



ELF Policies worldwide - Protection of General Public

Developing and Implementing Protective Measures for
ELF EMF

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Main Objectives of the Regulator

- Protection from adverse health effects of ELF electric and magnetic fields.
- Considerations:
 - Scientific evidence;
 - Public concerns;
 - Costs and benefits.

Range of actions

- No formal action/policy.
- Communication.
- Promotion of research.
- Maintaining status-quo in terms of limiting exposure to ambient.
- Incentives for reducing exposure. Voluntary compliance with proposed policy “soft regulation”
- Quantitative standards of increasing severity. Below, at, or above the international guidelines.

ELF guidelines/ standards/ recommendations

- ICNIRP - International Commission on Non Ionizing Radiation Protection (1998); IRPA (1990).
- IEEE – The Institute Of Electrical and Electronics Engineers (2002).
- EU recommendation on EMF Public exposures (July 1999/519)

Minimal interference

Countries without a formal ELF policy:

Armenia, Bahrain, Canada, India, Kazakhstan, Malaysia, Mongolia, Thailand, USA and Uzbekistan.

Voluntary adoption of International Guidelines

Countries that have *de facto* adopted ICNIRP guidelines, but do not enforce them:

Australia, Austria, Belgium, Brazil, Denmark, Finland, France, Ireland, Latvia, Luxemburg, Malta, Netherlands, New Zealand, Singapore, South Africa, South Korea, Spain, Sweden, Taiwan, the United Kingdom and Venezuela.

Countries incorporating International Guidelines into legislation

- Following 1999/519/EC recommendation, some countries incorporated a protection framework based on ICNIRP into their national legislation. These include: [Austria](#), [Finland](#), [Greece](#) and [Portugal](#)
- Some countries that have recently joined the EU have adjusted their national guidelines to EC recommendation. Originally their guidelines were more stringent. These include: [Czech Republic](#), [Croatia](#), [Estonia](#) and [Hungary](#).
- [Norway](#).

Certain countries adopting international guidelines (voluntarily or into their legislation) also incorporate the PP.

Countries with stricter policies

Certain countries adopted stricter guidelines based on “alternative” scientific evidence, such as:

- **Argentina** 25 μT
- **China** 0.5mA/m² basic restriction
- **Japan** 3kV/m
- **Poland** 48 μT ; 1kV/m
- **Russia** 50 μT ; 500V/m in houses, 1kV/m outdoors

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Precautionary Principle

- Risk management policy applied in circumstances where there is scientific uncertainty.
- What does this mean practically?



Countries with precautionary limits

The following countries have incorporated the PP into national legislation and established stricter numeric guidelines:

- **Switzerland 1999:** Fixed installation limit - 1 μ T in sensitive areas. Precautionary limits based on the the lowest level of exposure possible taking into consideration technical and economic considerations, exemptions for new installations granted on technical or cost grounds, not applicable to old installations with optimized phasing .
- **Italy 2003:**
 - 3 μ T new installations, new homes;
 - 10 μ T existing- sensitive areas (> 4h/day);
 - 100 μ T other.

Precautionary limits

- Israel:
 - 100 μT health limit (WHO/EC recommendation)
 - In addition environmental guideline:
 - 1 μT (24h average) (2001-2004)
 - No “numeric” guideline (2005): Precautionary measure: “*Measures be taken to significantly reduce the number of residents, in general, and children, in particular, that are continuously or even temporarily exposed to magnetic fields from the electricity network that exceed the values cited in the professional literature as possibly causing increased health risks*”. **Meaning:** reduce exposure to levels under 0.3-0.4 μT .
 - Establishment of a 0.2 μT lower limit? (2005)

Other forms of Precautionary policies

- **Keeping status quo:** installing new facilities so as not to produce higher fields than the existing lines. Some states in the US: [Florida](#) and [Minnesota](#).

Other forms of Precautionary policies

Reducing exposure :

- Advice:
 - At low or minimal cost : *“Minimizing, as appropriate, ELF and/or static electric and magnetic field exposure, provided this can be readily achieved without undue inconvenience and at reasonable expense. Any such precautionary measures should follow good engineering and risk minimization practice. Planning practice and relevant codes of practice should also be followed. Precautionary measures should be proportional to the risk. (e.g.. Additional precautions may be considered appropriate). The incorporation of arbitrary additional safety factors beyond the exposure limits of this Standard is not supported.”* **(draft Australian Standard 2007)**
 - Reducing exposures *“radically deviating from what would be considered normal”* at *“reasonable expense and with reasonable consequences in all other aspects”*. **Sweden 1996, 2005**
 - Reducing exposure to levels as low as practically achievable - 0.4 μT as a level for elucidation. **Norway 2005**

