

October 31, 2019

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street, 2nd Floor
Harrisburg, PA 17120

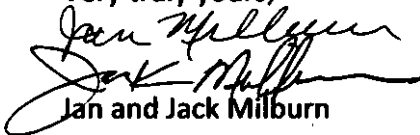
RE: Jan and Jack Milburn v. West Penn Power Company
Docket No. C-2018-3002756

Dear Secretary Chiavetta:

Attached please find the Brief on behalf of Jan and Jack Milburn regarding the above-referenced matter. This document has been served on all parties as shown in the Certificate of Service. The attached was also filed via email to Mr. Pallas on September 30, 2019.

Please contact us if you have any questions.

Very truly yours,


Jan and Jack Milburn

c: As Per Certificate of Service

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Brief To Pennsylvania Public Utility Commission
C-2018-3002756
West Penn Power
Smart Meter

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Introduction

I have devoted much of my life -over fifty years- to working as a volunteer on issues of health, welfare, and safety. I started the PTA in Ligonier, served as president and was also chairperson of the Children's Health and Welfare committee. We worked to have pesticides which had been sprayed in schools on a monthly, regular basis without cause, greatly reduced. I also co-founded and served as president of a group that worked for state legislation to protect children from risks posed by pesticides sprayed in schools. (A coalition of groups did get a bill passed in Pennsylvania). I was on the board of the LWV for a decade . Asbestos was being removed in our school with no appropriate safety protections or proper disposal measures. Our League authored a study of the asbestos removal, worked with the school board, and removal was halted.

In no case, on any of those issues, were we received by administrators or elected officials who were hungry for information, anxious to take action to protect public health. Industry always has the finances and power to have access and influence. Children, the elderly, and those with compromised immune systems, our most vulnerable populations, most often do not. I wish I had the finances to bring forward any one of the thousands of eminent researchers who have produced findings regarding serious concerns about potential health effects of smart meters.

Today, I doubt most people would advocate ripping asbestos out on Saturday with a complete lack of safety measures and then children returning to the classroom Monday morning with fibers still remaining in the heating vents, or would have no concerns about the regular spraying of classrooms with pesticides . The same is true of tobacco smoke, lead in drinking water, PCBs, and a host of other environmental issues.

There *are* people who chain smoke, who don't correct high radon levels in their homes, who regularly spray pesticides in their homes, who eat a steady diet of food I wouldn't put in my mouth. It's their home and if those are risks they choose to take then that's their choice as are the ramifications. But when those risks are mandated, forced on those of us who are educated about and don't choose to take those risks, then that is unethical and should be illegal. The idea that those people who are most concerned are uninformed is the greatest untruth. It was untrue in regard to the above noted situations. It is untrue of smart meters. Many of us have taken the time and effort to educate ourselves and our concerns should not be easily dismissed.

The Public Utilities Commission, and West Penn, should grant our request to opt out of smart meter installation based on the following:

1. Due Process We were denied the right to due process. Due process, guaranteed to citizens by the US Constitution, allows for adequate notification and the opportunity to be heard. With the passage of the legislation and the PUC's and West Penn's implementation of the smart meter act, we had no opportunity to express opposition because the public was not notified of mandatory installation of smart meters at the critical time of public discussion and input. If a zoning change affects my home or property, i.e., a fence being constructed by a neighbor, I must be provided with appropriate notification (by law, a notice must appear in a local newspaper for a required number of days) and I then have the opportunity to personally testify before any action is taken. Despite the fact that the electromagnetic radiation is not merely cosmetic, and invades home living space, there was no broad public notification of the proposal for mandatory smart meters. There were not local news articles or postings, nor did we receive a letter in 2008 for purposes of notification of the proposed mandatory implementation plan and opportunities for testimony when it most mattered. The witness for West Penn testified that the only notification provided was via the West Penn website and the Pennsylvania Bulletin, neither of which are read by the vast majority of West Penn customers. That substitute for legitimate notification would not be legal under zoning codes even for a neighbor's proposed fence construction. Consumers received no notification of mandatory smart meters from the PUC or West Penn.

Since there was no opportunity for consumers to provide testimony at public hearings, we are left only with the option of a legal hearing. The hearings, being run as a regular court proceeding, place an onerous burden on consumers, with time consuming requirements and correspondence, and the fact that any of the thousands of research studies, (of which I rely on), on harmful effects of EMFs on DNA, cancer, thyroid, immune diseases, eyes and testes, reproductive systems will not be submitted into the record. The only alternative is for individual citizens to pay for expert witnesses and an attorney which is unaffordable for most people. During no part of this process has there been adequate and fair allowance for residents of the state to present their opposition to forced smart meter installation. I have testified at hearings of EPA, DEP, DOE, and other agencies. None were run in this fashion- as a legal proceeding. They were designed for citizen input without the legal trappings and requirements of interrogatories, requirements for expert witnesses, and exchange of hundreds of pages of documentation.

2. PA Constitution, US Constitution Art 1, Section 1 of the Pennsylvania Constitution guarantees my right to protect our property. The US Constitution guarantees my right to safety. Those rights are being denied: EMF's emitted by smart meters invade my family's property and living space. Hundreds of scientists have petitioned governmental agencies internationally to provide more stringent regulations to protect consumers from EMFs. Thousands of independent research studies describe the health risks posed. US

governmental agencies other than the FCC have argued that there is insufficient regulation resulting in a lack of safety.

With many eminent scientists, as well as US government agencies strongly arguing that re-examination of the health risks of the non-thermal effects of EMFs is necessary, the PUC nor West Penn can declare with reliability and the consensus of the scientific community that our safety is being protected; therefore, our rights are being violated.

3. Relief /Disability The legislation passed, nor the Commission/West Penn, provide for medical relief or protection for individuals affected by, or at high risk of being affected by EMFs due to existing health conditions. The complaints of thousands of consumers across the country are being summarily dismissed. It is not a novel concept that medical relief or protection should be provided.

For example, the Pesticide Hypersensitivity Registry provides protection for those who are sensitive to chemicals used in pesticides. Several of my family members are listed on the registry. Years ago, when pesticides were applied in my neighborhood, I had to leave our home because my daughter would experience severe asthma attacks. The Act's protection recognizes the potential physical effects of pesticides and at least allowed me the notification necessary to avoid a hospital visit for my daughter. Legislators then instituted wait periods before children were to re-enter schools, reducing risk for all children.

The Disabilities Act also protects those who have physical sensitivities. When a roofing job at our high school provoked a severe asthma attack in my daughter, she was protected by the Disabilities Act; the work was stopped to be resumed on weekends only.

In recognition of harmful physical effects of non-ionizing radiation, official medical diagnostic codes of the American Medical Association and the Centers for Medicare and Medicaid offer a number of billing codes related to RF radiation exposure. The American Disabilities Act recognizes ES (electrosensitivity). Pennsylvania State utility companies are superseding the authority of the Americans Disabilities Act in regard to Smart Meters.

The Architectural and Transportation Barriers Compliance Board (Access Board) is the Federal agency devoted to the accessibility for people with disabilities. The Access Board is responsible for developing and maintaining accessibility guidelines to ensure that newly constructed and altered buildings and facilities covered by the Americans with Disabilities Act and the Architectural Barriers Act are accessible to and usable by people with disabilities. During the public comment period on the proposed rule, the Access Board received approximately 600 comments from individuals with multiple chemical sensitivities (MCS) and electromagnetic sensitivities (EMS). The Board has taken the commentary very seriously and acted upon it. As stated in the Background for its Final Rule published in September 2002:

"The Board recognizes that multiple chemical sensitivities and electromagnetic sensitivities may be considered disabilities under the ADA if they so severely impair the neurological, respiratory or other functions of an individual that it substantially limits one or more of the individual's major life activities. The Board plans to closely examine the needs of this population, and undertake activities that address accessibility issues for these individuals".

Following its recognition of Electromagnetic Sensitivity (EMS) and its declaration of commitment to attend to the needs of EMS people, the Board contracted the National

Institute of Building Sciences (NIBS) to examine how to accommodate the needs of the EMS in federally funded buildings. In 2005 the NIBS issued a report:

<http://scientists4wiredtech.com/wp-content/uploads/2019/01/2015-ADA-IEQ-Project.pdf> <https://scientists4wiredtech.com/what-are-4g-5g/electromagnetic-sensitivity/>

The insurance industry also recognizes the electromagnetic fields of radiation (EMFs) emitted by wireless technology as a leading risk. Lloyds of London and others have already put exclusions in their policies, which could leave municipalities and businesses assuming legal liability for harm. Courts in France, Spain, Italy and elsewhere have already set precedent in awarding for damages.

<https://hibr.nih.gov/workgroups/electromagnetic-fields-emf-and-electromagnetic-radiation-emr>

If the government recognizes these health issues via medical and disability care on the one hand, it cannot pretend they do not exist on the other.

West Penn and the PUC does not have the power to override or ignore physical problems and sensitivities recognized by the Disabilities Act and must provide a means for relief. EMFs, according to thousands of independent research studies, can contribute to a wide array of adverse health conditions. There is no way to minimize or avoid exposure; no way to turn off a smart meter, the only solution is for citizens to be provided with the opportunity to opt out of installation. The PUC and consequently West Penn is negligent in not providing for medical exemptions.

Since my family has multiple chemical and environmental sensitivities and other health problems, most of which link to research indicating an exacerbation or creation of those problems, we request an exemption.

