

**ITU Workshop on  
“Practical measurement of EMF exposure”**

**(Gaborone, Botswana, 25-26 July 2011)**

**Communicating the Results of Base  
Station Measurement Surveys**

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Director Research & Sustainability  
GSM Association**

# **GSM Association (GSMA)**

- **Themes:**
  - ➔ **Mobile Broadband.**
  - ➔ **Mobile Lifestyle.**
  - ➔ **Mobile Planet.**
  
- **Technical.**
  
- **Public policy:**
  - ➔ **EMF science and communications.**

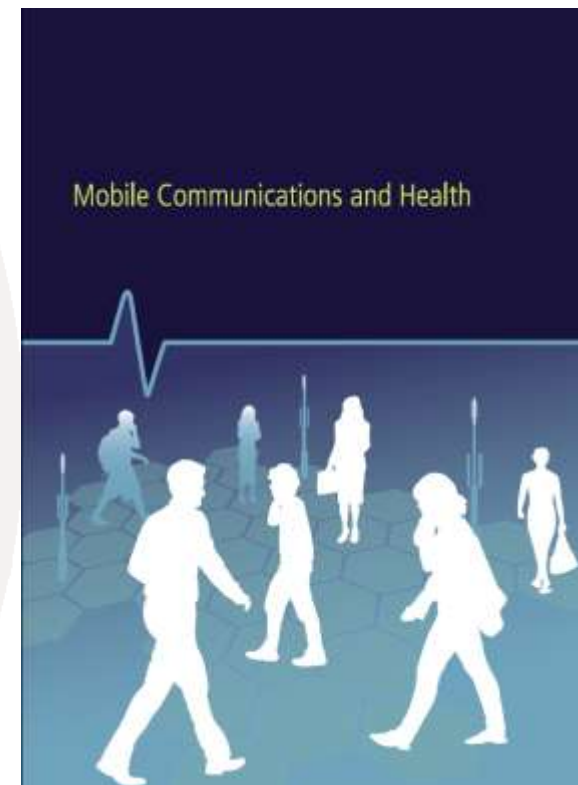
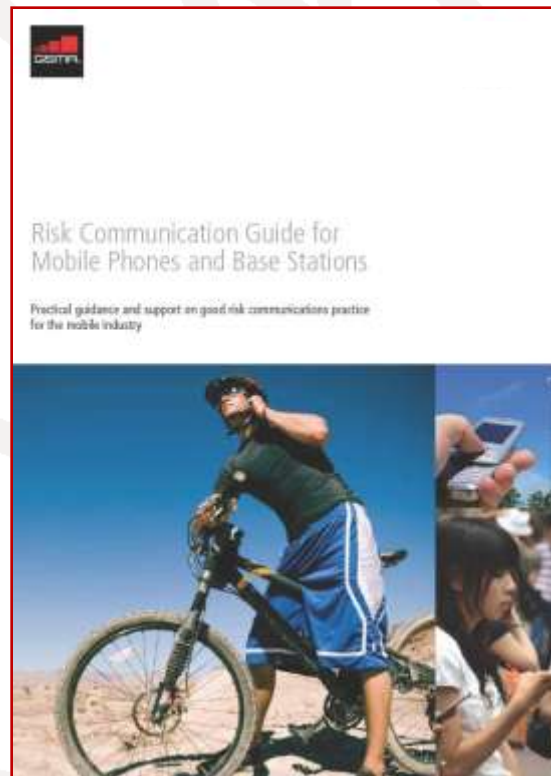
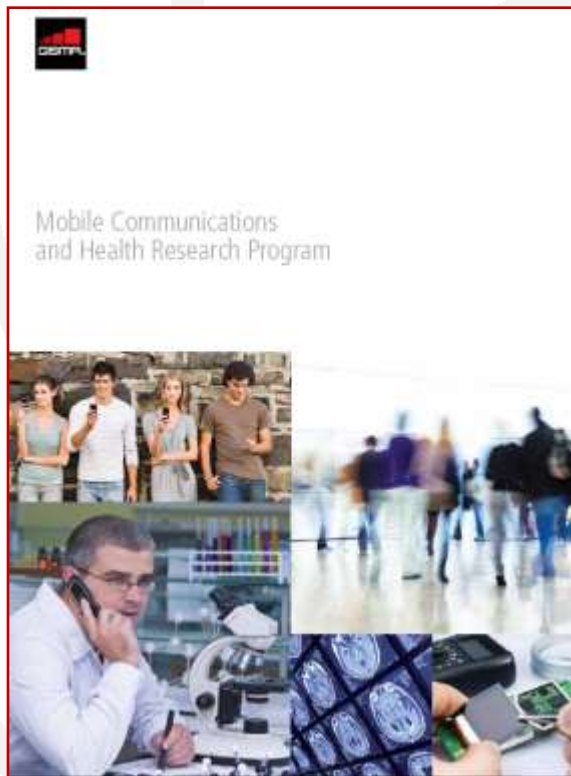
# Africa – Mobile Communications



[www.wirelessintelligence.com](http://www.wirelessintelligence.com)

# GSMA EMF Program

- EMF policy should be evidence based.



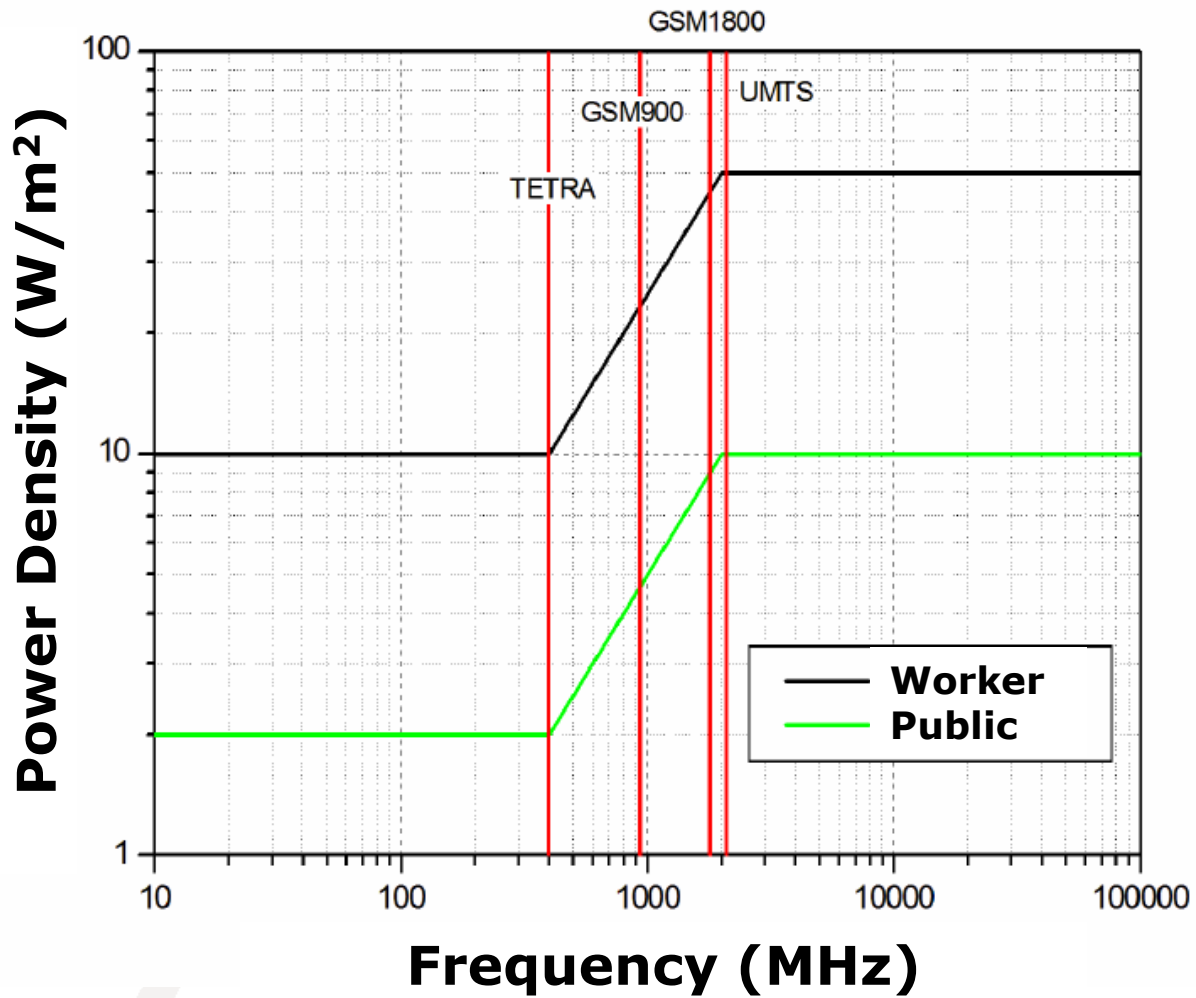
# RF Exposure Evaluation

- Near to antennas:
  - ➔ Compliance zones.
  - ➔ Access controls.
- Far from antennas:
  - ➔ Very low exposures.
  - ➔ Communication.



# Compliance Levels

- Worker.
- Public.
- Awareness.