Other forms of Precautionary policies

○ Reducing exposure

- Establishing a budget for exposure reduction:
 - Up to 4% of project cost spent on field mitigation, provided 15% field reduction can be achieved: [California](#)
 - Annual budget of \$2M: [Israel](#)

Precautionary policies - Planning regulations

- **Limiting the construction** of new facilities within a certain distance of sensitive areas (e.g. residential buildings, schools, hospitals)
 - Residential areas
 - Children: Schools, Day care centers
 - General advice

Planning regulations - Residential

- **Limiting distance**

- In [Ireland](#), the Electric Company does not build new transmission lines or substations closer than 22 meters from an existing building or permit anyone to build within this distance.
- In [Luxembourg](#). Ministry of Internal Affairs recommends not to create new residential areas in vicinity of high voltage overhead power lines (30m). This recommendation does not restrict construction in existing residential areas.
- In [Connecticut](#) buffer zones for new overhead transmission lines 345kV or above.
- In [Israel](#) new lines are not granted a building permit unless they are at least at a distance of 35m - 400kV ; 20m-161kV; 3m -110kv, 3m -11-36kV. Indoor transformers - 3m from wall shared by residential room.

- **Requiring a limit**

- In the [Slovenia](#), limit of 10 μ T for new power facilities >1kV.

Planning regulations – Children: Schools/ day care centers

- **Limiting distance**

- In [Ireland](#). The local government does not grant construction permits for new electrical power installations in vicinity of schools and daycare centers.
- In [California](#), setback limits for locating any part of a school property line near the edge of easements for any electric power lines above 50kV (e.g. 50- 133kV - 100ft; 220-230kV – 150 ft; 500-550kV -350ft).

- **Requiring a limit**

- In the [Netherlands](#), increase in the distance to new facilities so that average exposure to children will not exceed 0.4 μ T. No change to existing facilities is recommended.

Planning regulations – general advice

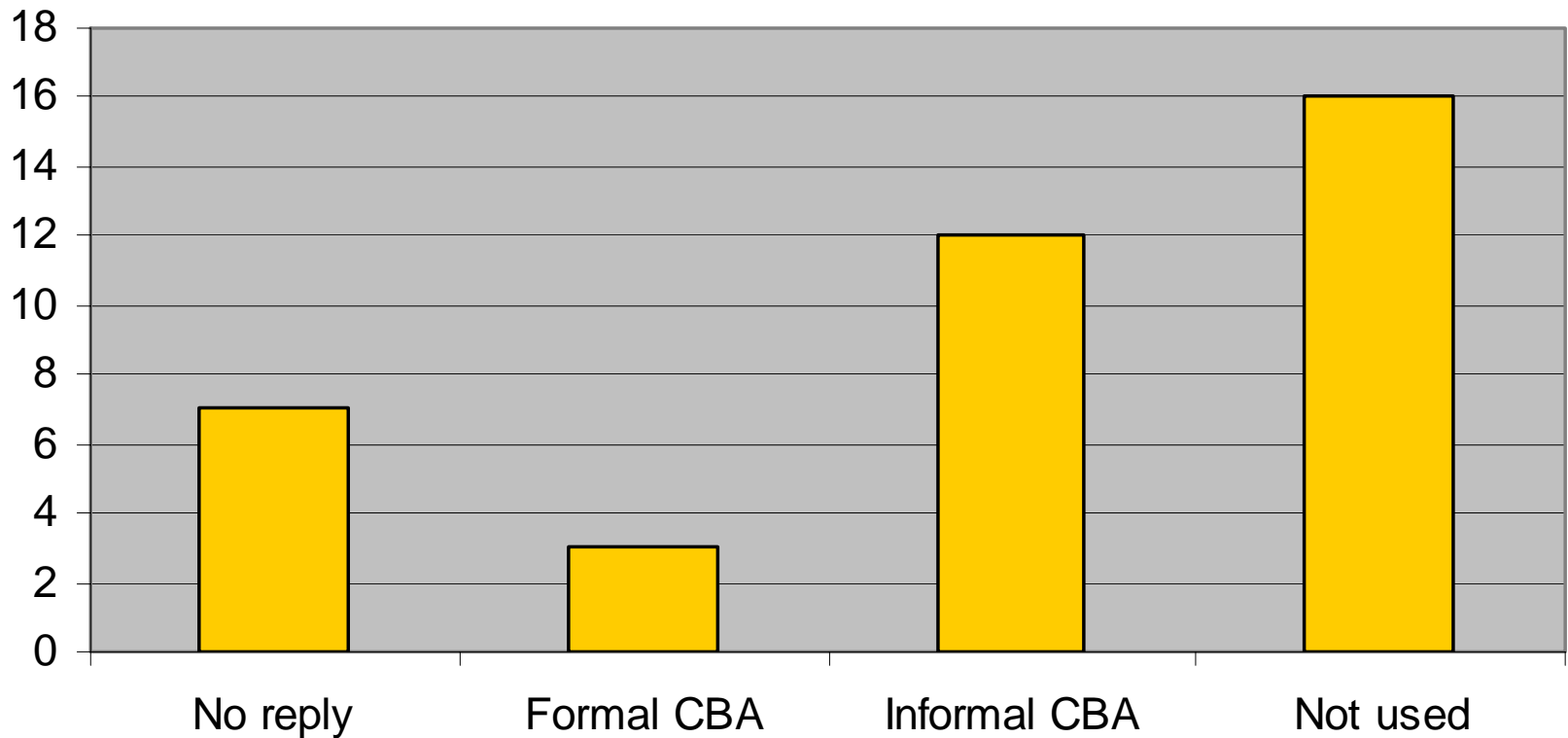
- Prudent avoidance for new power lines: California, Colorado, Connecticut, Maryland, New Jersey, Hawaii, Ohio and Pennsylvania
- Public involvement in locating sites for future facilities: Ireland, Italy and Netherlands.
- Agreement between industry, government and local municipalities as to siting of facilities: Netherlands and United Kingdom.