4. Family Health Issues My husband and I have multiple health issues and I have multiple sensitivities, many of which have been found in the research to be associated with or exacerbated by EMFs. I do not want a smart meter to exacerbate already existing conditions, nor do I want to develop further health problems. We do not want to assume the risks as defined by scientists, yet Pennsylvania residents have not been granted that right or choice.

Other countries are more protective in regard to EMFs. In France for example, Wi-Fi is not permitted in schools of young children.

The American Academy of Environmental Medicine AAEM recommends that patients with a broad range of medical conditions avoid sources of EMF and RF radiation, especially smart meters on patients' homes and on neighbors' homes, nearby."

American Academy of Environmental Medicine Recommendations Regarding Electromagnetic and Radiofrequency Exposure
<http://www.electrosmogprevention.org/public-health-alert/wifi-dangers/aaem-releases-recommendations-for-emf-and-rf-exposures-71412/>

People who have medical and/or metal implants or other conditions rendering them vulnerable to health risks at lower levels than FCC RF limits, may be particularly at risk, as are, " children and people who are ill or taking medications, or are elderly, for they have different reactions to pulsed RF. Children's' tissues absorb RF differently and can absorb more RF than adults (Christ et al, 2010; Wiart et al, 2008). The elderly and those on some medications respond more acutely to some RF exposures."

This data specifically relates to my husband and me .

(Assessment of Radiofrequency, Microwave Radiation Emissions from Smart Meters, Sage Associates Santa Barbara, CA

http://sagereports.com/smart-meter-rf/docs/Smart-Meter_Report.B-Tables.pdf)

We do not want to assume those risks to health. And while there are studies that do not find health effects from exposure to EMFs, there are thousands that do. Research does not prove, it indicates, so while it cannot be required of citizens to *prove* the harmful health effects of EMFs, independent research provides evidence that the supposition of the PUC and West Penn that there are conclusively no health effects is not valid. Therefore, residents should not be guinea pigs by being forced to accept smart meters.

5. PUC Mission Statement West Penn's action on mandatory smart meters is in contradiction to the PUC's mission statement: "The Pennsylvania Public Utility Commission balances the needs of consumers and utilities; ensures safe and reliable utility service at reasonable rates; protects the public interest; educates consumers to make independent and informed utility choices; furthers economic development; and fosters new technologies and competitive markets in an environmentally sound manner."

The mandatory installation of smart meters does not balance the needs of consumers and utilities; consumers were not educated to make independent and informed utility choices; and this technology is not unequivocally environmentally sound according to thousands of scientists and governmental agencies' findings that run counter to the PUC's mission of environmental safety.

EM & R of Environmental Testing and Technology of California advises "Consumers should be provided with clearly understandable information about the radiofrequency emissions of all devices that emit RF radiation including smart meters. Such information should include intensity, duration, and frequency of the power output and, in the case of smart meters, the pattern of sending and receiving transmissions to and from all sources. Be also aware that any electric meter is a "hot spot" for elevated magnetic fields, which is why frequent-use rooms such as bedrooms and dining areas should be located away from electrical meters."

In addition to the emissions from the smart meter itself, smart metering can turn every single appliance into the equivalent of a transmitting cell phone, and this at a time when public concern about the safety of exposure to the radiofrequency radiation (RF) of wireless technologies is on the rise.

And consumers have no choice. It cannot be turned off.

There is radiation from transmission since transmitters inside the home will communicate with a Smart Meter attached to the outside of the house. That meter, in turn, will transmit at an even higher frequency to a central hub installed in local neighborhoods. In "mesh networks," signals can also be bounced from house-meter to house-meter before reaching the final hub. So, exposures will not just emanate from the homeowner's own meter, but accumulate from possibly 100-to-500 of neighbors' meters as well.

We have seen no fact sheet, no informational letter, from West Penn explaining this network of radiation or the levels involved. Consumers have not been provided with any of the critical data. The witness for West Penn was woefully ill -informed of the:

“ intensity, duration, and frequency of the power output and, in the case of smart meters, the pattern of sending and receiving transmissions to and from all sources” as described by EM&R of Environmental Testing and Technology of California.

West Penn has clearly not fulfilled the PUC mission of educating the public.

In addition, the Commission states: “The Commission believes that the *true usefulness* of a smart meter is to provide information to **empower customers** to control their electric use, for knowledge is power.”

If the true usefulness of a smart meter is to empower me as a customer, I forego that empowerment, and will continue to inform myself on energy usage in the traditional manner-by reading, buying energy efficient appliances, and minimizing usage to the extent possible.

(mission statement from PUC site: http://www.puc.state.pa.us/General/pdf/About_the_PUC_FS.pdf)

6. Legal Process- Based On Out of Date Data There are now thousands of independently conducted, peer reviewed research studies indicating risks posed to health resulting from exposure to EMFs. I question the scope and adequacy of testimony to the Legislators, the PUC, and consequently, West Penn, on the effects of EMFs, accordingly, the legal process that resulted in forced smart meters. Who selected the expert witnesses and how many expert witnesses were present to advocate for protection of public health? Additionally, the data from 2008, when the Act was passed, is incomplete and out of date.

According to the National Institute of Health working group, “**Current FCC public radiation exposure guidelines were set decades ago, based on the outdated premise that a device would need to emit enough heat to raise the temperature of one’s skin in order to cause harm. There are now over 25,000 articles published, and the majority of non-industry funded studies show great evidence of biological harm at the non-thermal level and the mechanisms of harm are being identified. Children and fetuses are especially vulnerable, as are the elderly and those with existing health conditions such as multiple chemical sensitivities, mold toxicity and chronic illnesses.**”

<https://hibr.nih.gov/workgroups/electromagnetic-fields-emf-and-electromagnetic-radiation-emr>

Without in-depth, comprehensive examination of valid, current, scientific data, from those scientists who have found adverse health risks related to the meters, legislators nor the PUC-West Penn, can assert with confidence, that smart meters can reliably be assumed to pose no risk to public health. Nor can they claim that the legal process is informed.

It is the responsibility of the PUC and West Penn to access updated research both technical and health-related, and inform legislators of those recent findings in order that Act 129 be amended, changing the mandate “Electric distribution companies *shall* furnish smart meters” to *MAY* furnish smart meters to allow individuals to opt out of the program.

7. Government Agencies, Health Organizations and the FCC Failure of the PUC, thus West Penn, to give weight to the recommendations and guidance of federal agencies to the

FCC. Several national agencies have acknowledged harmful effects of EMFS and have advised that FCC standards are flawed.

The U.S. Department of Interior, 2014:

“Study results have documented [bird] nest and site abandonment, plumage deterioration, locomotion problems, reduced survivorship, and death.... The electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today.”

<https://takebackyourpower>

The 2009 U.S. President’s Cancer Panel pointed to cell phones and other wireless technologies as potential causes of cancer. In its recommendations, the panel stated:

“ Incidence of brain cancer, particularly glioma, and other types of cancer has increased concomitantly with use of cell phones and other modes of wireless communication. Although not all of the data are conclusive, this area should receive attention from the U.S. Government.”

8. Standards for public health as determined by *public health policy* have not been considered.

“Often, the *industry view* of allowable risk and proof of harm is most influential, rather than what *public health experts* would determine is acceptable.

Scientists and public health policy experts *use very different definitions of the standard of evidence used to judge the science, so they* come to different conclusions about what to do. Some experts say that all studies have to be consistent (turn out the same way every time) before they are comfortable saying an effect exists.”

Public health policy does not require consistency in all studies. Public health policy is established to **prevent** harm to public health.

“ The Bionitative report compiled by 29 independent eminent scientists and health experts from around the world including the Chair of the Russian National Committee on Non-Ionizing Radiation and the Senior Advisor to the European Environmental Agency, after reviewing, collating, and summarizing 3800 peer-reviewed scientific studies came to the clear consensus that the existing public safety limits are inadequate for both ELF and RF.

The Precautionary Principle: Leaders from around the world take the harmful effects of EMFs much more seriously . Switzerland, Italy, France, Austria, Luxembourg, Bulgaria, Poland, Hungary, Israel, Russia and China and have set RF exposure limits 100 to 10,000 times less than the USA. They recognize that there can be non-thermal biological effects from wireless radiation.” Ultimately, these nations are assuming The Precautionary Principle that states “if an action or policy has a suspected risk of causing harm to the public, or to the environment, in the absence of scientific consensus (that the action or policy is not harmful), the burden of proof that it is not harmful falls on those taking that action.”

RESEARCH

This information is by no means inclusive. It is only representative of the thousands of studies on health effects and these studies are directly related to existing family health problems which is one of our primary concerns. At the hearing before Judge Watson, it was made clear that research in any form would not be accepted without a witness from that field. That is unaffordable, so the only option is to include that material which relates and supports my arguments regarding health issues, knowing it will not be considered as part of the decision, but must be presented as the concerns expressed reflect those of researchers; they are not exclusively concerns of my husband and me.

A. " The Bioinitiative Report 2012, was prepared by 29 authors from ten countries including three former presidents of the Bioelectromagnetics Society. One distinguished author is the Chair of the Russian National Committee on Non-Ionizing Radiation. Another is a Senior Advisor to the European Environmental Agency.

The authors reviewed 3800 studies and concluded that biological effects "are clearly established and occur at very low levels of exposure to electromagnetic fields and radiofrequency radiation. Many of these bioeffects can reasonably be presumed to result in adverse health effects if the exposures are prolonged or chronic. This is because they interfere with normal body processes (disrupt homeostasis) (Homeostasis is the state of steady internal physical and chemical conditions maintained by living systems.[1] This dynamic state of equilibrium is the condition of optimal functioning for the organism and includes many variables, such as body temperature and fluid balance, being kept within certain pre-set limits (homeostatic range). Other variables include the pH of extracellular fluid, the concentrations of sodium, potassium and calcium ions, as well as that of the blood sugar level, and these need to be regulated despite changes in the environment, diet, or level of activity. Each of these variables is controlled by one or more regulators or homeostatic mechanisms, which together maintain life.), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resilience to disease across multiple pathways.