[www.icnirp.org](http://www.icnirp.org)

# Antennas Not Accessible

- Simplified evaluation.



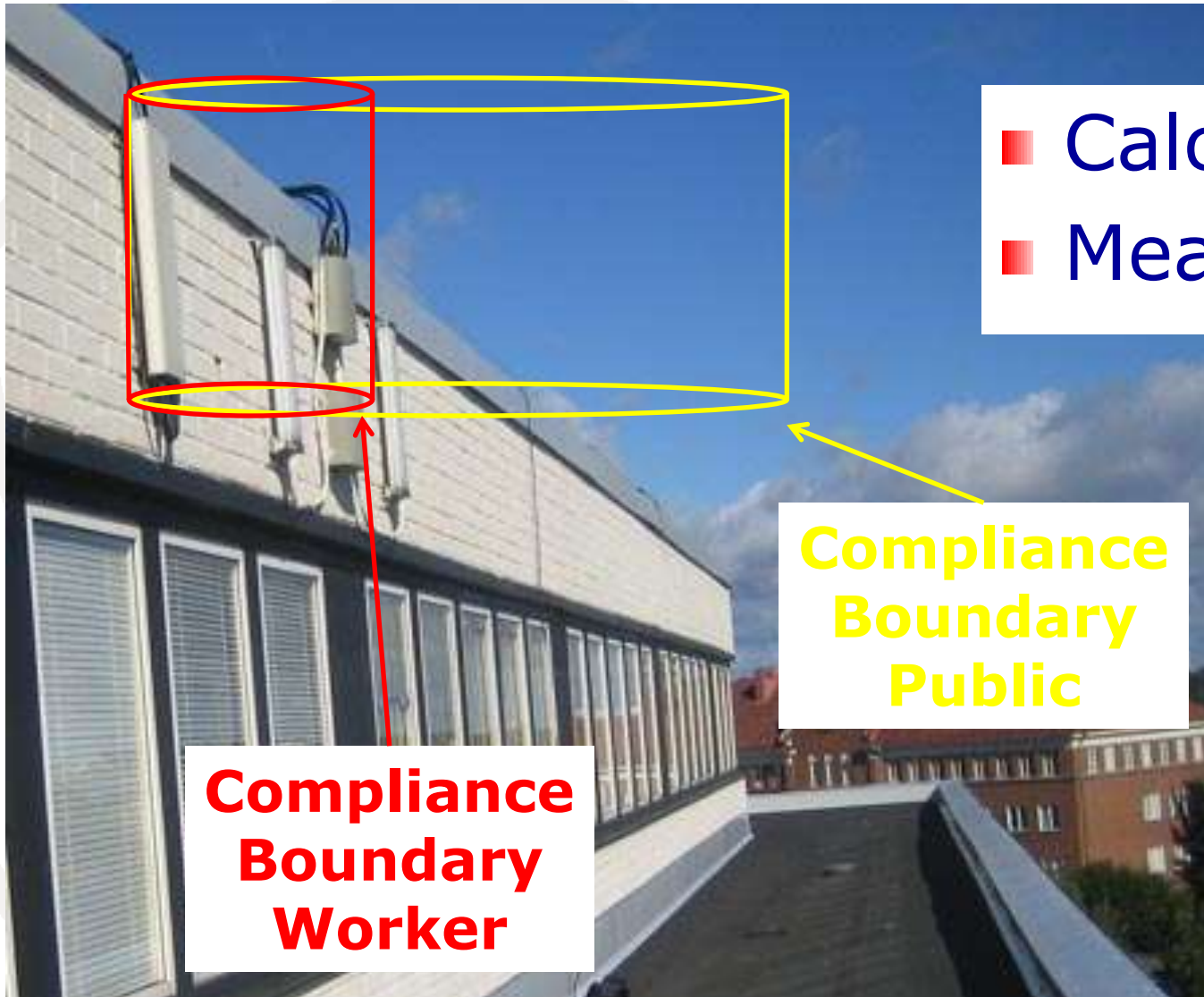
# Antennas Possibly Accessible

- Compliance zones.





# Compliance Boundaries



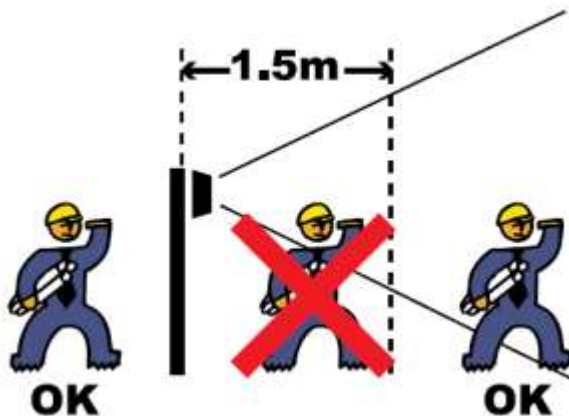
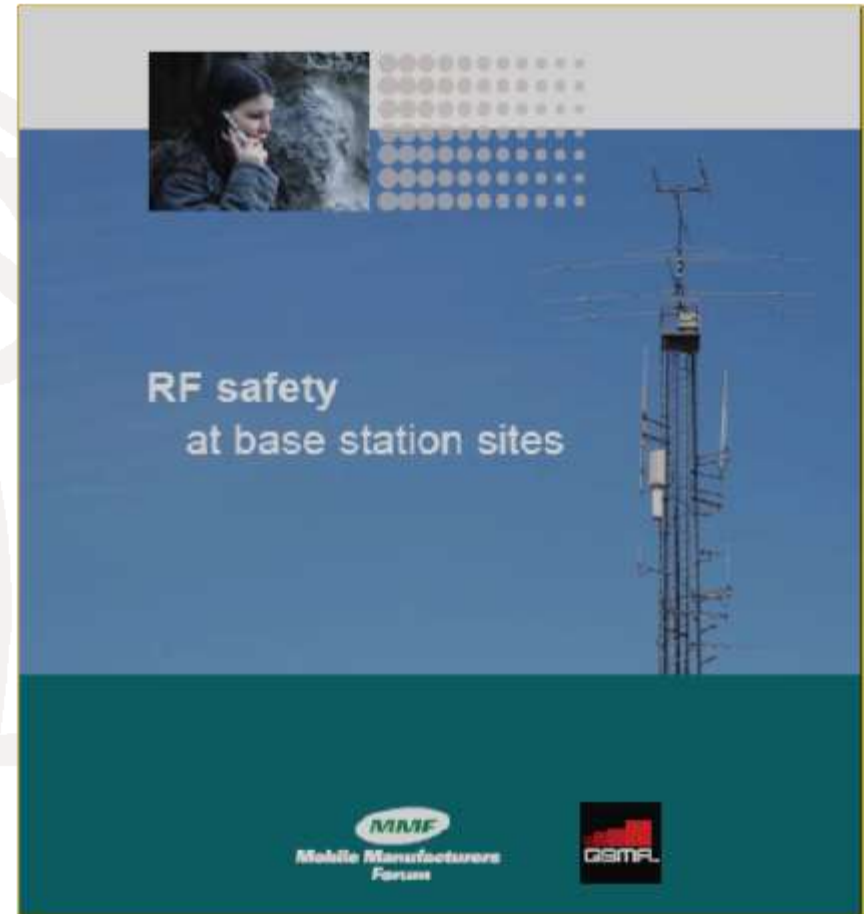
- Calculation.
- Measurement.

