produced in the "Bioinitiative" report, a report drawn up by 14 scientists of international standing who concurred, regarding mobile telephony and other radio frequencies, as to abnormally high incidence of brain tumours and acoustic neuroma, effects on the nervous system and cerebral functions, and effects on genes, cell stress proteins and the immune system. In this context, it has been observed for instance that radio frequency exposure can cause inflammatory and allergic reactions and impair the immune function even at levels well below the norms of exposure for the public.

49. A major programme of research into the specific features of these effects such as genotoxicity of waves (REFLEX programme), funded by the European Commission and involving 12 European research teams, was launched and the results were made public in December 2004. The conclusions of the report were disturbing on several counts as the results bore out genotoxic effects of mobile telephone waves, and in particular greater frequency of chromosomal deletions and breakup of DNA molecules in different types of cultivated human and animal cells. In addition, stress protein synthesis was greatly increased and gene expression was modified in various types of cells.

50. Concerning the Interphone study, the biggest epidemiological survey was carried out on mobile phone users and their exposure to glioma, meningioma, acoustic neuroma and tumours of the parotid gland after protracted use of their mobile telephones. The partial early results published on 18 May 2010 by IARC more than ten years after the commencement of the study pointed to profound disagreement between the different teams of researchers (16 teams from 13 countries) over the interpretation of these results. The study co-ordinator, Ms Elisabeth Cardis, summed up a kind of compromise by saying that the study did not reveal an increased risk, but one could not conclude that there was no risk because there were sufficient results suggesting a possible risk. Indeed, some results show that lasting intensive use very significantly increases the risks of glioma (40% and even 96% looking at ipsilateral use, that is to say where the glioma has appeared at the side of the head to which the telephone was held) and the meningioma risks (15%; 45% for ipsilateral use).

51. The rapporteur feels that one of this epidemiological study's principal weaknesses lies in the fact that the period of mobile phone use analysed, extending until the early years of the 21st century, is probably too short at less than 10 years to reach conclusive results given the period of latency and growth of cerebral tumours. In fact, ionising radiation (radioactivity) is recognised as a cause of brain cancer, but cases due to radioactivity rarely become apparent before 10 or 20 years of exposure.

52. The Interphone study, performed solely on adults, nevertheless raises serious speculation as to what will happen, after 15 or 20 years of intensive use, to the young adults, teenagers or even children who are currently the biggest users and in whom absorption of the radiation is still greater and more problematic.

53. The rapporteur would like to emphasise another side of the potential risks: while attention is focused at present on the radiation from mobile phones, and while he appeals for the wisest possible use of this device, by children and young people especially, it is inescapable that for some years there have been many other sources of electromagnetic fields and radio frequencies.

54. Whether outside or inside offices and dwellings, we are now exposed to a whole variety of electromagnetic frequencies on top of the chemical pollutants in the air that we breathe or accumulated in the food chain. Outdoors or indoors, we encounter the electromagnetic fields or the radio frequencies of the

(nearby) electric power lines and of the base stations of GSM, UMTS and WiFi relay antennas or of, for example, radio or radar stations. Besides these, inside offices or private residences there is very often the radiation of cordless telephones (DECT), baby phones and other devices of wireless technology.

55. What is more, industrialists seek a further expansion of mobile telephony infrastructures for hosting the fourth generation (4G) facility with the intention of delivering a secure, comprehensive broadband mobile system for the cordless modems of laptop computers, "smart" mobile phones and other portable backup devices for broadband mobile Internet access, games services, etc.

56. In Israel, the ministries concerned (environment, health, communication) fall back on the application of the precautionary principle, opposing the introduction of these new infrastructures on the grounds that the effects of the irradiations should be verified before authorising new systems.

57. A question that always strongly arouses the European populations is the problem of where base stations and relay antennas are sited. In parallel to certain local or regional studies (mainly Swiss and German), describing the advent of health problems in farm animals after the installation of mobile telephone relay antennas near some farms, describing unaccountable problems of infertility, deformity, cataracts, etc., certain local or regional epidemiological studies, carried out by groups of scientists and doctors, have succeeded in also showing certain disease symptoms in residents of districts or villages near relay antennas installed a few months or years ago. These local studies were carried out in France, Germany, Switzerland, Austria, etc.