*(Assessment of Radiofrequency, Microwave Radiation Emissions from Smart Meters, Sage Associates Santa Barbara, CA
http://sagereports.com/smart-meter-rf/docs/Smart-Meter_Report.B-Tables.pdf)*

B. 2019 Signatories of the International EMF Scientist Appeal have all published papers in peer-reviewed journals on the biological or health effects of EMFs and include over 230 scientists from more than 40 countries. The signatories have expressed their "serious concerns" regarding the ubiquitous and increasing exposure to EMF generated by electric and wireless devices. " and note that the overall weight-of-evidence strongly supports greater precaution.

"Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines". Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plants and animals."

For the list of international signatories: <https://emfscientist.org/index.php/emf-scientist-appeal>

C. The "Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters, Sage Associates Santa Barbara, CA:

"Safety standards for peak exposure limits to radiofrequency have not been developed to take into account the particular sensitivity of the eyes, testes. There are no peak power limits defined for the eyes and testes, and it is not unreasonable to imagine situations where either of these organs comes into close contact with smart meters and/or collector meters.

In summary, no positive assertion of safety can be made by the FCC with respect to pulsed RF when exposures are chronic and occur in the general population. There is too much information to the contrary. Indiscriminate exposure to environmentally ubiquitous pulsed RF from the rollout of millions of new RF sources (smart meters) will mean far greater general population exposures, and potential health consequences. **Uncertainties about the existing RF environment (how much RF exposure already exists), what kind of interior reflective environments exist (reflection factor), how interior space is utilized near walls, and other characteristics of residents (age, medical condition, medical implants, relative health, reliance on critical care equipment that may be subject to electronic interference, etc.) and unrestrained access to areas of property where meter is located all argue for caution.**

(The reflectivity of a surface is a measure of the amount of reflected radiation. It can be defined as the ratio of the intensities of the reflected and incident radiation. The reflectivity depends on the angle of incidence, the polarization of the radiation, and the electromagnetic properties of the materials forming the boundary surface. These properties usually change with the wavelength of the radiation. The reflectivity of polished metal surfaces is usually quite high (such as stainless steel and polished metal surfaces typical in kitchens, for example). Reflections can significantly increase localized RF levels. High uncertainty exists about how extensive a problem this may create in routine installations of smart meters, where the utility and installers have no idea what kind of reflectivity is present within the interior of buildings.)

Bioeffects are clearly established and occur at very low levels of exposure to electromagnetic fields and radiofrequency radiation. Bioeffects can occur in the first few minutes at levels associated with cell and cordless phone use. Bioeffects can also occur from just minutes of exposure to mobile phone masts (cell towers), WI-FI, and wireless utility 'smart' meters produce whole-body exposure. Chronic base station level exposures can result in illness.

Many of these bioeffects can reasonably be presumed to result in adverse health effects if the exposures are prolonged or chronic."

(Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters Sage Associates Santa Barbara, CA)

USA http://sagereports.com/smart-meter-rf/docs/Smart-Meter_Report.B-Tables.pdf

D. "Scientific literature has proven that exposure to wireless radiation is responsible for numerous medical symptoms and conditions. The landmark study by the National Institute for Environmental Health Sciences (NIEHS) has shown that DNA damage as well as brain and heart tumors develop in mice exposed to cell phone radiation. According to the government liaison for the America Academy for Environmental

Medicine, the science documenting negative health effects of smart meters and Wi-Fi is emerging. Many people are already experiencing radiation related symptoms in schools, homes, and workplaces. Effects can include insomnia, headaches, fast heartbeat, dysautonomia, anxiety, tinnitus (ringing in the ears), tingling, nausea, skin rashes, cognitive impairment, depression, and behavioral issues. Non-industry funded scientists indicate children and fetuses are especially vulnerable. The science on EMFs has existed for decades, and other countries have already established more protective radiation exposure limits. Many physicians in the United States are seeing patients every day with electrical intolerance induced by overexposure in their environment.”

(Lisa Lavine Nagy, M.D, government liaison for the American Academy of Environmental Medicine, Environmental Health Trust)

<https://ehtrust.org/massachusetts-leads-nation-five-bills-protect-citizens>)

E. “The International Agency for Research on Cancer of the World Health Organization classified Extremely Low Frequency EMF “possibly carcinogenic to humans” (Group 2B) a decade earlier than RFR.

Dr. Henry Lai, Professor Emeritus at the University of Washington and Co-Editor-in-Chief of the journal *Electromagnetic Biology and Medicine*, has compiled summaries of several areas of the research on the biologic and health effects of exposure to RFR and ELF EMF. His sets of abstracts which cover the period from 1990 to 2017 constitute a comprehensive collection of this research.

Dr. Lai finds that the preponderance of the research has found that exposure to RFR (radio frequency radiation) or ELF (extremely low frequency) EMF produces oxidative stress or free radicals, and damages DNA. Moreover, the preponderance of RFR studies that examined neurological outcomes has found significant effects.”

<https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=iebm20>

F. “This is a commentary on the California Council on Science and Technology (CCST)report, “*Health Impacts of Radio Frequency from Smart Meters*” published January 2011. I submit that the CCST report, written in response to health concerns expressed by Assembly Members of the California Legislature, contains inaccuracies and minimizes the biological effects and health impacts of non-thermal radiofrequency radiation, such as those produced by **wireless technologies including Smart Meters.**

Dr. Karl Maret, For the record, my qualifications to make this commentary are that I hold a Bachelor of Science in Electrical Engineering, a Master of Engineering degree in Biomedical Engineering, and a Medical Doctor degree and have additionally completed a four-year post- doctoral fellowship in physiology. I have been interested in the health effects of electromagnetic fields (EMFs) for many years and given lectures about the potential health impacts of non-ionizing radiations, both in Europe and the United States. I am president of a non-profit foundation interested in energy medicine, a sub-specialty within the field of Complementary and Alternative Medicine (CAM) as defined by the National Center for

Complementary and Alternative Medicine (NCCAM), a center within the U.S. National Institutes of Health (NIH).

There is now a large body of scientific literature describing several key mechanisms for the action of weak electromagnetic fields. These include, among others:

- **removal of calcium ions bound to cellular membranes, leading to their weakened structure and changed cellular functioning**
- **change of calcium ions leading to changes in metabolic processes in cells,**
- **the leakage of calcium ions into neurons generating spurious action potentials,**
- **fragmentation of DNA in cells seen through the Comet assay**
- **changes in the blood-brain barrier in animals after microwave exposure**
- **defined cellular stress response, including the production of heat shock proteins (HSP), that are triggered electromagnetically at non-thermal levels that require much less energy than when triggered by heat (so-called thermal considerations)**
- **activation of specific genes by exposure to non-thermal electromagnetic fields leading to gene transcription to form RNA, the first stage in the synthesis of proteins**

All these biological effects are well substantiated in the scientific literature and occurred at much lower exposure levels than current FCC standards, but are minimized by the CCST report. It takes many years for definitive health effects to be substantiated beyond all shadow of doubt. Yet the evidence is accumulating that health effects will become more widespread, given sufficient time, from the scientifically researched biological responses to RFR.

The European community has been more concerned about non-thermal radio frequency radiation effects while our government has essentially stopped funding all research in this area (see below). The extensive REFLEX study involving research groups from seven countries found effects on biological systems from cell phone radiation at levels 1/40th of the level of accepted safety guidelines promulgated by the International Commission on Non- Ionizing Radiation Protection (ICNIRP) (Adlkofer, 2006). This report focused on a four-year international collaboration of twelve European research groups involving in vitro studies of non-thermal radiofrequency radiation from cell phones. Even Austrian insurance companies are now accepting the dangers from non-thermal electromagnetic radiation from cell phones (AUVA Report, 2009).

Biological systems often respond in a non-linear manner and there is a large degree of genetic variability as to how animals or people are affected. Non-thermal EMFs might be comparable to the hazards of low levels of toxins found in the environment which can be potent in very low levels at disrupting enzyme systems in the body, but may not be proportionately worse at higher levels."

*Commentary on the California Council on Science and Technology Report, **Health Impacts of Radio Frequency from Smart Meters***

By Dr. Karl Maret, Dove Health Alliance, Aptos, CA January 30, 2011

<http://sagereports.com/smart-meter-rf/docs/letters/Maret - CCST Commentary 1-31-2011 final.pdf>

(my qualifications to make this commentary are that I hold a Bachelor of Science in Electrical Engineering, a Master of Engineering degree in Biomedical Engineering, and a Medical

Doctor degree and have additionally completed a four-year post- doctoral fellowship in physiology. I have been interested in the health effects of electromagnetic fields (EMFs) for many years and given lectures about the potential health impacts of non-ionizing radiations, both in Europe and the United States. I am president of a non-profit foundation interested in energy medicine, a sub-specialty within the field of Complementary and Alternative Medicine (CAM) as defined by the National Center for Complementary and Alternative Medicine (NCCAM), a center within the U.S. National Institutes of Health (NIH).)