**Compliance  
Boundary  
Public**

**Compliance  
Boundary  
Worker**

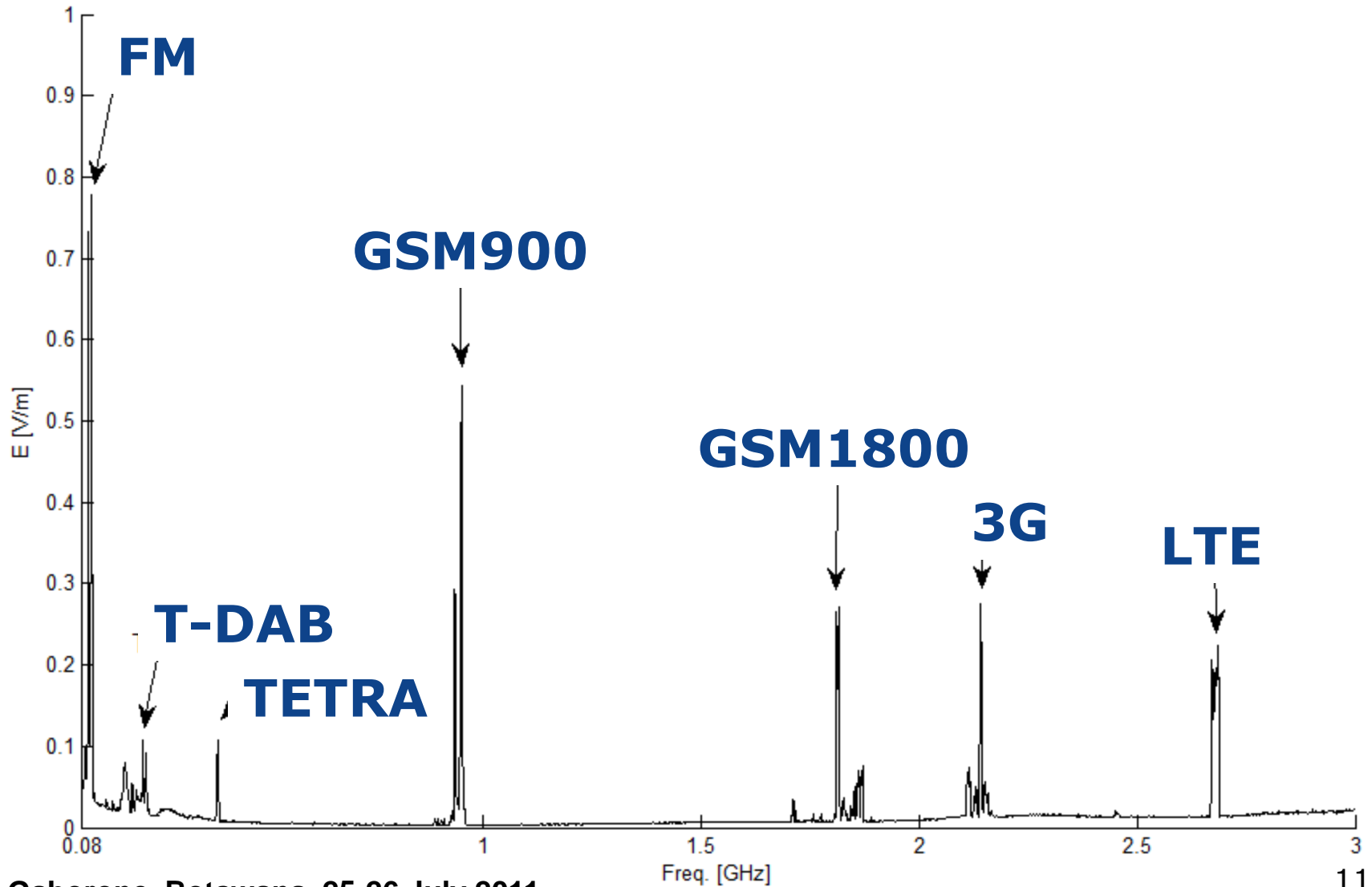
# Management of RF Compliance

- Evaluate exposure.
- Implement controls.
- Shared sites.



[www.gsmworld.com/health](http://www.gsmworld.com/health)

# Environmental Radio Signals



Gaborone, Botswana, 25-26 July 2011

# Complex Sites



Gaborone, Botswana, 25-26 July 2011

# Environmental RF Evaluations

- Why?
- What?
- Where?
- When?
- How?



# Australia – RF Evaluations

## ARPANSA Environmental EME Reports

Before mobile phone base stations are built or upgraded, the network operator (carrier) is required to produce a report that shows the predicted levels of electromagnetic energy (EME) around the new or upgraded facility.

- **New and updated sites.**
- **Compliance declaration.**
- **Prediction method.**

[www.arpansa.gov.au](http://www.arpansa.gov.au)

# Australia – RF Evaluations

## ARPANSA Environmental EME Reports

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## ARPANSA Base Station Survey 2007- 2011

ARPANSA is currently coordinating a survey of environmental radio frequency electromagnetic energy (RF EME) levels arising from mobile phone base station antennas.

- **Nominated sites.**
- **Procedure defined.**
- **Progressive data reporting.**

[www.arpansa.gov.au](http://www.arpansa.gov.au)

# Greece – pedion24 Project



The **pedion24** project was developed by the Mobile Radiocommunications Laboratory of Athens, Radiocommunications Lab of Aristotle University of Thessaloniki and Communications Laboratory of University of the Aegean. Its purpose is to continuously monitor environmental conditions at various locations of Greece. The measurements collected by the monitoring units are published on the website.



Prefectures where monitoring stations are installed are shown on the map coloured in **green**. Clicking on them takes you to the results page.

In the context of the program **pedion24** there have been installed totally **172 (145 active)** monitoring stations in **38** prefectures. Totally there have been made **1000000** electric field measurements.

- **Fixed monitor stations.**
- **240 measurements per day.**
- **Internet accessible results.**



[www.pedion24.gr](http://www.pedion24.gr)



# Ireland – Mobile Phone Site Surveys

Commission for Communications Regulation

About Us Publications Telecoms Radio Spectrum Postal Consumer Initiatives **Licensing & Services**

You Are Here: » Comreg.ie » Licensing & Services » Mobile Masts Info

## Licensing & Services

### Mobile Masts Info

ComReg is the licensing authority for the use of the radio frequency spectrum in Ireland and is used for the transmission of a wide range of services, including radio and other telecommunications services such as internet connection.

As the licensing authority for radiocommunications in Ireland, ComReg is responsible with their licence conditions, which include conditions relating to non-ionising radiation must be within the levels set down in the latest international guidelines.

#### Non Ionising Radiation

ComReg commissions a programme of site surveys to verify that licensed operators relating to non-ionising radiation. [Reports](#) of the site surveys are available for

## Initial Site Survey and Broadband Measurements



## Frequency Selective Measurements

SPECTRUM ANALYSER WITH TRIPOD MOUNTED ANTENNA CONNECTED



PORTABLE SPECTRUM ANALYSER WITH ANTENNA DIRECTLY CONNECTED



- **3 measurement stages.**
- **About 100 sites per year.**
- **All radio services reported.**

[www.comreg.ie](http://www.comreg.ie)

# UK – Mobile Phone Base Station Audit

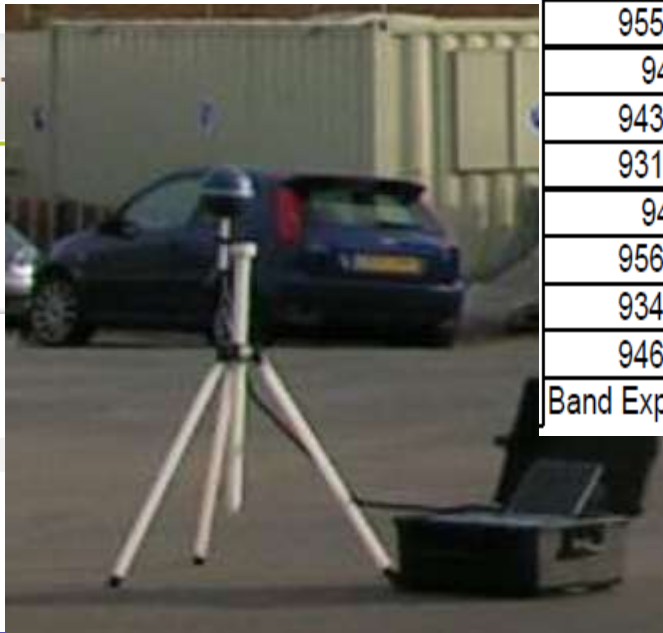
**Ofcom**  
Independent regulator and competition authority for the UK communications industries.