Use of Cost Benefit Analysis (CBA)

- Cost-benefit analysis is a rational framework to determine the most effective use of limited resources.
- The goal is that society does not devote too much of its resources to one issue, which creates more harm in the neglected areas than the benefit it creates.
- It is a way of assessing the appropriate response to a health or safety issue.

Use of Cost Benefit Analysis (38 countries)

Number of Countries in Each Category



Overview

Of the 52 countries that are members of the WHO International EMF project:

36 adopted the ICNIRP guidelines, while 16 adopted a more stringent policy.

WHO data <http://www.who.int/docstore/peh-emf/EMFStandards>

Several countries are in the process of formulating or changing their national ELF policies and some are formulating a legislative framework to enable better implementation /enforcement of their policies.

Policy	Countries (Non exhaustive)
No policy	Armenia, Bahrain, Belgium, Canada, India, Kazakhstan, Malaysia, Mongolia, Thailand, USA, Uzbekistan. Other countries
ICNIRP - voluntary	Australia, Brazil, Denmark, France, Ireland, Latvia, Luxemburg, Malta, Netherlands, New Zealand, Singapore, South Africa, South Korea, Spain, Sweden, Taiwan, United Kingdom, Venezuela.
ICNIRP - legislation	Austria, Finland, Czech Republic, Croatia, Estonia, Greece, Hungary, Norway, Portugal.
Stricter limits than ICNIRP	Argentina, China, Japan, Poland, Russia.

Precautionary policy	Specific Actions	Guidelines	Countries
Precautionary limit			Israel, Italy, Switzerland
Status quo			Some states in US
Reducing exposure at a reasonable cost	General Advice		Australia, Norway, Sweden.
	Setting a Budget		California, Israel,
Planning	Limiting construction of new facilities in residential areas	Distance	Connecticut, Ireland, Israel, Luxembourg.
		Limit	Slovenia
	Limiting construction of new facilities near schools and daycare centers	Distance	California, Ireland
		Limit	Netherlands
	Public involvement in siting		Ireland, Italy, Netherlands, UK
	Policy applies to old facilities		
Formal CBA			Few countries

Policy Results

- Undergrounding :
 - General: Turkey - power lines ; since 1991- 30kV; since 1998 - 154kV; since 2006-380kV
 - Specific cases only: Israel
- Low field lines e.g: Compact/ Optimal phasing of new lines/ Balancing loads in 2 circuit lines/ raising height of lines. California, Japan, Israel
- Buffer zones :
 - zones where new residential areas cannot be constructed
 - Zones where new facilities cannot be constructed
- Routing away from residential areas
- Measurement campaigns
- Communication
- Other.



Policy Results

- Changes to distribution system
- Changes to wiring in houses
- Other changes

Changes to existing facilities:

- Relocation- of lines or of houses/schools
- Shielding
- Gradual change during upgrades
- Other



Issues to Consider

- There is a risk of regulatory competition (race to the bottom) among countries and regions.
- Use of CBA, or a similar framework.
- Policy implementation – the cost of reducing exposures: land use, property value, and public anxiety.
- Dialogue between policymakers and a variety of stakeholders - industry, public, various organizations.

Issues to consider - continued

- Equity issues:
 - Voluntary/involuntary exposure;
 - New/old facilities;
 - New/old residential areas.
- Children/adults.

Convergence or Divergence in ELF policies?

- Scientific evidence is the same worldwide.
- Regulators can learn from each others experience and converge to a common approach.
- Country specific stakeholders and conditions



Thank you