58. According to these epidemiological and also partly clinical studies, symptoms of sleeping disorders, headaches, blood pressure problems, dizziness, skin trouble and allergies appeared or increased some time after relay antennas were commissioned or their beams intensified. by raising the number or the power of the antennas. The scientific value of such local studies is regularly queried by the operators and very often the security and regulatory bodies too, and so a most recent study released early in 2011 in a German medical publication (Umwelt-Medizin-Gesellschaft 1/2011) is nonetheless worthwhile and revealing, although the number of participants in the study (60 persons) remains quite small. These persons, from the locality of Rimbach in Bavaria, underwent analysis before a new relay antenna base station came into service in January 2004, then afterwards in July 2004, January 2005 and July 2005. In this study, as in similar epidemiological studies, the symptoms that increased or became aggravated after the station began operating were sleep disorders, headaches, allergies, dizziness, and concentration problems.

59. Doctors and scientists measured and determined significant changes in concentrations of stress-related and other hormones in urine samples. There was a significant increase of adrenalin and noradrenalin over several months and a significant reduction of dopamine and phenylethylamine (PEA), changes indicating a state of chronic stress which, according to the authors of the study, caused the aforesaid heightened symptoms. The authors correlate the lowered PEA levels with impaired attention and hyperactivity in children, disorders which significantly increased in Germany from 1990 to 2004.

60. Here, too, the rapporteur stresses that some people may be more sensitive than others to electromagnetic radiation or waves. The research performed, for instance, by Professor Dominique Belpomme, President of the Association for Research on Treatments Against Cancer (ARTAC), on more than 200 people describing themselves as "electrosensitive" succeeded, with corroborative results of clinical and biological analyses, in proving that there was such a syndrome of intolerance to electromagnetic fields across the whole spectrum of frequencies. According to these results, not only proximity to the sources of electromagnetic emissions was influential, but also the time of exposure and often concomitant exposure to chemicals or to (heavy) metals present in human tissues. In this context, Sweden has granted sufferers from electromagnetic hypersensitivity the status of persons with reduced capacity so that they receive suitable protection.

61. In connection with the proven or potential risks of electromagnetic fields, it should also be noted that after a Lloyd's report, insurance companies tended to withhold coverage for risks linked with electromagnetic fields under civil liability policies, in the same way as, for example, genetically modified organisms or asbestos, which is hardly reassuring given the potential risks that stem from these electromagnetic fields.

62. Finally, the rapporteur wonders whether it might not be expedient and innovative to try and develop new wireless communication technologies, equally powerful but more energy-efficient and above all less problematic in terms of the environment and health than the present microwave-based wireless communication. Systems such as optical or optoelectronic communication technologies employing visible and infrared light are reportedly being developed in the United States and Japan and could largely replace the present technologies. Should such changes in transmission and communication systems prove realistic, it would then be a case of technological and economic innovations not to be missed or obstructed.

10. Conclusions

63. The potentially harmful effects of electromagnetic fields on the environment and human health have not yet been fully elucidated and a number of scientific uncertainties continue to exist in that regard. Nevertheless, anxieties and fears over the health hazards posed by the waves remain in wide sectors of the population, as do the demands voiced by high-level scientists, by groupings of doctors and by the associations of concerned citizens which abound in many Council of Europe member states.

64. The precautionary principle and the right to a healthy environment, particularly on behalf of children and future generations, must be key factors in all economic, technological and social development of society. In that regard, the Parliamentary Assembly has decided on several previous occasions (see Recommendation 1863 (2009) on environment and health: better prevention of environment-related health hazards and Recommendation 1959 (2011) on preventive health care policies in the Council of Europe member states) that coherent, effective preventive measures must be taken to protect the environment and human health.

65. After analysing the scientific studies available to date, and also following the hearings for expert opinions organised in the context of the Committee on the Environment, Agriculture and Local and Regional Affairs, there is sufficient evidence of potentially harmful effects of electromagnetic fields on fauna, flora and human health to react and to guard against potentially serious environmental and health hazards.

66. That was moreover already the case in 1999 and 2009 when the European Parliament overwhelmingly passed resolutions upholding the precautionary principle and efficient preventive actions vis-à-vis the harmful effects of electromagnetic fields, in particular by substantially lowering the exposure thresholds for workers and the general public according to the ALARA principle, by restoring genuine independence of research in that field, and through a policy of enhanced information and transparency towards the anxious populations (see European Parliament Resolution of 2 April 2009 on health concerns associated with electromagnetic fields, 2008/2211 INI).

67. Lastly, the Assembly could endorse the analyses and warnings issued first in September 2007, then in September 2009, by the European Environment Agency (EEA), concerning the health hazards of electromagnetic fields, mobile telephony and not least mobile phones. According to the EEA, there are sufficient signs or levels of scientific evidence of harmful biological effects to invoke the application of the precautionary principle and of effective, urgent preventive measures.