Enter your search

Consultations ▾ Broadcasting ▾ Spectrum ▾

Home / Stakeholders / Sitefinder / Information sheet

**Audit of mobile phone base stations**

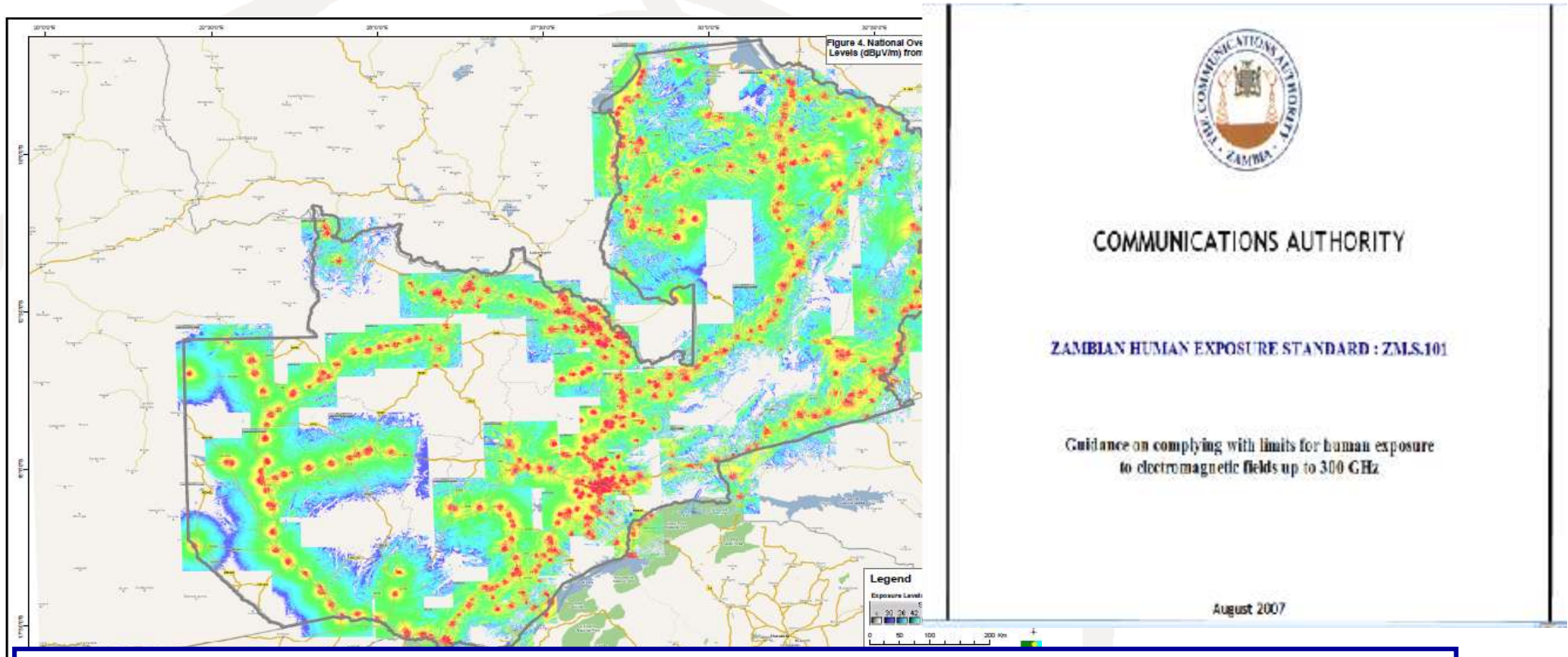


Frequency (MHz)	Power Density (W/m <sup>2</sup> )	ICNIRP Maximum (W/m <sup>2</sup> )	Exposure Quotient
930.6	7.01E-06	4.653	1.51E-06
946	5.45E-06	4.73	1.15E-06
955.8	4.82E-06	4.779	1.01E-06
941	4.69E-06	4.705	9.98E-07
943.8	4.66E-06	4.719	9.88E-07
931.2	4.4E-06	4.656	9.44E-07
940	4.39E-06	4.7	9.35E-07
956.6	4.07E-06	4.783	8.51E-07
934.8	3.11E-06	4.674	6.66E-07
946.2	1.54E-06	4.731	3.26E-07
Band Exposure Quotient:			9.37E-06

- **Emphasis on schools and hospitals.**
- **Mobile communication signals.**
- **Ten years of data available.**

[www.ofcom.org.uk](http://www.ofcom.org.uk)

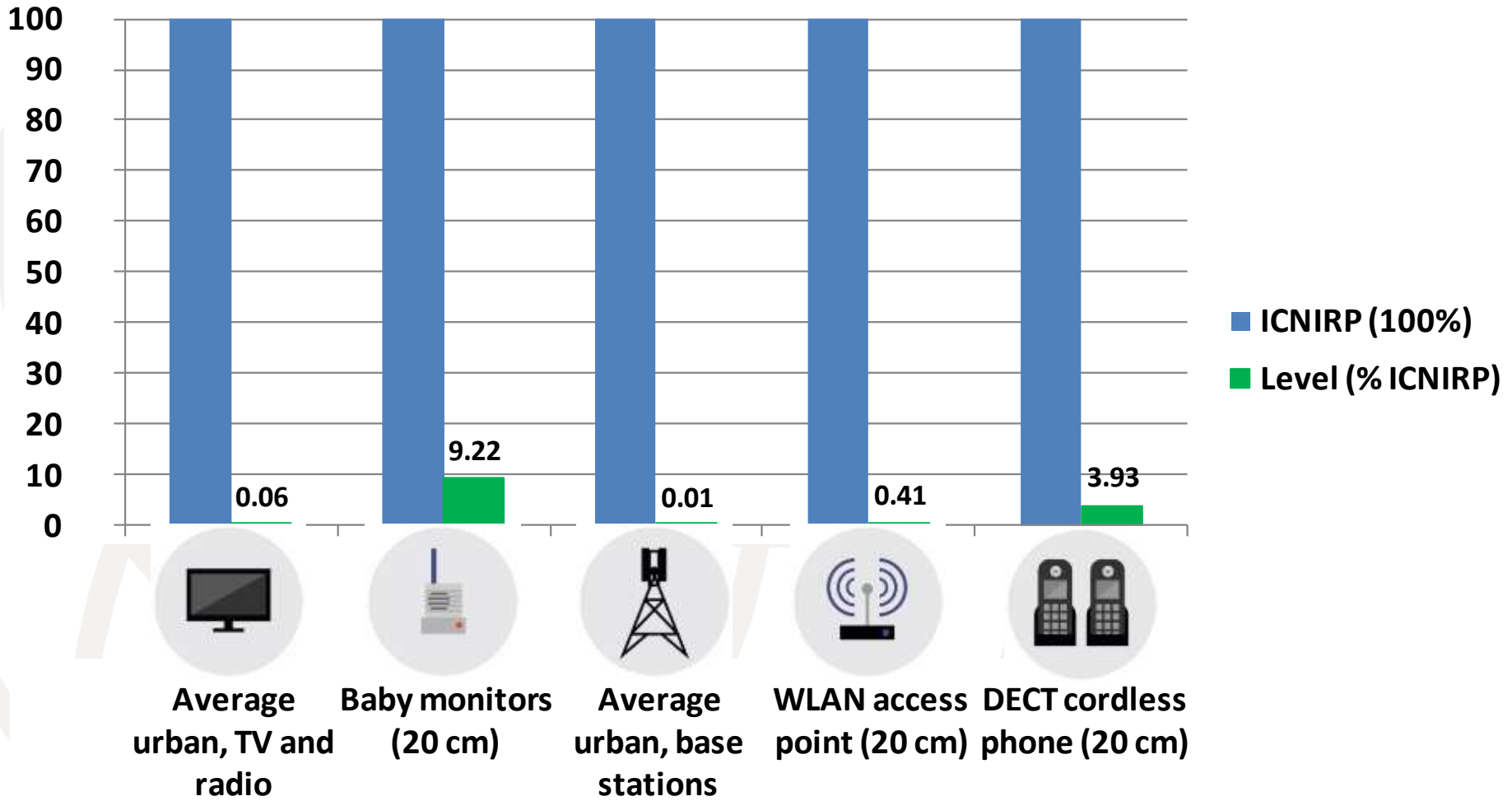
# Zambia – National Baseline Study



- **Calculated exposures.**
- **Measured FM, TV, GSM900, GSM1800, WCDMA2100.**
- **Locations: stationary, trunk roads, cities/towns.**

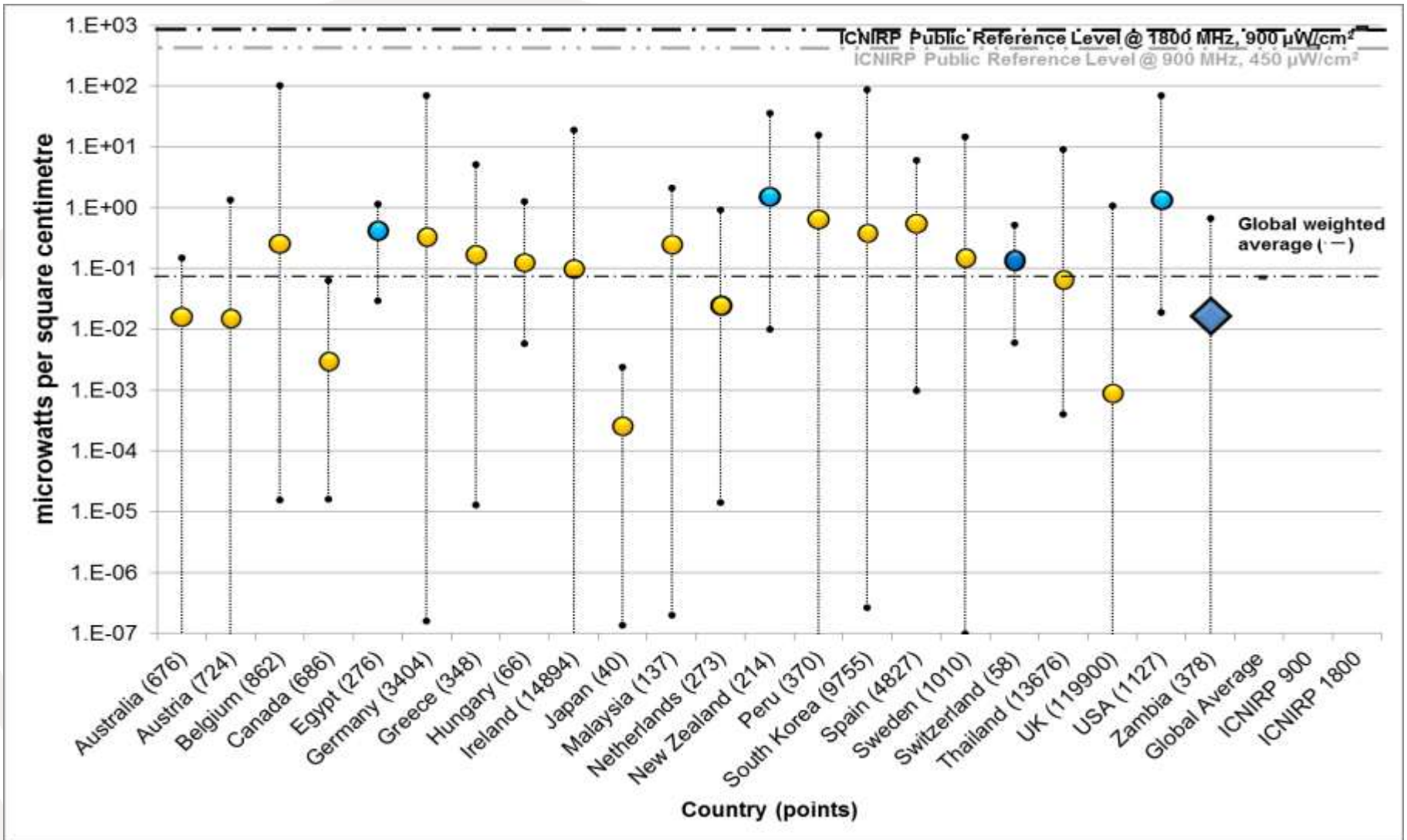
[www.caz.zm](http://www.caz.zm)