G. Wilke I. Review: *Biological and pathological effects of 2.45 GHz radiation on cells, fertility, brain, and behavior*, *umwelt • medizin • gesellschaft*. 2018; 31 (1) Suppl: 1-32. 2018. (English translation)

The available studies document damage to the reproductive system, impacts on the EEG and brain functions, as well as effects on the heart, liver, thyroid, gene expression, cell cycle, cell membranes, bacteria, and plants. As a mechanism of action, many studies identify oxidative stress. Adverse effects on learning, memory, attention, and behavior are the result of cytotoxic effects.

Conclusions: Based on the extensive body of research and the adverse health effects demonstrated in the majority of the studies, it is recommended that steps should be taken to minimize RF radiation exposure in accordance with official recommendations. **Wired solutions should be given preference. Current exposure limits and SAR (specific absorption rate -measurement of how much electromagnetic radiation is absorbed by body tissue while using a mobile phone) values do not protect from health risks associated with Wi-Fi radiation.** The adverse effects on learning, attention, and behavior serve as a basis for educational institutions of all age groups to forgo the use of Wi-Fi applications. Due to cytotoxic effects, Wi-Fi technologies are not suitable for hospitals and telemedicine. Wi-Fi technologies should not be used in bedrooms, work spaces, common lounges, hospital rooms, lecture halls, classrooms, and public transport. The possible risks associated with Wi-Fi radiation could be avoided by testing alternative technologies at other frequency bands like optical VLC/Li-Fi technologies (visible light communication). When Wi-Fi cannot be avoided as a transition solution, the ALARA principle must be applied: no continuous transmission, **instead Wi-Fi networks that can be turned off and feature dynamic power management.**

To date, there are a few long-term studies, very few in humans and even fewer epidemiological studies, apart from the studies on laptops with small numbers of study subjects. It is also far too early to generate reliable figures at this time. However, there are indications that especially newborns, children, or adolescents are particularly vulnerable as has been presented in detail by the research teams of Nazırođ lu, Atasoy, Margaritis/ Panagopoulos, Orendac ˆ ova, Othmann, Ozorak, Sangun, Shahin and Yuksel.

“Potential health impacts of non-ionizing radiation from EMF/RF (electromagnetic fields/radiofrequencies) of 30 KHz – 300 GHz include carcinogenicity (Class B, IARC 2011), developmental neurotoxicity, effects on DNA, fertility, hypersensitivity and other serious effects are well documented in peer reviewed studies. RFR can increase oxidative stress in cells and lead to increase of pro-inflammatory cytokines and lower capacity to repair DNA single- and double-strand breaks. Cognitive impairments in learning and memory have also been shown. These effects can occur at levels well below existing limits of

ICNIRP. ... Exposure to EMF/RF at an early developmental stage is of particular concern due, amongst other, to greater absorption and potential effects on the developing brain, nervous system as well as their reproductive system, may induce cancer, cognitive effects, etc."

Wi-Fi must not be used continuously and close to the human body.

(www.diagnose-funk.org/publikationen/artikel/detail&newsid=1242 and www.cyprus-child-environment.org/easyconsole.cfm/id/428).

H. Topsakal S, Ozmen O, Cicek E, Comlekci Si. *The ameliorative effect of gallic acid on pancreas lesions induced by 2.45 GHz electromagnetic radiation (Wi-Fi) in young rats.* Journal of Radiation Research and Applied Sciences, Available online 4 May 2017.

Highlights

- Effects of electromagnetic radiation (EMR) on pancreata examined by immunohistochemical level.
- **EMR exposure caused both endocrine and endocrine pancreas problems.**
- **Our results indicate possible relation with EMR and pancreatic lesions in developmental ages.**

At the immunohistochemical examination, marked increase was observed in calcitonin gene related protein and Prostaglandin E2 expressions in pancreatic cells in this group. There were no changes in interleukin-6 expressions. GA ameliorated biochemical and pathological findings in the EMR+GA group. These findings clearly demonstrate that EMR can cause degenerative changes in both endocrine and exocrine pancreas cells in rats during the developmental period and GA has an ameliorative effect.

<http://www.sciencedirect.com/science/article/pii/S1687850717300468>

I. Rainer Nyberg, EdD, Professor Emeritus (Åbo Akademi), Vasa, Finland
(NRNyberg@abo.fi)
lennart.hardell@regionorebrolan.se)

The EUROPA EM-EMF Guideline 2016 states that, "there is strong evidence that long-term exposure to certain EMFs is a risk factor for diseases such as certain cancers, Alzheimer's disease, and male infertility...Common EHS (electromagnetic hypersensitivity) symptoms include headaches, concentration difficulties, sleep problems, depression, lack of energy, fatigue, and flu-like symptoms."

An increasing part of the European population is affected by ill health symptoms that have for many years been linked to exposure to EMF and wireless radiation in the scientific literature. **The International Scientific Declaration on EHS & multiple chemical sensitivity (MCS), Brussels 2015, declares that: "In view of our present scientific knowledge, we thereby stress all national and international bodies and institutions...to recognize EHS and MCS as true medical conditions which acting as sentinel diseases may create a major public health concern in years to come worldwide i.e. in all the countries implementing unrestricted use of electromagnetic field-based wireless technologies and marketed chemical substances..."**

J. **"Dr. Henry Lai, Professor Emeritus at the University of Washington and Co-Editor-in-Chief of the journal *Electromagnetic Biology and Medicine*, has compiled summaries of several areas of the research on the biologic and health effects of exposure to**

RFR and ELF EMF. His sets of abstracts which cover the period from 1990 to 2017 constitute a comprehensive collection of this research.

Dr. Lai finds that **the preponderance of the research has found that exposure to RFR or ELF EMF produces oxidative stress or free radicals, and damages DNA. Moreover, the preponderance of RFR studies that examined neurological outcomes has found significant effects.**"

<https://www.tandfonline.com/action/journalInformation?show=editorialBoard&journalCode=iebm20>

K. **Martínez-Sámano J, Flores-Poblano A, Verdugo-Díaz L, Juárez-Oropeza MA, Torres-Durán PV. Extremely low frequency electromagnetic field exposure and restraint stress induce changes on the brain lipid profile of Wistar rats.** BMC Neurosci. 2018 May 21;19(1):31. doi: 10.1186/s12868-018-0432-1.

BACKGROUND: Exposure to electromagnetic fields can affect human health, damaging tissues and cell homeostasis. Stress modulates neuronal responses and composition of brain lipids. The aim of this study was to evaluate the effects of chronic extremely low frequency electromagnetic field (ELF-EMF) exposure, restraint stress (RS) or both (RS + ELF-EMF) on lipid profile and lipid peroxidation in Wistar rat brain.

METHODS: Twenty-four young male Wistar rats were allocated into four groups: control, RS, ELF-EMF exposure, and RS + ELF-EMF for 21 days. After treatment, rats were euthanized, the blood was obtained for quantitate plasma corticosterone concentration and their brains were dissected in cortex, cerebellum and subcortical structures for cholesterol, triacylglycerols, total free fatty acids, and thiobarbituric acid reactive substances (TBARS) analysis. In addition, fatty acid methyl esters (FAMES) were identified by gas chromatography.

RESULTS: Increased values of plasma corticosterone were found in RS and ELF-EMF exposed groups ($p < 0.05$), this effect was higher in RS + ELF-EMF group ($p < 0.05$, vs. control group). **Chronic ELF-EMF exposure increased total lipids in cerebellum, and total cholesterol in cortex, but decreased polar lipids in cortex.** In subcortical structures, increased concentrations of non-esterified fatty acids were observed in RS + ELF-EMF group. FAMES analysis revealed a decrease of polyunsaturated fatty acids of cerebellum and increases of subcortical structures in the ELF-EMF exposed rats. TBARS concentration in lipids was increased in all treated groups compared to control group, particularly in cortex and cerebellum regions.

CONCLUSIONS: These findings suggest that chronic exposure to ELF-EMF is similar to physiological stress, and induce changes on brain lipid profile.

<https://www.ncbi.nlm.nih.gov/pubmed/29783956>

L. Dasdag et al. *Effects of 2.4 GHz radiofrequency radiation emitted from Wi-Fi equipment on microRNA expression in brain tissue.* Int J Radiat Biol 2015 Jul; 9(17):555-561. Abstract

PURPOSE: *MicroRNAs* (miRNA) play a paramount role in growth, differentiation, proliferation and cell death by suppressing one or more target genes. However, their interaction with radiofrequencies is still unknown. The aim of this study was to investigate **the long-term effects of radiofrequency radiation emitted from a Wireless Fidelity (Wi-Fi) system on some of the miRNA in brain tissue.**

MATERIALS AND METHODS: The study was carried out on 16 Wistar Albino adult male rats by dividing them into two groups such as sham (n = 8) and exposure (n = 8). Rats in the exposure group were exposed to 2.4 GHz radiofrequency (RF) radiation for 24 hours a day for 12 months (one year). The same procedure was applied to the rats in the sham group except the Wi-Fi system was turned off. Immediately after the last exposure, rats were sacrificed and their brains were removed. miR-9-5p, miR-29a-3p, miR-106b-5p, miR-107, miR-125a-3p in brain were investigated in detail.

RESULTS: The results revealed that long-term exposure of 2.4 GHz Wi-Fi radiation can alter expression of some of the miRNAs such as miR-106b-5p (adj p* = 0.010) and miR-107 (adj p* = 0.005). We observed that mir 107 expression is 3.3 times and miR- 106b-5p expression is 3.65 times lower in the exposure group than in the control group. However, miR-9-5p, miR-29a-3p and miR-125a-3p levels in brain were not altered.

