



FACT SHEET ON SMART METERS AND ASSOCIATED HEALTH CONCERNS

What Are Smart Meters?

Smart Meters are energy meters that measure consumption of electrical energy and provide additional information to both consumers and utility companies. Smart Meters are the backbones for modern power grids or smart grids. Unlike conventional energy meters, Smart Meters measure energy consumption in real time, use automation and interaction allowing more control for both consumers and utility companies.

How do Smart Meters work?

Smart Meters send electric usage information between the utility company and consumers via two-way wireless communications such as Broadband over Power Line (BPL), Power Line Communications (PLC), and Fixed Radio Frequency (RF). Smart Meters will help utility companies allocate power more smoothly, give consumers more information on their energy consumption and thus provide incentives for energy reduction. In fact, Smart Meters are a key enabling technology for a smart grid that is expected to become increasingly clean, efficient, reliable, and safe, at a potentially lower cost to the consumer.

The Law

With the Energy Independence and Security Act of 2007, the Federal Government mandated States to modernize the nation's electric system through the development and introduction of innovative and environmental friendly energy technologies such as the Smart grid technology. A smart grid uses several components working together to monitor, control, and manage the creation, distribution, and consumption of energy.

The Energy Independence and Security Act of 2007, Public law 110-140.

Why are some people concerned about Smart Meters?

Smart Meters transmit RF emissions that are similar to those of wireless communication and other existing household electronic devices (e.g., computers, cordless phones, televisions, and cordless routers). Over the last few years, there has been mounting concern about the possibility of adverse health effects resulting from exposure to radiofrequency electromagnetic fields, such as those emitted by mobile phones. Because of its similar

characteristics with mobile phones, Smart Meters have also raised concerns over potential adverse health effects to humans.

What are the health impacts from radio frequency exposure?

Because of the availability of data on mobile phones and its similarities with Smart Meters, the majority of our conclusions will be inferred from mobile phone research.

RF waves are electromagnetic fields (EMF) which, unlike ionizing radiation such as X-rays or gamma rays, can neither break chemical bonds nor cause ionization in the human body. RF exposure may result in thermal and non-thermal effects. Tissue heating is the principal mechanism of interaction between radiofrequency energy and the human body. At the frequencies used by

mobile phones, most of the energy is absorbed by the skin and other superficial tissues, resulting in negligible temperature rise in the brain or any other organs of the body. Results of epidemiological studies to date give no consistent or convincing evidence of a causal relationship between RF exposure and many adverse health effects other than cancer. Because of the limited focus of these studies on mainly brain tumors and leukemia, research that would include a broad range of health effects is needed. In the aim to prevent harmful health effects and protect the public, the Federal Communications Commission and various other regulatory health agencies have established several exposure guidelines.

What health concerns are associated with Smart Meters?

Published research indicates that exposure to RF from Smart Meters is very low, approximately a thousand times or more below the exposure guidelines established by the FCC. At these levels, RF emissions from Smart Meters are unlikely to produce any adverse health effects to humans.

Can Smart Meters cause Electromagnetic Hypersensitivity?

Some studies have suggested that non-thermal effects may include fatigue, headache, and irritability. These non-thermal symptoms, known as Electromagnetic Hypersensitivity (EHS), are defined by The World Health Organization (WHO) as a set of non-thermal symptoms which afflicted individuals attribute to exposure to EMF.

According to WHO, EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. In fact, several national and international assessments of EHS have concluded that symptoms experienced by some EHS individuals are not correlated with EMF exposure. Furthermore, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem. It is plausible that these symptoms might arise from environmental factors unrelated to EMF. Therefore, additional research is needed to better understand potential non-thermal effects.

Can Smart Meters cause cancer?

On May 31st, 2011, the WHO's International Agency for Research on Cancer (IARC) announced that EMF produced by mobile phones was classified as "possibly carcinogenic". This classification acknowledged the scarcity of scientific evidence to rule out any risk of cancer associated with heavy use of cell phones and shed light on the possibility of a small increase in risk of a rare form of brain cancer. In other words, there could be some potential risk of developing brain cancer as a result of heavy use of mobile phones. Consequently, the agency called for additional research on the long-term health effects from heavy use of mobile phones. It appears that the lack of any consistent and convincing evidence of a causal relation between RF exposure from average use of mobile phones and cancer would indicate even less concern for potential carcinogenic effects from use of Smart Meters. On the other hand, no study population to date has included children and youths, who are becoming increasingly heavy users of mobile phones. They might be particularly susceptible to harmful effects as they are likely to accumulate many years of exposure. Accordingly, research on adverse health effects shall also include these age groups.