# Comparison to Other Sources

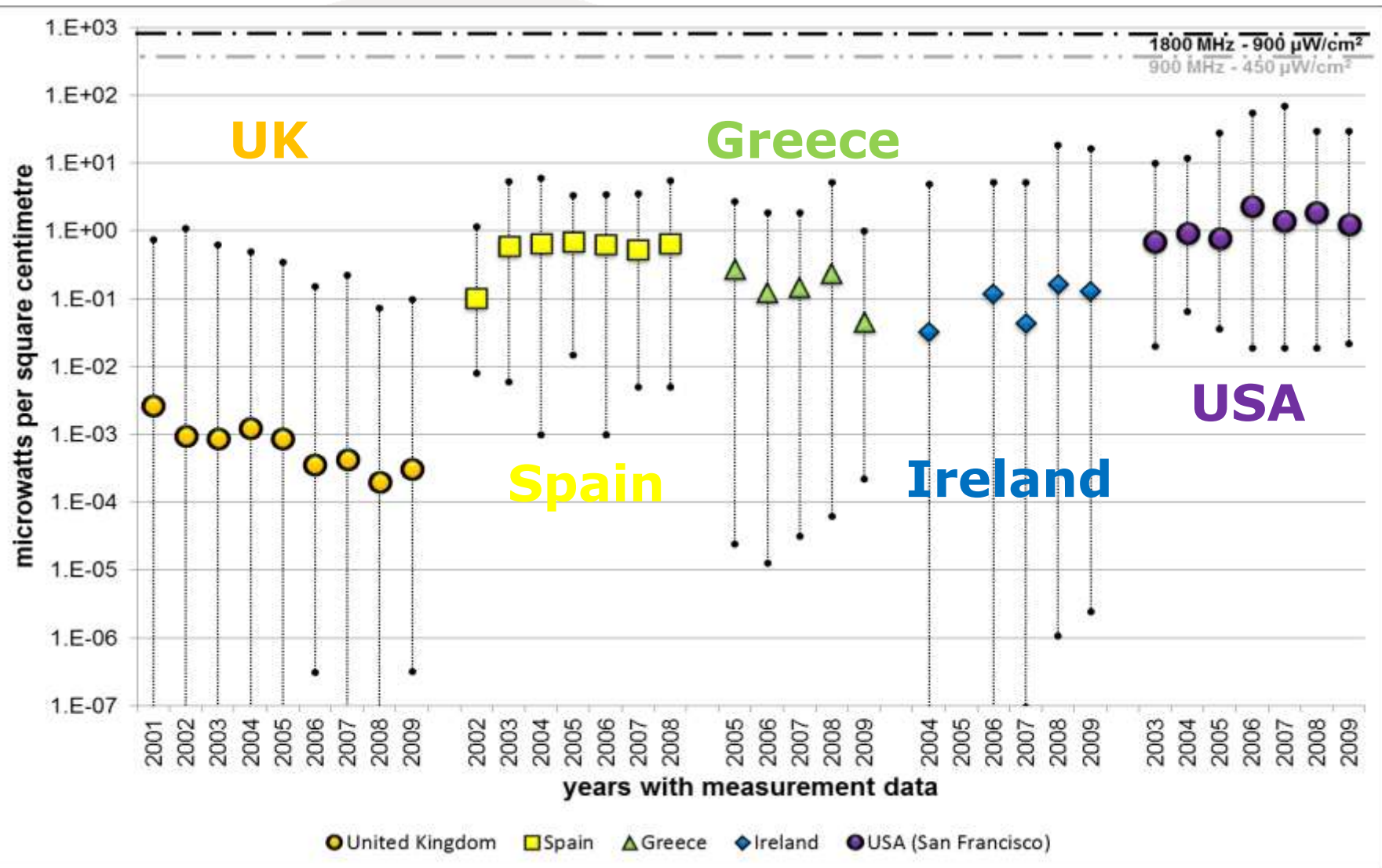


Based on [Valberg et al., 2007](#).

