



# Scientific consensus on electric and magnetic fields (EMF) from power lines and Smart Meter

The scientific evidence does not establish any chronic health effects from exposure to extremely low frequency (ELF) electric and magnetic fields (EMF) from power lines or electrical equipment

Extremely low frequency (ELF) is the range in which power line electric and magnetic fields (EMF) are emitted. Neither guidelines nor standards currently exist in Canada or the United States that aim at preventing chronic health effects from exposure to ELF EMF, as no causation between the two has been established. In a recent 2015 fact sheet on this issue, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) concluded that: “There is no established evidence that the exposure to magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects.”<sup>1</sup>

This is in line with the current international scientific consensus on this subject. One of the most recent studies on this matter, a scientific literature review released by the European Commission in 2015, found that “existing studies do not provide convincing evidence for a causal relationship” between chronic health effects and exposure to ELF EMF.<sup>2</sup> Similarly, no ELF EMF exposure guidelines were established in the World Health Organization’s 2015 update to the European Code against Cancer, as they were “not an established cause of cancer and (were) therefore not addressed in the recommendations to reduce cancer risk.”<sup>3</sup> Similarly, a 2015 study released by the Swedish Radiation

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<sup>1</sup> ARPANSA, “Electricity and Health” Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) <<http://www.arpansa.gov.au/pubs/factsheets/ElectricityAndHealth.pdf>> (October 2015, Accessed: January, 2016): 1.

<sup>2</sup> Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR), “Opinion On: Potential Health Effects of Exposure to Electromagnetic Fields (EMF)” European Commission <[http://ec.europa.eu/health/scientific\\_committees/emerging/docs/scenihr\\_o\\_041.pdf](http://ec.europa.eu/health/scientific_committees/emerging/docs/scenihr_o_041.pdf)> (January 2015, Accessed: November 2015): 7.

<sup>3</sup> Neil McColl et al., “European Code against Cancer 4<sup>th</sup> Edition: Ionising and non-ionising radiation and cancer” Cancer Epidemiology (International Agency for Research on Cancer-WHO) 39 (June, 2015): S93.





Safety Authority, found that “a causal relationship has not been established” between ELF EMF exposure and chronic illnesses.<sup>4</sup>

These findings build upon a long-standing international consensus regarding ELF EMF and human health. For instance, in 2010, nearly five years prior to the release of the aforementioned studies, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) concluded that “there is no compelling evidence that [chronic health conditions] are causally related to low-frequency EMF exposure.”<sup>5</sup>

## What about Smart Meters?

As with nearly all electrical devices, Smart Meters emit ELF EMF. They also utilize radiofrequency (RF) signals to enable a host of beneficial features, including environmentally-friendly energy conservation functions.

RF EMF is generally located between the frequency ranges of 3 kHz to 300 GHz, which is just above ELF EMF frequencies and just below the visible light range of the electromagnetic spectrum. Low-level RF fields are emitted from a variety of natural sources, including the sun, the earth and the ionosphere. Manmade sources of RF signals are primarily used in telecommunications, such as radio and television broadcasting. RF signals are also used in mobile phones, cordless phones, emergency services radios and a whole host of other communications technologies.

Smart Meters emit low power signals, similar to those emitted by cellular phones and Wi-Fi equipment. However, Smart Meters only emit RF waves intermittently and for a short duration. For instance, a study of the meters used by BC Hydro indicates that these meters communicate for about 1.4 seconds per day. In fact, the RF EMF exposure produced by a meter over its expected 20-year lifespan is less than a cellular phone produces during a 30-minute call.<sup>6</sup> RF wave exposure is further limited as Smart Meters are often located on the outside of houses.

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<sup>4</sup> SSM’s Scientific Council on Electromagnetic Fields, “Recent Research on EMF and Health Risk – Tenth report from SSM’s Scientific Council on Electromagnetic Fields, 2015” [Swedish Radiation Authority](http://www.stralsakerhetsmyndigheten.se/Global/Publikationer/Rapport/Stralskydd/2015/SSM-Rapport-2015-19.pdf) <<http://www.stralsakerhetsmyndigheten.se/Global/Publikationer/Rapport/Stralskydd/2015/SSM-Rapport-2015-19.pdf>> (March 2015, Accessed: January 2016): 9.

<sup>5</sup> ICNIRP, “ICNIRP Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1Hz-100 kHz)” [Health Physics](#) 99, no. 6 (2010): 818.

<sup>6</sup> BC Hydro, “Radio Frequency and Smart Meter” [BC Hydro](https://www.bchydro.com/energy-in-bc/projects/smart_metering_infrastructure_program/faqs/radio_frequency.html?WT.mc_id=rd_smartmeters_safety) <[https://www.bchydro.com/energy-in-bc/projects/smart\\_metering\\_infrastructure\\_program/faqs/radio\\_frequency.html?WT.mc\\_id=rd\\_smartmeters\\_safety](https://www.bchydro.com/energy-in-bc/projects/smart_metering_infrastructure_program/faqs/radio_frequency.html?WT.mc_id=rd_smartmeters_safety)> (Accessed: November 2015).