CONCLUSION: Long-term exposure of 2.4 GHz RF may lead to adverse effects such as neurodegenerative diseases originated from the alteration of some microRNA expression and more studies should be devoted to the effects of RF radiation on micro RNA expression levels.

<http://www.ncbi.nlm.nih.gov/pubmed/25775055?dopt=Abstract>

M. “Repeated Wi-Fi studies show that Wi-Fi causes oxidative stress, sperm/testicular damage, neuropsychiatric effects including EEG changes, apoptosis, cellular DNA damage, endocrine changes, and calcium overload Each of these effects are also caused by exposures to other microwave frequency EMFs, with each such effect being documented in from 10 to 16 reviews. Therefore, each of these seven EMF effects are established effects of Wi-Fi and of other microwave frequency EMFs. Each of these seven is also produced by downstream effects of the main action of such EMFs, voltage-gated calcium channel (VGCC) activation. While VGCC activation via EMF interaction with the VGCC voltage sensor seems to be the predominant mechanism of action of EMFs, other mechanisms appear to have minor roles. Minor roles include activation of other voltage-gated ion channels, calcium cyclotron resonance and the geomagnetic magnetoreception mechanism.

five properties of non-thermal EMF effects are discussed. These are that **pulsed EMFs are, in most cases, more active than are non-pulsed EMFs**; artificial EMFs are polarized and such polarized EMFs are much more active than non-polarized EMFs; **dose-response curves are non-linear** and non-monotone; **EMF effects are often cumulative**; and EMFs may impact young people more than adults.” Pall ML. *Wi-Fi is an important threat to human health. Environmental Research.* 164:405-416. 2018. <https://doi.org/10.1016/j.envres.2018.01.035>

N. Esmekaya et al, 2010. *Pulse modulated 900 MHz radiation induces hypothyroidism and apoptosis in thyroid cells: A light, electron microscopy and immunohistochemical study* 2 Int. J. Radiat. Biol., Vol. 86, No. 12, December 2010, pp. 1106–1116

[:http://www.avaate.org/IMG/pdf/Tiroides_Pulse_modulated_900_MHz_radiation_induce_hypothyroidism_and_apoptosis.pdf](http://www.avaate.org/IMG/pdf/Tiroides_Pulse_modulated_900_MHz_radiation_induce_hypothyroidism_and_apoptosis.pdf)

Rats were exposed to a 900 MHz pulse-modulated RF (cell phone) radiation at a specific absorption rate (SAR) of 1.35 Watt/kg for 20 min/day for three weeks.] **“The results**

indicated that thyroid hormone secretion was inhibited by the RF radiation. In addition, we also observed formation of apoptotic bodies and increased caspase-3 and caspase-9 activities in thyroid cells of the rats that were exposed to modulated RF fields. **Conclusion: The overall findings indicated that whole body exposure to pulse-modulated RF radiation that is similar to that emitted by global system for mobile communications (GSM) mobile phones can cause pathological changes in the thyroid gland by altering the gland structure**

{See addendum for more thyroid studies.}

O. Bandara P, Carpenter DO. Planetary electromagnetic pollution: it is time to assess its impact. *The Lancet Planetary Health*. 2(12):Pe512-e514, December 01, 2018. [https://doi.org/10.1016/S2542-5196\(18\)30221-3](https://doi.org/10.1016/S2542-5196(18)30221-3)

“The most notable is the blanket of radiofrequency electromagnetic radiation, largely microwave radiation generated for wireless communication and surveillance technologies, as mounting scientific evidence suggests that prolonged exposure to radiofrequency electromagnetic radiation has serious biological and health effects. However, public exposure regulations in most countries continue to be based on the guidelines of the International Commission on Non-Ionizing Radiation Protection and Institute of Electrical and Electronics Engineers, which were established in the 1990s on the belief that only acute thermal effects are hazardous. **Prevention of tissue heating by radiofrequency electromagnetic radiation is now proven to be ineffective in preventing biochemical and physiological interference. For example, acute non-thermal exposure has been shown to by NIH scientists alter human brain metabolism, electrical activity in the brain, and systemic immune responses. Chronic exposure has been associated with increased oxidative stress and DNA damage and cancer risk.** Laboratory studies, including large rodent studies by the US National Toxicology Program and Ramazzini Institute of Italy, confirm these biological and health effects in vivo.”

Open access paper: [https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(18\)30221-3/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(18)30221-3/fulltext)

P. The effect of 2.45 GHz non-ionizing radiation on the structure and ultrastructure of the testis in juvenile rats

Šimaiová V, Almášiová V, Holovská K, Kisková T, Horváthová F, Ševčíková Z, Tóth Š, Raček A, Račeková E, Beňová K, Dvořák P, Cigánková V. The effect of 2.45 GHz non-ionizing radiation on the structure and ultrastructure of the testis in juvenile rats. *Histol Histopathol*. 2018 Sep 27:18049. doi: 10.14670/HH-18-049.

RESULTS: EMR caused an irregular shape of seminiferous tubules with desquamated immature germ cells in the lumen, a large number of empty spaces along the seminiferous epithelium and dilated and congested blood vessels in the interstitial tissue of the testis. The cytoplasm of Sertoli cells showed strong vacuolization and damaged organelles, with the cytoplasm full of different heterophagic and lipid vacuoles or the cytoplasm of spermatocytes with swollen mitochondria in both irradiated groups. A significant increase in the total tubular area of seminiferous tubules was observed in both EMR groups compared with controls ($P < 0.001$). A significant increase in the TUNEL-positive apoptotic nuclei ($P < 0.01$) was accompanied by a significant rise in both Cu-Zn-SOD ($P < 0.01$) and Mn-

SOD ($P < 0.001$) positive cells in the 6 week old experimental rats compared to control animals.

CONCLUSION: Our results confirmed **The effect of 2.45 GHz non-ionizing radiation on juvenile rats showed a harmful effect of non-ionizing radiation on the structure and ultrastructure of the juvenile rat testis.**

<https://www.ncbi.nlm.nih.gov/pubmed/30259955>

It is incumbent on the PUC and West Penn to inform legislators that there has been an information explosion regarding emf's since Act 129 was passed in 2008, and concurrence among numbers of eminent scientists that smart meters pose potential health risks. Therefore, the PUC/West Penn, in an effort to protect consumers health and choice, should advocate that the word "shall" in Act 129 regarding the installation of smart meters should be changed to "may" making the installation optional. We request an exemption from installation.

Data on Emissions/Exposure:

The data used by utilities to argue the safety of smart meters has been questioned by scientists, reporters, and a utility administrative judge, and has been found , in many cases, to be flawed. One utility admitted that there are variations in emission reports that affect exposure and consequently risk to humans. This kind of data thus far has been inaccessible to consumers in PA.

A smart meter emits emf's throughout the day on a constant basis. Scientists note that exposure is underestimated due to lack of consideration of reflectivity, whole body exposure, the pulsed nature of smart meters, and use of statistics that average pulses. Furthermore, testing was not done with consideration of children's bodies versus adults.

1. Health Effects Can Result from Low Level Exposure

A. Dr. Ronald B. Herberman, Founding Director of the University of Pittsburgh Cancer Institute, Vice Chancellor of Cancer Research at University of Pittsburgh and the first head of an NCI funded cancer center

"A disservice has been done in inaccurately depicting the body of science, which actually indicates that there *are* biological effects from the radiation emitted by wireless devices, including damage to DNA, and evidence for increased risk of cancer and other substantial health consequences...The public the world over has been misled by this reporting."

B. BIOINITIATIVE Report 2012 *Bioeffects With Chronic Exposures Can Reasonably Be Presumed to Result in Adverse Health Effects.*

The Bio Initiative Report 2012 reviewed 3800 studies and concluded that biological effects "are clearly established and occur at very low levels of exposure to electromagnetic fields and radiofrequency radiation." As from wi-fi and smart meters.

. Bioeffects can occur in the first few minutes at levels associated with cell and cordless phone use. **Bioeffects can occur from just minutes of exposure to mobile phone masts (cell towers), WI-FI, and wireless utility ‘smart’ meters that produce whole-body exposure.** Chronic base station level exposures can result in illness.

Many of these bioeffects can reasonably be presumed to result in adverse health effects if the exposures are prolonged or chronic. This is because they interfere with normal body processes (disrupt homeostasis), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resilience to disease across multiple pathways. Essential body processes can eventually be disabled by incessant external stresses (from system- wide electrophysiological interference) and lead to pervasive impairment of metabolic and reproductive functions.

BIOINITIATIVE 2012 - CONCLUSIONS Table 1-1 (Genetics and Neurological Effects Updated March 2014)

http://www.bioinitiative.org/report/wp-content/uploads/pdfs/section_1_table_1_2012.pdf

<https://www.healthandenvironment.org/environmental-health/environmental-risks/built-environment>

<https://www.magdahavas.com/wp-content/uploads/2011/06/BioInitiative-2007.pdf>
(public summary)

C. Because the World Health Organization considers wireless radiation a possible human carcinogen, it states wireless radiation does not belong in schools with young children” Yet West Penn, with no exceptions, mandates it in homes .

Anthony B. Miller MD PhD, expert advisor to WHO, Professor Emeritus University of Toronto in The C4ST Women’s College Hospital Symposium 9/12/14 <http://ehtrust.org/wp-content/uploads/2015/12/Schools-and-Wireless-Briefing-October-2015.pdf>

D. As previously stated, US Agencies have commented that FCC exposure standards are seriously flawed and not based on non- thermal heating.