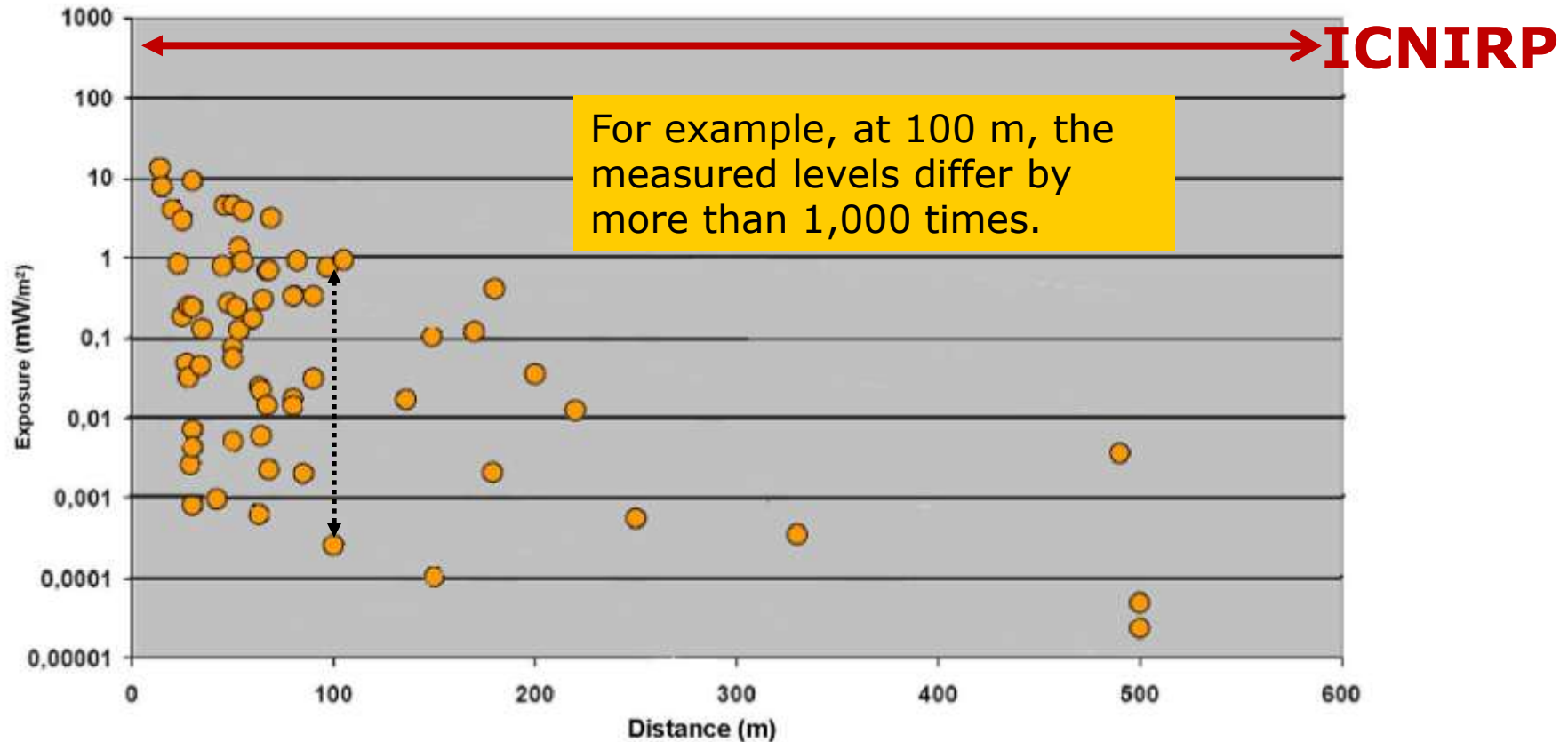
# Exposure Similar Between Countries



# Exposure Trends Over Time

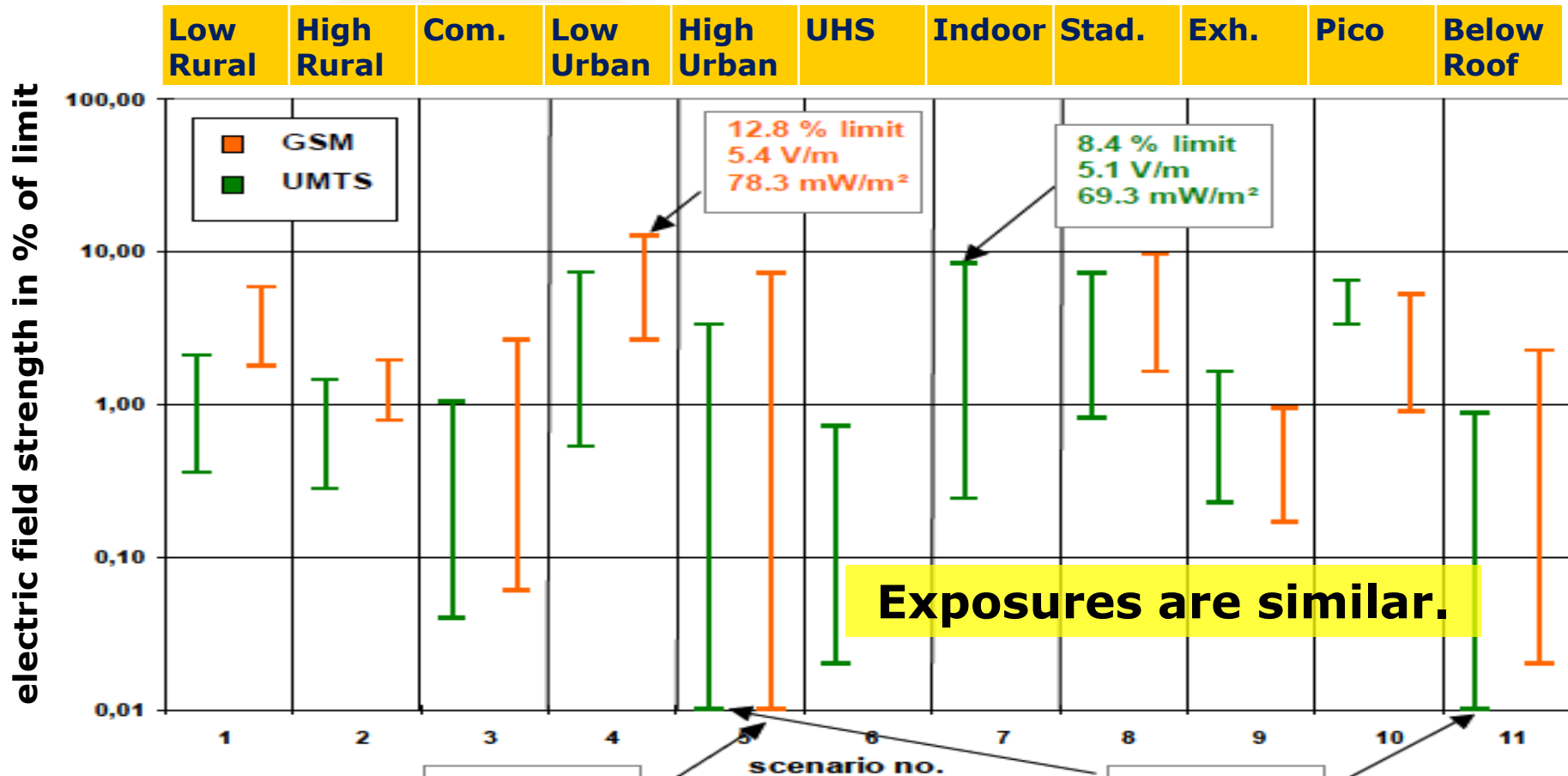


# Influence of Distance



**The distance between a residential area and an antenna is not a proper indicator of effect on exposure.**

# Influence of Base Station Type



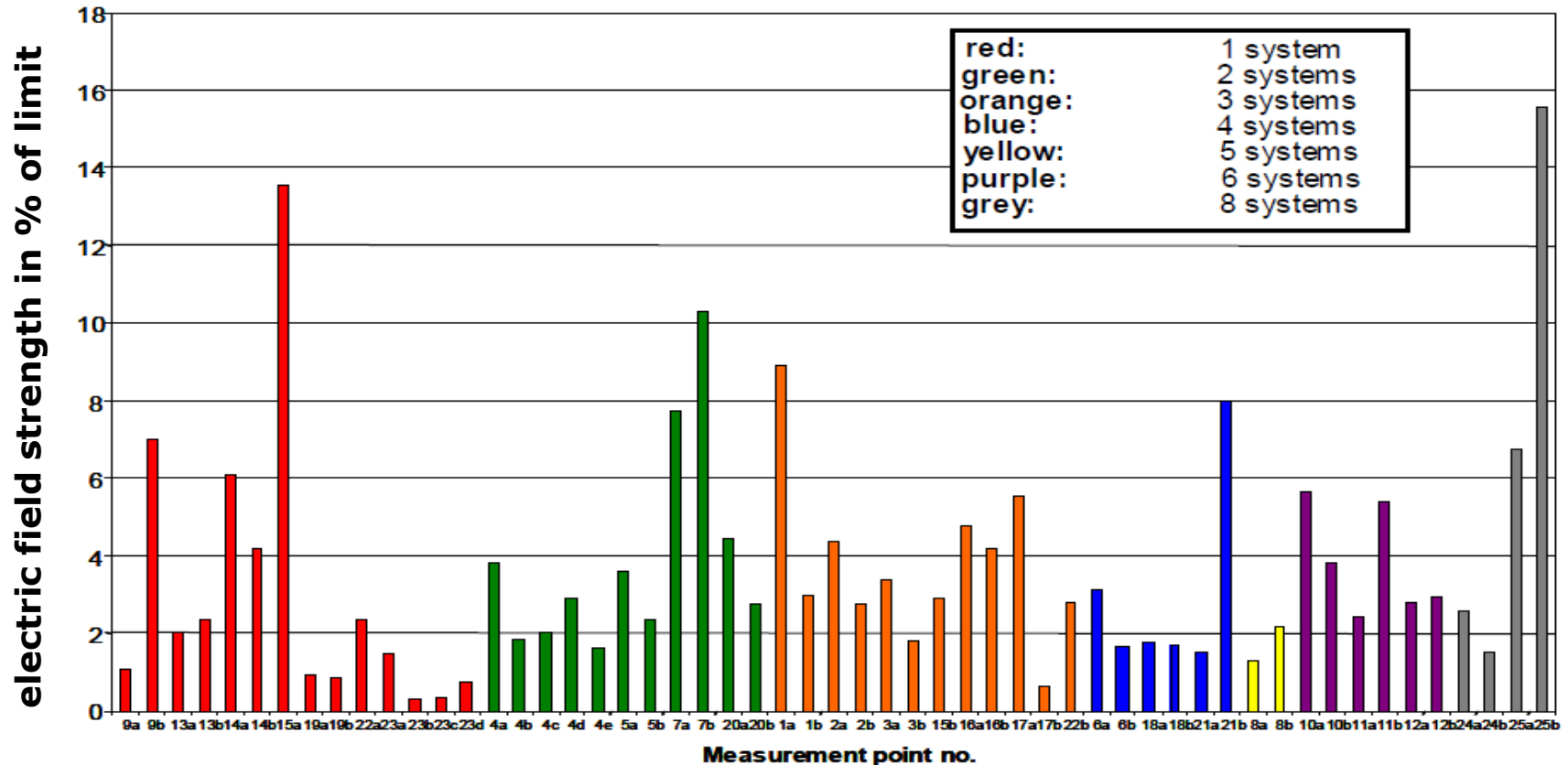
**Exposures are similar.**

Com. = commercial.  
 UHS = Ultra High Site.  
 Stad. = Football stadium.  
 Exh. = Exhibition centre.

Bornkessel, *RF Exposure Measurement Campaigns - Between Pure Facts and Practical Risk Communication in Electromagnetic Field Exposure: Risk Communication in the context of Uncertainty*, 2006.



# Influence of Visible Base Stations



**The number of visible base stations does not significantly influence RF exposure level.**

Bornkessel, *RF Exposure Measurement Campaigns - Between Pure Facts and Practical Risk Communication in Electromagnetic Field Exposure: Risk Communication in the context of Uncertainty*, 2006.