As *Figure 2* demonstrates, the RF EMF exposure from Smart Meters is very small relative to many other electronic devices commonly found in modern households. The RF EMF exposure from Smart Meters, such as those used by Hydro-Québec, is 55,000 times less than Health Canada's Safety Code 6 limits. Similarly, a 2015 study released by Hydro One found that the Smart Meter they use comply with Safety Code 6 guidelines "by a very wide margin ranging from hundreds to hundreds of thousands of times less than those limits."<sup>7</sup>

Even beyond the exposure levels originating from Smart Meters, international scientific consensus holds that no causation has been established between RF EMF exposure and chronic illnesses. Testament to this is the fact that RF guidelines were not considered in the World Health Organization's (WHO's) 2015 update to the European Code against Cancer, as RF waves were determined not to be an established cause of cancer.<sup>8</sup> Similarly, an October 2014 WHO factsheet asserts that: "To date, no adverse health effects have been established as being caused by mobile phone (RF) use."<sup>9</sup> Most recently, in its 2015 scientific literature review, the Swedish Radiation Safety Authority found no established causation between RF EMF exposure and any chronic illnesses.<sup>10</sup>

Health Canada has come to similar conclusions. Its 2015 update to [Safety Code 6](#) concludes that there are no "established adverse health effects associated with RF field exposures in the frequency range from 3 kHz to 300 GHz".<sup>11</sup> It should be noted that, Safety Code 6 guidelines are intended to protect against the "tissue heating and nerve stimulation" that is associated with acute RF EMF exposure. For more information on these guidelines please see the "Exposure Guidelines for EMF" section (link to page 4).

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<sup>7</sup> Richard A. Tell, "Radiofrequency Fields Associated with Operation of the Hydro One Smart Meter System" Prepared for Hydro One by Richard Tell Associates, Inc. (Hydro One Networks Inc.: Toronto, December 19, 2015): 1.

<sup>8</sup> McColl et al., S93.

<sup>9</sup> WHO, "Electromagnetic fields and public health: mobile phones" World Health Organization Factsheet no. 193 <<http://www.who.int/mediacentre/factsheets/fs193/en/>> (October 2014, Accessed: November 20, 2015).

<sup>10</sup> SSM's Scientific Council on Electromagnetic Fields, 52-80.

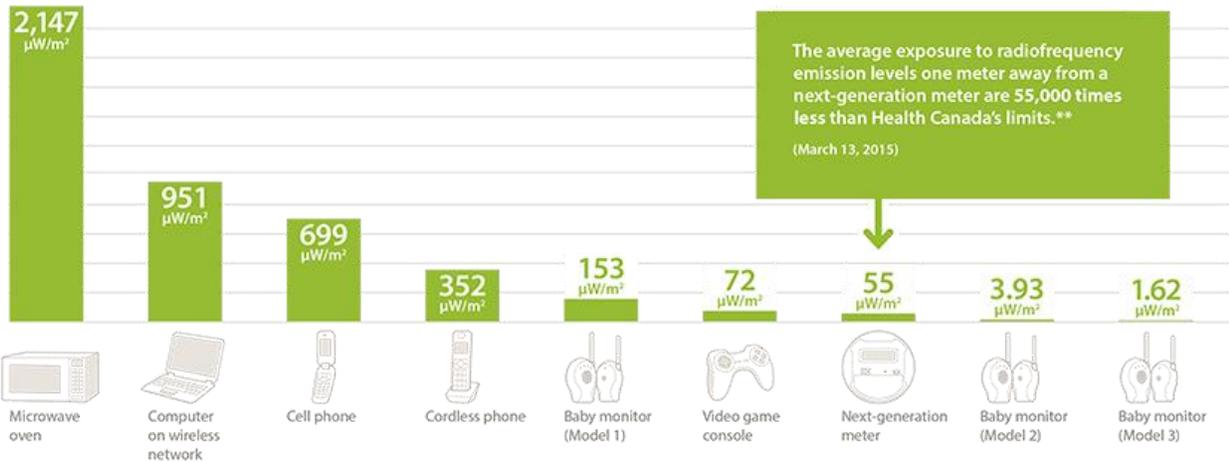
<sup>11</sup> Consumer and Clinical Radiation Protection Bureau, "Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 KHZ to 300 GHZ" Health Canada <[http://www.hc-sc.gc.ca/ewh-semt/consult/\\_2014/safety\\_code\\_6-code\\_securite\\_6/final\\_finale-eng.php](http://www.hc-sc.gc.ca/ewh-semt/consult/_2014/safety_code_6-code_securite_6/final_finale-eng.php)> (June 22, 2015, Accessed: December 2015): 2.





Both [Health Canada](#) and the [Australian Government](#) have ruled that there is no evidence of a health risk posed by RF signals from Smart Meters. These findings are consistent with those of other science-based determinations from governments around the world. This view is also in line with various international organizations such as the Institute of Electrical and Electronics Engineers (IEEE) which released a statement in 2013 asserting:

*“most Smart Meters actually transmit RF fields for only a few minutes per day at most. The low peak power of Smart Meters and the very low duty cycles lead to the fact that accessible RF fields near Smart Meters are far below both U.S. and international RF safety limits whether judged on the basis of instantaneous peak power densities or time-averaged exposures. This conclusion holds for Smart Meters alone or installed in large banks of meters”<sup>12</sup>*



\* For details on the measurement protocol used to obtain these values, see *Rapport d'essais de compatibilité électromagnétique. Mesures comparatives des compteurs avancés*, CRIQ file 670-43736-5.  
\*\* Limit recommended by Health Canada: 2,700,000 µW/m²



<sup>12</sup> IEEE, “COMAR Technical Information Statement: Radiofrequency Safety and Utility Smart Meter” [Institute of Electrical and Electronics Engineers](http://ewh.ieee.org/soc/embs/comar/COMAR%20Smart%20Meter%20TIS%20%289-25-2013%29.pdf)  
<<http://ewh.ieee.org/soc/embs/comar/COMAR%20Smart%20Meter%20TIS%20%289-25-2013%29.pdf>>  
(September 2013, Accessed: January 2016): 1.

