

Radio Frequency Fields in Our Surroundings

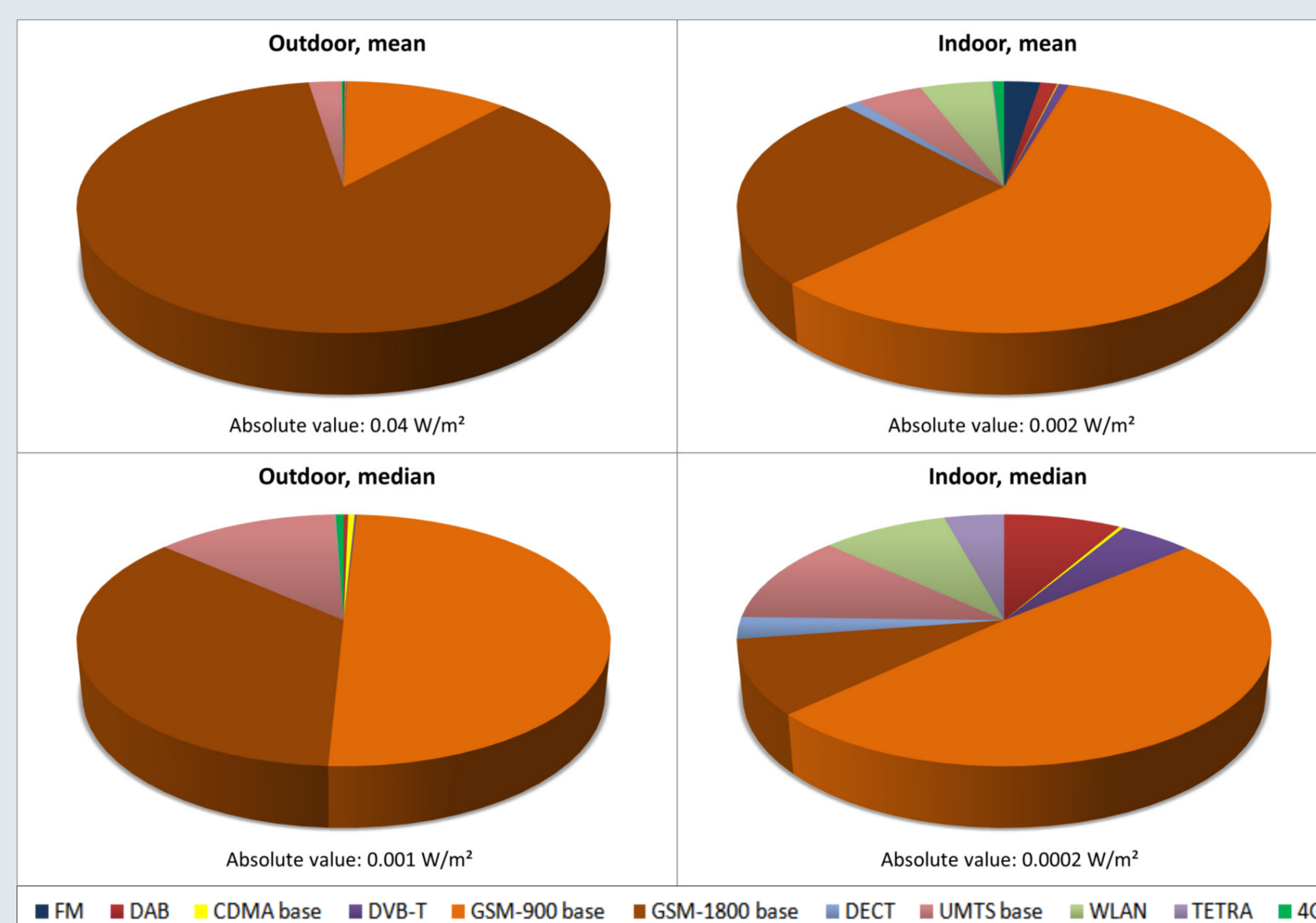
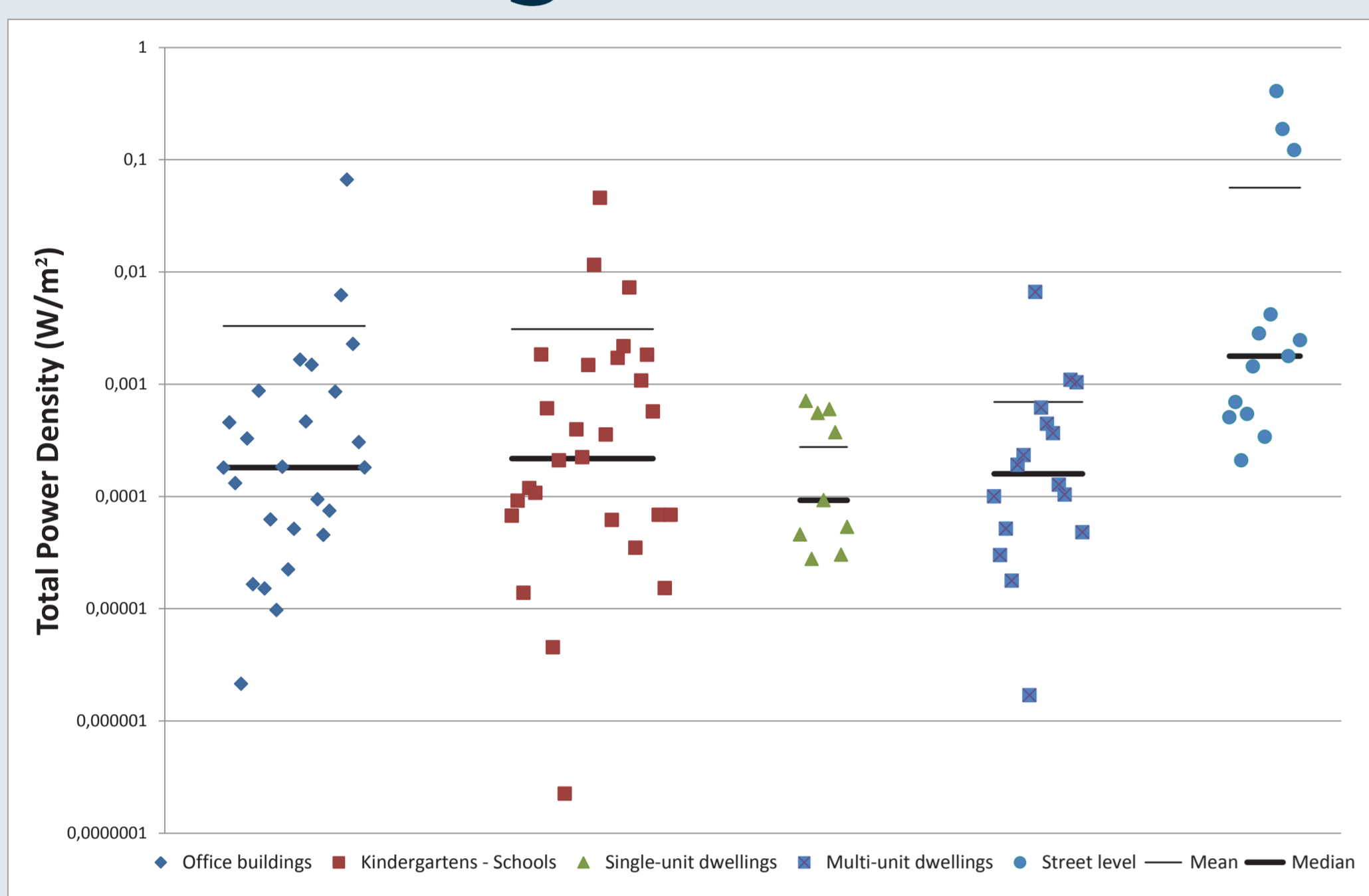
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Measurements in the Frequency Range of 80 MHz–3 GHz Are Measurements Sufficient to Meet Peoples Concern?