# Relative Exposures from Handsets and Base Stations

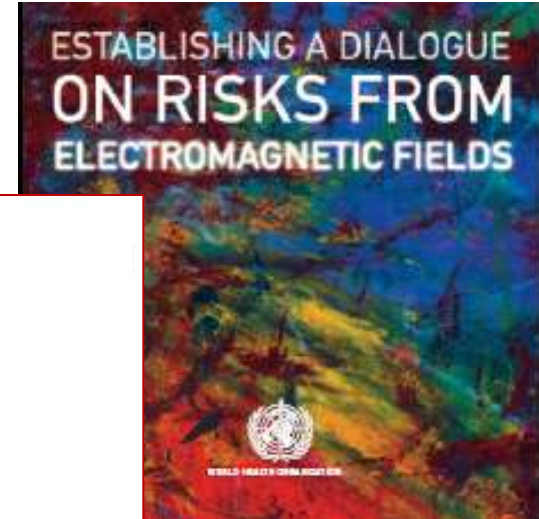
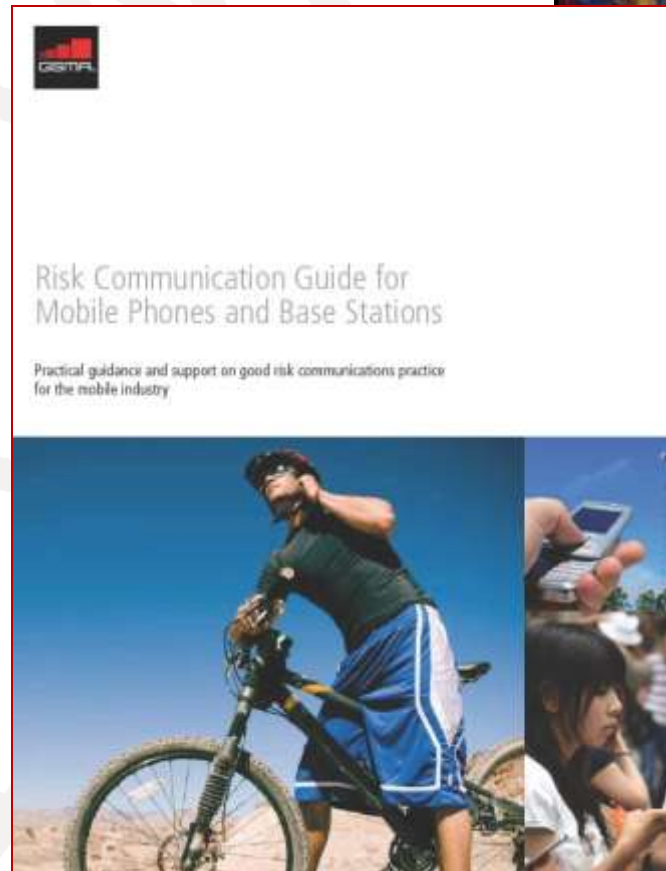
1 second



Based on [Neubauer et al., 2010.](#)

# Essentials of Communication

- Listen.
- Perception is reality.
- Trust then information.

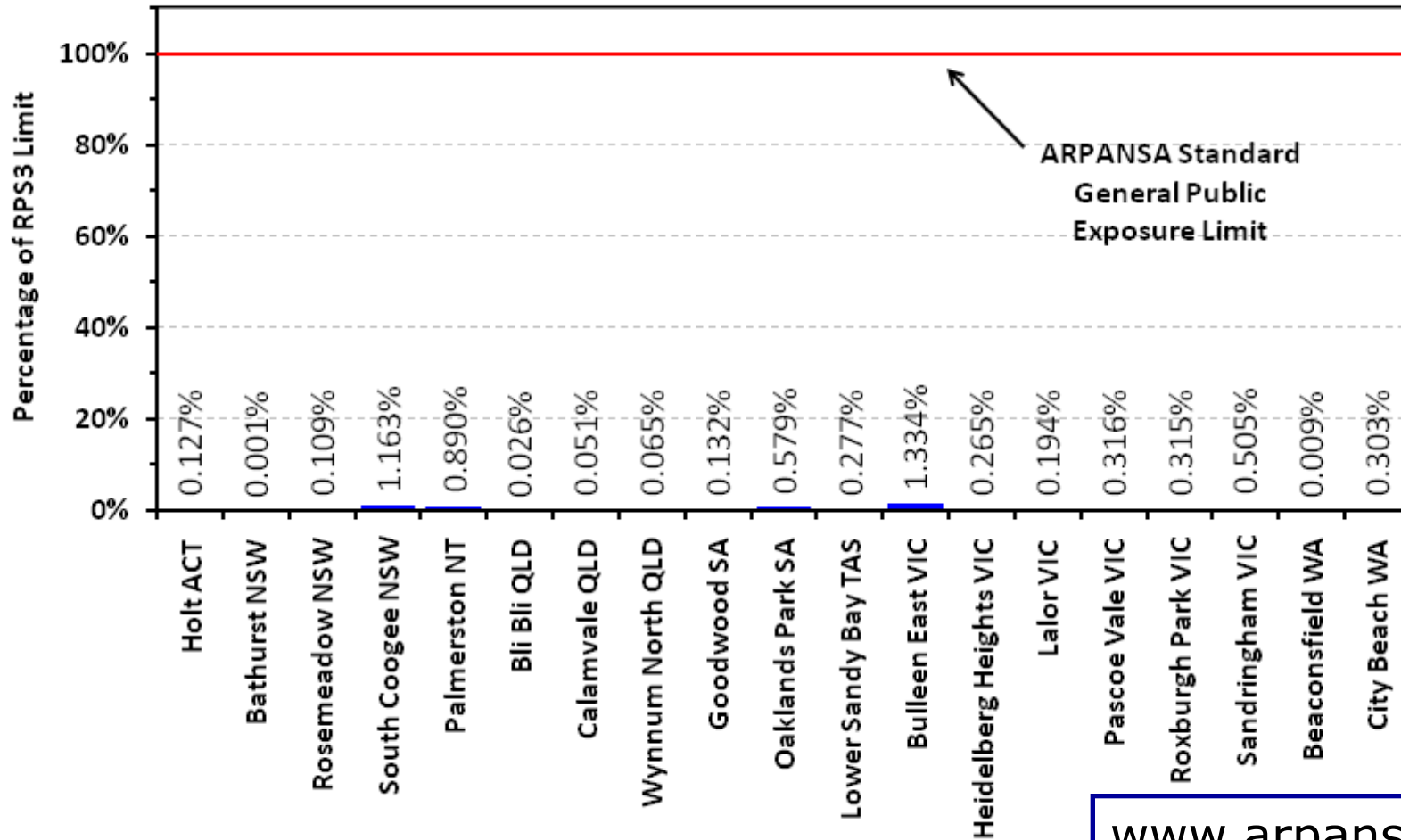


# Good Practice Risk Communication

- Use 3 key messages, for example:
  - *Complies with limits.*
  - *Levels are very low relative to limits.*
  - *No established health risks.*
- Use simple language.
  - Minimise technical terms.
- Use images to explain results.

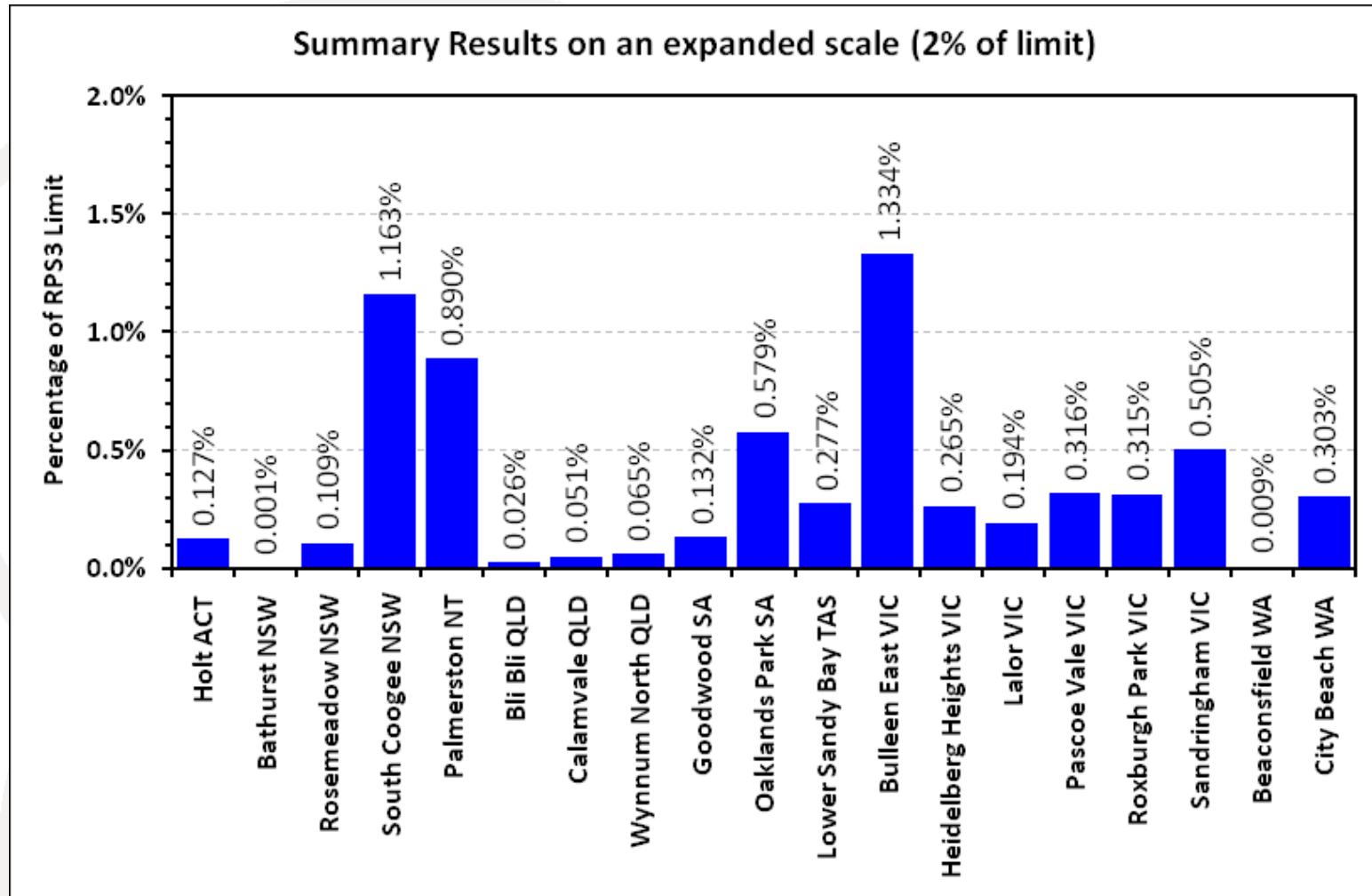
# Example Graphics – Australia (1)