In addition , **“The FCC guidelines for public RF exposure are based on 30 minute exposures, not every day 24/7 type of exposures.**

“Current regulations do not take into account the plethora of peer reviewed studies that show health effects and cellular damage at 1,000 to 10,000 times lower than the thermal-based standard used today.

Waiting 40 years to document the damage, as was done with tobacco use, will be too late for our children.

Taking action to reduce exposure is imperative to protect our future generation and that is why we are speaking out on this issue.”

David Wientjes of Woodacre, president of the Council on Wireless Technology Impacts.

<http://www.marinij.com/opinion/20110109/marin-voice-smart-to-worry-about-smartmeters>

2. Children Current testing procedures do not consider the smaller size of children and teen bodies and brains.

3. Unlike other emitting devices, you can't turn off a smart meter.

4. Whole Body Exposure An error that has been pointed out by scientists is that everything should be compared in terms of average whole body exposure but is not. The cumulative whole body exposure from a Smart Meter at 3 feet appears to be approximately two orders of magnitude higher than that of a cell phone, rather than two orders of magnitude lower.

See chart--Figure A. Comparison of Radio-Frequency Levels to the Whole Body from Various Sources in $\mu\text{W}/\text{cm}^2$ over time [corrected for assumed duty cycle and whole body exposure extrapolated from assumed cell phone dose at ear].

Comments on the Draft Report by the California Council on Science and Technology "Health Impacts of Radio Frequency from Smart Meters" by Daniel Hirsch 31 January 2011, lecturer and expert in nuclear policy and radiation at UCSC,

It is strongly recommended that CCST (California Council on Science and Technology) revise its Draft Report and that actual measurements of cell phone, microwave oven, and SmartMeter RF cumulative whole-body power densities be conducted. . If measurements aren't made, then rigorous calculations correcting for cell phone and microwave oven duty cycles and whole-body exposures should be made.

See chart--Figure A. Comparison of Radio-Frequency Levels to the Whole Body from Various Sources in $\mu\text{W}/\text{cm}^2$ over time [corrected for assumed duty cycle and whole-body exposure extrapolated from assumed cell phone dose at ear]."

Comments on the Draft Report by the California Council on Science and Technology "*Health Impacts of Radio Frequency from Smart Meters*"

by Daniel Hirsch, lecturer and expert in nuclear policy and radiation at UCSC,
http://eon3emfblog.net/wp-content/uploads/2011/02/110212_GBG-on-Smart-Meters.pdf

5. Polarized -----Man-made EMFs/EMR - in contrast to natural EMFs/EMR - are polarized. Polarized EMFs/EMR can have increased biological activity, due to: 1) Ability to produce constructive interference effects and amplify their intensities at many locations. 2) Ability to force all charged/polar molecules and especially free ions within and around all living cells to oscillate on parallel planes and in phase with the applied polarized field. Such ionic forced-oscillations exert additive electrostatic forces on the sensors of cell membrane electro-sensitive ion channels, resulting in their irregular gating and consequent disruption of the cell's electrochemical balance. These features render man-made EMFs/EMR more bioactive than natural non-ionizing EMFs/EMR. This explains the increasing number of biological effects discovered during the past few decades to be induced by man-made EMFs, in contrast to natural EMFs in the terrestrial environment which have always been present throughout evolution, although human exposure to the latter ones is normally of significantly higher intensities/energy and longer durations. Thus, polarization seems to be a trigger that significantly increases the probability for the initiation of biological/health effects.

6. Pulsed and Averaging

Five properties of non-thermal EMF effects are discussed. **Pulsed EMFs are, in most cases, more active than are non-pulsed EMFs; artificial EMFs are polarized and such polarized EMFs are much more active than non-polarized EMFs; dose-response curves are non-linear and non-monotone; EMF effects are often cumulative; and EMFs may impact young people more than adults.**

(Pall ML. *Wi-Fi is an important threat to human health*. *Environmental Research*. 164:405-416. 2018. <https://doi.org/10.1016/j.envres.2018.01.035>
<https://www.sciencedirect.com/science/article/pii/S0013935118300355/pdf?md5=9069268a3663e48f70de7d9e2ee185c0&pid=1-s2.0-S0013935118300355-main.pdf>)

“Often Wi-Fi risk is down-played by saying “the exposure is only a fragment of the public exposure guidelines. **Current radiation guidelines are 20 years old and do not take into consideration biological effects of the pulsed-nature of the signal,** <https://smartmeterguard.com/pages/faq> [11]. **When Wi-Fi devices produce pulsed microwave radiation, its peak values will exceed several precautionary recommendation levels of what is considered safe for exposure.” Mikko Ahonen, PHD**

<http://ehtrust.org/france-new-national-law-bans-wifi-nursery-school/>
<https://www.scribd.com/document/182641315/RNCNIRP-Russia-Wi-Fi-Regulation-19-06-12-pdf>
<http://www.emf-portal.org>
<http://www.ncbi.nlm.nih.gov/pubmed/22112647,26199911,24460421,22465825,24490664>
<http://www.ncbi.nlm.nih.gov/pubmed/24792079,26578367,23479077,26520617>

***Dr. Joel Moskowitz points out, most 5G studies are misleading because they do not pulse the waves. This is important because research on microwaves already tells us how pulsed waves have more profound biological effects on our body compared to non-pulsed waves. Previous studies, for instance, show how pulse rates of the frequencies led to gene toxicity and DNA strand breaks.**

<https://www.electricsense.com/12399/5g-radiation-dangers/?fbclid=IwAR1B8P9SpmUsDmESN-1Zj8nYmnZaouvh-SoTxmi0EZDDA1XqgQD1DNYS8>

EXAMPLES

*****Pulses and Averaging** However, many researchers believe that the many Guidelines are inadequate to ensure safety. Furthermore, Researchers have found that **Peak RF levels have been averaged over 1 minute which is too long, since short-term intense pulses may have biologic effects.**

“The figures for RF exposure given by utilities are often time-averaged numbers which hide the peak power of the “smart” meter, and disguise the fairly continuous nature of the pulses. “Smart” meters are unlike cell phones or WiFi in their bizarre pattern of sharp spikes of RF.

For example, the data is available for *The PG&E Silver Springs Network “smart” meter which operates in the 902-928 MHz range, near the range of most cell phones, and in the radio-frequency microwave range (300 MHz to 3 GHz). The 2-millisecond spikes of RF (radio-frequency) it emits are randomly assigned to a pattern of alternating frequencies—the pulses keep shifting which frequency they are using. At least 90% of the pulses are not your data, but the “mesh network” talking to itself—also known as network “chatter.” The “smart” meter RF emissions constitute an all-new,*

bizarre pattern, unlike the pattern of emissions from your cell phone or any other RF-emitting device.

The spiked pulses are like a strobe light, which also emits spiked pulses, about 1/2 millisecond each. The “smart” meter pulses can go off at a rate of 2 to 20 per second. The calculations used to arrive at the low RF exposure numbers that most utilities published are arrived at by time-averaging. “Smart” meters have an unusual, unpredictable pattern of RF emissions, usually referred to as “pulses”—sudden high levels of RF followed by no emissions. Each pulse is about 2 milliseconds (2/1000th of a second) long.

By time averaging, they can bring down the total peak level that they claim the meters emit. This is bogus science. If you time-average the strong millisecond pulses of a strobe light, they “equal” a low-wattage light bulb continuously on; but no one would legitimately make such a claim. Strobe lights have distinct neurological effects in many people—headaches, dizziness, and for some- epileptic seizures.

PG&Es claim that the meters emit only 45 seconds a day. Since each pulse is about 2 milliseconds long, that comes out to 22,500 pulses a day, which can be going off at any rate, even 2 to 20 pulses per second. It is only by the specious, unscientific manipulation of the facts that utilities can claim the short emission periods that they do.

PG&E’s own documents revealed last year that their meters pulse between 10,000 and 190,000 times per day. The *median* was 10,000 pulses/day—but that means half the meters emit more than this. The reason they didn’t use a different and more usual statistical figure—the average—is because it’s likely that figure would have been higher. The highest meter they measured emitted 190,000 pulses/day. If you are wondering about meters in used by other utilities, consider this: If they claim the meter only emits “60 seconds a day”, then you can calculate the approximate number of pulses. *Sixty seconds of 3-millisecond pulses (typical) equals about 20,000 pulses.* There about 85,000 seconds in a day. If the rate of pulsing were consistent (though it never is) that would be about one pulse every 4 seconds, for the whole 24 hours. Depending on the rate of pulsing, the meter is very likely to be emitting something during most of the day. All of this speculation on our part arises because of a lack of true disclosure on the part of the manufacturers and the utilities as to how the meters operate.

Some research indicates that pulsed radiation induces a greater biological effect than constant radiation.

<https://stopsmartmeters.org/frequently-asked-questions/radio-frequency-radiation-issues/>

Karipidis K, Henderson S, Wijayasinghe D, Tjong L, Tinker R. *Exposure to Radiofrequency Electromagnetic Fields From Wi-Fi in Australian Schools*. Radiat Prot Dosimetry. 2017 Jan 10.

: <http://rpd.oxfordjournals.org/content/early/2017/01/10/rpd.ncw370.long>

http://www.bioinitiative.org/report/wp-content/uploads/pdfs/section_1_table_1_2012.pdf

b. A 2009 PG&E bulletin states that the electric meter transmits radio signals to the network only once every four hours. In another PG&E bulletin it states that the meters will transmit every hour. A professional EMF electrician measured a Smart Meter and found they emit RF every 45 seconds. Another professional expert

measured one or more a minute, on a random basis. These wireless signals penetrate walls and buildings and are re-radiated throughout homes and businesses by electrical wiring, metal plumbing, gas lines, metal fences, etc.