Smart Meters are unlikely to cause health effects because:

- Smart Meters transmit RF emissions qualitatively similar but quantitatively different (significantly lower) than mobile phones.
- To date, research does not suggest any consistent evidence of adverse health effects of RF emissions produced by Smart Meters or other common household electronic devices.
- More studies are underway to further investigate cause-effect relationships of RF exposure and human health.

Can multiple adjacent Smart Meter installations result in an increase of exposure level?

The Federal Communications Commission (FCC) explains that multiple Smart Meters in the same geographical area can only communicate to a controller one at a time, therefore eliminating the potential for exposure to multiple signals at the same time.

How are RF exposure levels from Smart Meters measured?

For devices that are not expected to be used within 20 centimeters of the body, FCC recommends that strength or power density be the appropriate measure as opposed to Specific Absorption Rate (SAR). The maximum field strength at a distance is time-averaged and is derived from the effective radiated power (ERP) (Table 1, Appendix A). The ERP should not exceed 1.5 or 3.0 Watts in order to ensure compliance with FCC standards. Smart Meters are low-powered radiofrequency transmitters, operating at frequencies between 900 and 2400 MHz with peak powers in the range of 0.1 to 2 watts.

SmartGridCity™ project in Boulder, Colorado

Xcel Energy's SmartGridCity™ project in Boulder, Colo., has completed construction of the infrastructure and launched the remaining software to enable all SmartGridCity operational functions. This step makes it the first fully functioning smart grid enabled city in the world that increases reliability, provides customers with greater energy use information, and allows participating customers and Xcel Energy to control in-home energy management devices remotely when demand calls for it.

Denver post: October 7, 2009

Are there federal guidelines to protect the public from Smart Meters?

RF emissions from several sources including Smart Meters are regulated by the FCC, with advisory support from the Food and Drug Administration (FDA) and Environmental Protection Agency (EPA). The FCC has adopted, for several RF exposure sources, exposure limit values with a wide margin of safety against known

thermally induced health impacts (Table 2, Appendix A). Overall, based on the current knowledge, additional standards are not needed to protect public health.

Where can I get additional information?

- Electromagnetic fields and public health: mobile phones. World Health Organization, Fact sheet N°193, June 2011. <http://www.who.int/mediacentre/factsheets/fs193/en/index.html>
- Interphone study reports on mobile phone use and brain cancer risk. http://www.iarc.fr/en/media-centre/pr/2010/pdfs/pr200_E.pdf
- Electromagnetic hypersensitivity. World Health Organization Fact sheet N°296, December 2005. <http://www.who.int/mediacentre/factsheets/fs296/en/index.html>
- Government or Government-Affiliated Resources Reviewed on the Health Effects on Non-Ionizing Radiation. Maine CDC; November, 2010.
- Maine CDC Executive Summary, Review of Health Issues Related to Smart Meters. Maine CDC; November 8, 2010.
- Health impacts of radio frequency exposure from smart meters. California Department of Public Health, Smart Meter Project Team, April 2011.

For additional information, call: 303.692.2700

Appendix A

Table 1: Comparisons of Common Sources of Non-Ionizing Radiation

Item	Frequency in GHz	Power (max) in Watts	Power (average) Watts
Smart meter	2.4	1	0.100
G router	2.4	1	depends on use
N router	2.4 or 5.0	1	depends on use
Cordless Phone	2.4	0.25	0.010
Cell Phone	1.9	3	depends on use
FM Radio Tower	0.1	100,000	100,000
Cell Phone Tower	0.8 to 1.99	48,000	depends on use/loc

Source: Adopted from the Health Impacts of radio frequency exposure From smart meters. California Department of Public Health, Smart Meter Project Team (April 2011).

Table 2: Radio-Frequency Levels from Various Sources

Source	Frequency	Exposure Level (mW/cm ²)	Distance	Emission Time	Spatial Characteristic
Mobile phone	900 MHz, 1800 MHz	1-5	At ear	During call	Highly localized
Mobile phone base station	900 MHz, 1800 MHz	0.000005-0.002	to a few thousand feet	Constant	Relatively uniform
Microwave oven	2450 MHz	50.05-0.2	2 inches-2 feet	During use	Localized, non uniform
Local area networks	2.4—5 GHz	0.0002-0.001 0.000005-0.0002	3 feet	Constant when nearby	Localized, non uniform
Smart Meters	900 MHz, 2400 MHz	0.0001 (250 mW, 1% duty cycle)	3 feet -10 feet	When in proximity during transmission	Localized, non uniform

Source: Electric Power Research Institute (EPRI), Radio-Frequency Exposure Levels from Smart Meters: A Case Study of One Model (February 2011)