Introduction

In recent years there has been a growing concern in Norway regarding exposure to electromagnetic fields from different telecommunication systems. To some people's opinion, the reference levels set by ICNIRP are too high. There have been several local debates about installation of mobile antennas. People believe that wireless networks will represent a danger in the long run. How can authorities meet this concern?

Measuring Results



Exposure in Norway

- All measured values well below the ICNIRP reference levels (2–10 W/m² depending on frequency)
- Nearly 99% of the measured values below 1/1000 of the ICNIRP reference levels
- Highest measured value in our study: 0.4 W/m²
- Outdoor values are fairly higher than indoor values
- Wireless internet contributes the smallest part of the exposure
- Base stations for mobile phones contribute most even though the levels are low compared to the ICNIRP reference levels
- In the Norwegian Radiation Protection regulations the ICNIRP guidelines are stated as exposure limits. In addition we practice a precautionary approach.



Measurement in front of the Norwegian Parliament.
 Photo: Øystein Sølvberg, NPT

About the Measurements

Goal: To map the real exposure levels from fixed antennas in our normal living environment

Locations:

- In six different urban environments/ densely populated areas
- At 56 different addresses (1–3 measuring point at each address)
- Totally 91 measuring points

Five different surroundings:

- Indoor in office buildings
- In- and outdoor in kindergartens and schools
- Indoor in single-unit dwellings
- Indoor in multi-unit dwellings
- Outdoor on street level

Frequency range: 80 MHz–3 GHz

Systems included in the study:

- Radio and TV broadcasting (FM, DAB and DVB-T)
- Public safety radio network (TETRA)
- Mobile broadband (CDMA and 4G/LTE)
- Mobile phones (GSM-900, GSM-1800 and UMTS)
- Cordless phones (DECT)
- Wireless internet (WLAN)

Measuring equipment: TS-EMF measuring antenna and spectrum analyser from Rodhe & Schwarz

Who? NPT and NRPA

When? 2010

How to Meet Peoples Concern?

- Continuously updated scientific reviews:** A Norwegian expert group have recently reviewed available scientific literature about possible adverse health effects, measurements of exposure levels and governmental administration of human exposure.
- Knowledge about real exposure levels:** Exposure levels in Norway are acceptable low according to the ICNIRP reference levels, and the exposure is on the same level as published results in other European countries.
- Antenna planning:** After our study action was taken towards

the operators for the three sites on street level with the highest measuring values. They were asked to reconsider the antenna planning according to the precautionary approach.

- New measurements:** There is a need to map new systems as TETRA and 4G/LTE. Not the same need for well-developed systems as GSM-900/-1800, UMTS and WLAN. We are planning for long-term measurements in Norway.
- Correct information at the right time:** Information has to be adjusted to fit the target group, and based on recent scientific reviews and real exposure levels. Be available for media, the public, on twitter, etc.