<http://emfsafetynetwork.org/smart-meters/complaints/smart-meter-questions/>

Constant radiation WUSA9 TV report

<https://www.youtube.com/watch?v=mvSvKlepMlc>

C. WUSA9 TV out of Washington DC reported on health effects people were experiencing from smart meters. . PEPCO stated their smart meters emit every 4 to 6 hours. An electrosmog detection meter measured radiation being emitted every few seconds, about 4 to 6 times per minute or more. PEPCO's response was that there are a lot of variables involved.

D. "Recently CPUC administrative law judge Amy Yip-Kikugawa, California, ordered all investor owned utilities (IOU's) to answer Smart Meter radio frequency (RF) questions. Question 2: How many times in total (average and maximum) is a smart meter scheduled to transmit during a 24-hour period?

PG&E said the average number of RF pulses for the electric meter would be about 10,000, per meter, per day and the maximum number over 190,000. 90% of these pulses are for the mesh network maintenance (signals bouncing from homes) and only 6 pulses are for reading the meter data. This doesn't include Home Area Network transmissions.

What are peak power figures? The PG&E electric meter transmits at 900MHz with 1 watt of transmit power. It has an antennae gain 4.0 dBi for a peak level power of 2.5 watts. That's two and a half times more than their safety data stated.

<http://emfsafetynetwork.org/pges-big-confession/>

According to the Implementation Order, the Mandatory Smart Meter Act 129 requires:

A minimum of hourly reads delivered at least once per day

The ability to provide 15 minute or shorter interval data to customers, EGSs, third parties and a regional transmission organization ("RTO") on a daily basis.

<https://www.pabulletin.com/secure/data/vol39/39-28/1266.html>

Power

ET and T, Environmental Testing and Technology of California warns, "Accurate and precise measurements for the power density and duty cycles are not easily performed even with costly professional equipment. Few instruments are able to detect the short transmission bursts properly. Average power density readings are misleading because they severely underrate the peak power levels. Research is currently ongoing to evaluate if

the Smart Meter's switching mode power supply is creating dirty electricity (signal distortions), which may be carried throughout the building through the electrical circuits."

One estimate by Southern California Edison put peak pulses at 229,000 microwatts per square centimeter at eight inches from the transmitter. That means if a person sleeps next to a wall with a smart appliance on the other side, strong signals could be spiking several times a minute all night long – into the brain. From: UNITED STATES DEPARTMENT OF ENERGY PUBLIC SCOPING MEETING

Daniel Hirsch, a radiation expert and instructor at the University of California, San Diego (UCSD) stated :

"... the cumulative whole body exposure from a Smart Meter at 3 feet appears to be approximately two orders of magnitude higher than that of a cell phone, rather than two orders of magnitude lower."

https://www.naturalnews.com/054591_Smart_meters_radiation_EMF.html

11. Reflectivity resulting in exposure to occupants.

a. For example, one smart meter at 11" from occupied space produces somewhere between 1.4 and 140 microwatts per centimeter squared ($\mu\text{W}/\text{cm}^2$) depending on the duty cycle modeled (Table 12). Since FCC OET 65 specifies that continuous exposure be assumed where the public cannot be excluded (such as is applicable to one's home), this calculation produces an RF level of $140 \mu\text{W}/\text{cm}^2$ at 11" using the FCCs lowest reflection factor of 60%. Using the FCC's reflection factor of 100%, the figures rise to $2.2 \mu\text{W}/\text{cm}^2$ – $218 \mu\text{W}/\text{cm}^2$, where the continuous exposure calculation is $218 \mu\text{W}/\text{cm}^2$.

Reflections can significantly increase localized RF levels. High uncertainty exists about how extensive a problem this may create in routine installations of smart meters, where the utility and installers have no idea what kind of reflectivity is present within the interior of buildings

Depending on the reflection factor, there can be very significantly elevated RF exposures in comparison to typical individual exposures in daily life. Multiple smart meters in the nursery/bedroom example at 11" are predicted to generate RF levels from about 5 to $481 \mu\text{W}/\text{cm}^2$ at the lowest (60%) reflection factor; and 7.5 to $751 \mu\text{W}/\text{cm}^2$ using the FCCs 100% reflection factor (Table 13). Such levels are far above typical public exposures.

RF levels at 28" in the kitchen work space are also predicted to be significantly elevated with one or more smart meters (or a collector meter alone or in combination with multiple smart meters). At 28" distance, RF levels are predicted in the kitchen example to be as high as $21 \mu\text{W}/\text{cm}^2$ from a single meter and as high as $54.5 \mu\text{W}/\text{cm}^2$ with multiple smart meters using the lower of the FCCs reflection factor of 60% (Table 14). Using the FCCs higher reflection factor of 100%, the RF levels are predicted to be as high as $33.8 \mu\text{W}/\text{cm}^2$ for a single meter and as high as $85.8 \mu\text{W}/\text{cm}^2$ for multiple smart meters (Table 14). For a single collector meter, the range is 60.9 to $95.2 \mu\text{W}/\text{cm}^2$ (at 60% and 100% reflection factors, respectively) (from Table 15).

Consumers, for whatever personal reason, choice or necessity, who have already eliminated all possible wireless exposures from their property and lives, may now

face excessively high RF exposures in their homes from *smart meters on a 24-hour basis*. This may force limitations on use of their otherwise occupied space, depending on how the meter is located, building materials in the structure, and how it is furnished.

Hondou et al (2006) establishes that Power densities 1000 times to 2000 times higher than the power density predictions from computer modeling (modeling that does not account properly for reflections) can be found in daily living situations. Power density may not fall off with distance as predicted by formulas using limited reflection factors. The RF hot spots created by reflection can significantly increase RF exposures to the public, above current public safety limits.

Smart meters emit frequencies within the 800 MHz to 2400 MHz range. (2.4 ghz)

[Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters Sage Associates Santa Barbara, CA"

USA http://sagereports.com/smart-meter-rf/docs/Smart-Meter_Report.B-Tables.pdf

What technical determinations have been made per home or building as to the reflectivity value? What monitoring systems are in place for consumers in Pennsylvania to determine exact pulse rates in their home, the transmission power at each home from peak pulse rates? Safety cannot be ensured without those checks in place, without the protocols and employees to implement those protocols.

There is no evidence of plans for those safe guards to protect West Penn consumers.

Summary

These kinds of electromagnetic fields do not occur in nature. Current FCC public radiation exposure guidelines were set decades ago, based on the outdated premise that a device would need to emit enough heat to raise the temperature of one's skin in order to cause harm. The majority of non-industry funded studies now show great evidence of biological harm to living organisms at non-thermal levels far below the exposure guidelines adopted by most industrialized nations and those mechanisms of harm continue to be identified. Scientists repeatedly warn that children and fetuses are especially vulnerable, as are the elderly and those with existing health conditions such as multiple chemical sensitivities, mold toxicity, and chronic illnesses. They are being ignored. Legislators and the PUC are not listening.

Dr. Miller, expert advisor to WHO, stated wireless radiation does not belong in schools. But in Pennsylvania, due to the smart meter mandate, radiation will be emitted into homes and other buildings in pulses and spikes possibly thousands of times a day. To completely ignore this data poses health risks to Pennsylvanians who are being forced to have smart meters installed on their homes, even as many would be willing to pay more to maintain their meter reader.

We moved to the beautiful Ligonier Valley primarily to live in an area with clean air and water. We bought several acres to provide protection from pollutants from neighboring properties, e.g. burning of trash or pesticide use. I have immune conditions and my husband has multiple health problems. Now we have the threat of being exposed to continual emf's after a lifetime of living clean to maintain the best health possible despite our genetic predispositions .

There are scientists who argue the safety of EMFs, and there is research that does *not* indicate harm. And then, there are always those scientists who will defend industry regardless,—those who even now maintain the safety of tobacco smoke, DDT, asbestos, and pharmaceuticals that have been removed from the market. But when there are thousands of peer reviewed studies by highly esteemed scientists internationally that maintain that there are serious risks involved with emfs and that smart meters need much further study before being installed on homes, then officials should follow the precautionary principle and protect families.

The fact that an appeal has been submitted by 230 scientists from 40 nations to the United Nations, requesting the World Health Organization (WHO) to adopt more protective exposure guidelines for non-ionizing electromagnetic fields (EMF) and for the WHO to educate the public about health risks--- that should have stopped smart meter development in its tracks. There is simply too much conflicting data.

Non-ionizing electromagnetic fields are considered the fastest growing form of environmental pollution. The safety of smart meters is based on science that is outdated and is being questioned for many reasons. Exposure is underestimated due to lack of consideration of: reflectivity, whole body exposure, the pulsed nature of smart meters, consideration of children's bodies (as opposed to a 200 pound man), consideration of exposure to multiple sources - only 30 minutes of exposure to one device was used to set standards, consideration of the large degree of genetic variability which impacts how animals or people are affected, the polarized nature of these EMFs, and the use of statistics that average pulses. Research suggests our biology is affected by the erratic nature of the signal and that cells respond to short intense bursts of radiation even if the average over time seems low. Smart meters are unlike cell phones or WiFi in this bizarre pattern of sharp spikes of RF. The PUC-West Penn has ignored health studies by eminent scientists as well as declarations of prestigious organizations, and has not recognized the hypersensitivity that can be experienced by some individuals.

Yet, regardless of the abundance of data indicating potential adverse affects, Pennsylvania residents are being exposed daily, perhaps almost continuously, against their wishes because of forced smart meters.