Summary Results and ARPANSA Standard Limit



[www.arpansa.gov.au](http://www.arpansa.gov.au)

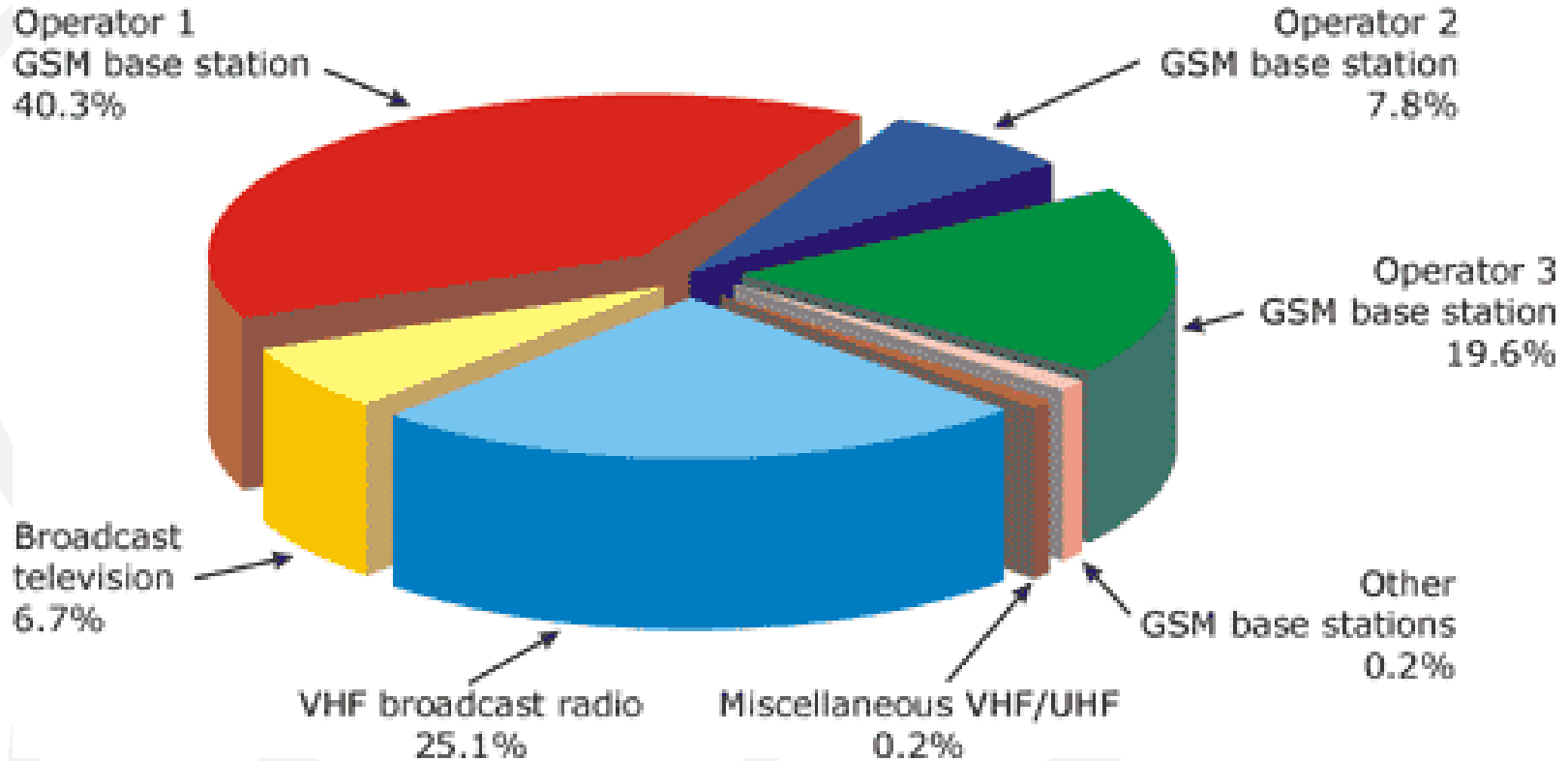
# Example Graphics – Australia (2)



[www.arpana.gov.au](http://www.arpana.gov.au)

# Example Graphics – UK (1)

Total Exposure Quotient (ICNIRP Public) = 1/23,000



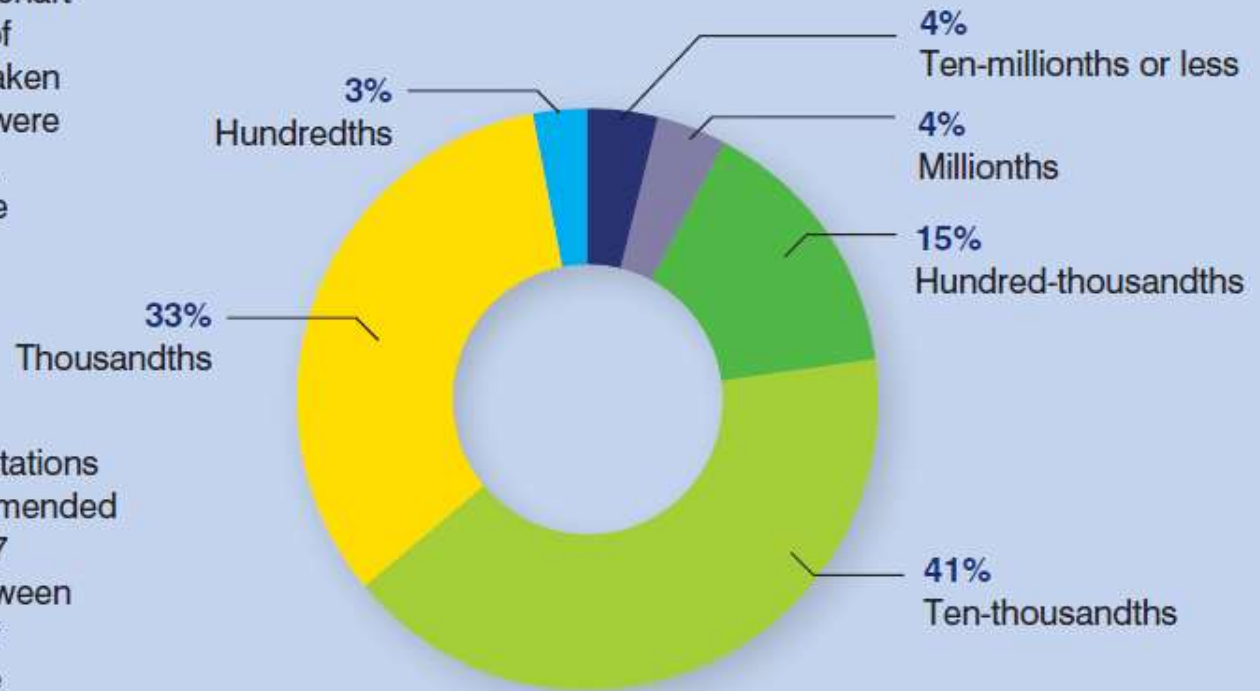
[www.hpa.org.uk](http://www.hpa.org.uk)

# Example Graphics – UK (2)

## Percentage of ICNIRP Guidelines

Correspondingly, the pie chart shows what percentage of the total measurements taken between 2001 and 2007 were hundredths, thousandths, ten-thousandths etc of the ICNIRP guidelines.

Emissions from all base stations are well below the recommended guidelines in all of the 537 measurements made between 2001 and 2007. In 97% of the cases emissions were thousands of times or more below the guidelines.





# Measurements in Africa

- Can you assist with access to existing data?
- Can you contribute other data?



★ = Measurements made.

# Recommendations

- Provide a legal basis for EMF limits.
- Be clear on purpose of evaluations.
- Define procedure.
- Make results available.
  - Relative to frequency or radio service;
  - In power density; and
  - As fraction of limits.
- Clear communications.

# Mobile Industry Reputation Index



Your progress



## Mobile Industry Reputation Index

Thank you for taking the time to give us your views on the mobile industry. Please answer based on your own perceptions of the industry and not based on how you think others might perceive it. Submitting a completed questionnaire entitles you to a free copy of the most recent 'Wireless Intelligence' Quarterly World Review Report.

- 1** In your opinion, how much does the mobile industry contribute to the advancement of society in terms of its policies and actions in the following areas?

[www.mobilereputationindex.com](http://www.mobilereputationindex.com)

# Thank You

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[www.gsmworld.com/health](http://www.gsmworld.com/health)