Dr. Carpenter graduate of Harvard Medical School who has worked in the area of electromagnetic fields (EMFs) and public health for over 18 years, sums it up..... "There is no evidence whatsoever that smart meters are in any way safe for human beings. In fact, ample evidence demonstrates "convincingly and consistently" that exposure to radiofrequency radiation (RFR) at elevated levels for long periods of time increases the risk of cancer, damages the nervous system, and adversely affects the reproductive organs. Dr. Carpenter advises that an informed person should demand that they be allowed to keep their analog meter."

<https://www.thehealthyhomeeconomist.com/harvard-medical-doctor-warns-against-smart-meters/>

As someone whose family experiences multiple health problems and chemical sensitivities, as an informed person, and for all of the above stated reasons, we ask that you work to give Pennsylvanians a choice and that you grant our request for an exemption to smart meter installation.

Court Case

Romeo vs PUC “Just because he cannot personally testify as to the health and safety effects does not mean that his complaint is legally insufficient. He could make out his claim through the testimony of others as well as other evidence that goes to that issue. Because his complaint was not legally insufficient, the Commission erred in dismissing the complaint.”

<https://caselaw.findlaw.com/pa-commonwealth-court/1776913.html>

Antonio Romeo, Petitioner v. Pennsylvania Public Utility Commission, Respondent

No. 498 C.D. 2016

Decided: February 08, 2017

Definitions

A duty cycle is the fraction of one period in which a signal or system is active. Duty cycle is commonly expressed as a percentage or a ratio. A period is the time it takes for a signal to complete an on-and-off cycle.

Antenna Gain an antenna's power gain or simply gain is a key performance number which combines the antenna's directivity and electrical efficiency. As a transmitting antenna, the gain describes how well the antenna converts input power into radio waves headed in a specified direction.

Homeostasis is the state of steady internal physical and chemical conditions maintained by living systems.[1] This dynamic state of equilibrium is the condition of optimal functioning for the organism and includes many variables, such as body temperature and fluid balance, being kept within certain pre-set limits (homeostatic range). Other variables include the pH of extracellular fluid, the concentrations of sodium, potassium and calcium ions, as well as that of the blood sugar level, and these need to be regulated despite changes in the environment, diet, or level of activity. Each of these variables is controlled by one or more regulators or homeostatic mechanisms, which together maintain life.},

Reflectivity (*The reflectivity of a surface is a measure of the amount of reflected radiation. It can be defined as the ratio of the intensities of the reflected and incident radiation. The reflectivity depends on the angle of incidence, the polarization of the radiation, and the electromagnetic properties of the materials forming the boundary surface. These properties usually change with the wavelength of the radiation. The reflectivity of polished metal surfaces is usually quite high (such as stainless steel and polished metal surfaces typical in kitchens, for example). Reflections can significantly increase localized RF levels. High uncertainty exists about how extensive a problem this may create in routine installations of smart meters, where the utility and installers have no idea what kind of reflectivity is present within the interior of buildings.*)

Non-linear manner and there is a large degree of genetic variability as to how animals or people are affected. Non-thermal EMFs might be comparable to the hazards of low levels of toxins found in the environment which can be potent in very low levels at disrupting enzyme systems in the body, but may not be proportionately worse at higher levels."

Peak Value The maximum value attained by an alternating quantity during one cycle is called its Peak value. ... The peak values of alternating voltage and current is represented by E_m and I_m respectively

Two Order of Magnitude-differ by a factor of 100 (multiply by 100)

Heat shock proteins (HSP) are a family of proteins that are produced by cells in response to exposure to stressful conditions. They were first described in relation to heat shock, but are now known to also be expressed during other stresses including exposure to cold, UV light, and during wound healing or tissue remodeling.

Polarized In the present study we analyze the role of polarization in the biological activity of Electromagnetic Fields (EMFs)/Electromagnetic Radiation (EMR). All types of man-made EMFs/EMR - in contrast to natural EMFs/EMR - are polarized. Polarized EMFs/EMR can have increased biological activity, due to: 1) Ability to produce constructive interference effects and amplify their intensities at many locations. 2) Ability to force all charged/polar molecules and especially free ions within and around all living cells to oscillate on parallel planes and in phase with the applied polarized field. Such ionic forced-oscillations exert additive electrostatic forces on the sensors of cell membrane electro-sensitive ion channels, resulting in their irregular gating and consequent disruption of the cell's electrochemical balance. These features render man-made EMFs/EMR more bioactive than natural non-ionizing EMFs/EMR. This explains the increasing number of biological effects discovered during the past few decades to be induced by man-made EMFs, in contrast to natural EMFs in the terrestrial environment which have always been present throughout evolution, although human exposure to the latter ones is normally of significantly higher intensities/energy and longer durations. Thus, polarization seems to be a trigger that significantly increases the probability for the initiation of biological/health effects. (Polarization: A Key Difference between Man-made and Natural Electromagnetic Fields, in regard to Biological Activity

Dimitris J. Panagopoulos, Olle Johansson & George L. Carlo
Scientific Reports volume 5, Article number: 14914 (2015) | Download Citation
<https://www.nature.com/articles/srep14914>

Specific Absorption Rate (SAR)SAR, or Specific Absorption Rate, is a measure of the amount of Radio Frequency (RF) Electromagnetic Fields (EMFs) absorbed by the human body when using an electronic device. This rate is measured as the power absorbed within a defined area of body tissue in a standard measurement of watts per kilogram (W/kg).

SAR can be an average measure over the entire body, or a small sample amount. What you get is the greatest level measured in a defined area of the body.

SAR measures exposure within the frequency range of 100 kHz and 10 GHz which includes electronic devices such as laptops, tablets, WiFi routers and cell phones.

The value is highly dependent upon the body parts being tested, energy levels and the proximity to the radiating source.

In the US, the Federal Communication Commission (FCC) requires that cell phones have a SAR level at or below 1.6 watts per kilogram (W/kg) taken over a volume containing a mass of 1 gram of tissue.

With a cell phone the highest SAR is near the ear. Not surprisingly the highest rate of cancers reported by cell phone users correlates to the location near the ear that has the most cell phone use.

European Union SAR Limits

The EU has set SAR limits for mobile phones (and other such hand-held devices), to be less than or equal to 2 W/kg averaged over 10g of tissue.

SAR Specific absorption rate as a measure of the rate that body tissue absorbs radiation when you are using a cell phone. Results

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0062663>

We find that: a) The energy absorbed by living matter during exposure to environmentally accounted EMFs is normally well below the thermal level. b) All existing methods for SAR estimation, especially those based upon tissue conductivity and internal electric field, have serious deficiencies. c) The only method to estimate SAR without large error is by measuring temperature increases within biological tissue, which normally are negligible for environmental EMF intensities, and thus cannot be measured.

Conclusions

SAR actually refers to thermal effects, while the vast majority of the recorded biological effects from man-made non-ionizing environmental radiation are non-thermal. Even if SAR could be accurately estimated for a whole tissue, organ, or body, the biological/health effect is determined by tiny amounts of energy/power absorbed by specific biomolecules, which cannot be calculated. Moreover, it depends upon field parameters not taken into account in SAR calculation. Thus, SAR should not be used as the primary dosimetric quantity, but used only as a complementary measure, always reporting the estimating method and the corresponding error. Radiation/field intensity along with additional physical parameters (such as frequency, modulation etc) which can be directly and in any case more accurately measured on the surface of biological tissues, should constitute the primary measure for EMF exposures, in spite of similar uncertainty to predict the biological effect due to non-linearity. Evaluation of Specific Absorption Rate as a Dosimetric Quantity for Electromagnetic Fields Bioeffects

Dimitris J. Panagopoulos, Olle Johansson, George L. Carlo

Published: June 4, 2013 <https://doi.org/10.1371/journal.pone.0062663>

Resources:

The BioInitiative Report 2012 is an update of the 2007 publication, is available online at <http://www.bioinitiative.org/>. It is a report by 29 independent scientists and health experts from around the world about possible risks from wireless technologies and electromagnetic fields.

The new report by the BioInitiative Working Group 2012 says that evidence for risks to health has substantially increased since 2007 from electromagnetic fields and wireless technologies (radiofrequency radiation). **The Report reviews over 1800 new scientific studies.** This update covers about 1800 new studies reporting bioeffects and adverse health effects of electromagnetic fields (powerlines, electrical wiring, appliances and hand-held devices) – and wireless technologies (cell and cordless phones, cell towers, WI-FI, wireless laptops, wireless routers, baby monitors, surveillance systems, wireless utility meters ('smart meters'), etc.

The BioInitiative 2012 Report has been prepared by 29 authors from ten countries*, ten holding medical degrees (MDs), 21 PhDs, and three MSc, MA or MPHs. Among the authors are three former presidents of the Bioelectromagnetics Society, and five full members of BEMS. One distinguished author is the Chair of the Russian National Committee on Non-Ionizing Radiation. Another is a Senior Advisor to the European Environmental Agency. Full titles and affiliations of authors is in Section 25 – List of Participants

." <http://www.bioinitiative.org>

<https://bioinitiative.org/table-of-contents/>

Dr. Joel Moskowitz Director of community health studies at the University of California

International Appeal In another effort, 215 scientists from 40 countries are calling on the United Nations and the World Health Organization to develop stronger guidelines for emf exposures. Those scientists have all published peer reviewed papers on the subject.

The World Health Organization officially classifies electromagnetic radiation a possible 2B carcinogen. (The same category as lead, DDT, and styrene.) The signatories of the International EMF Scientist Appeal have all published papers in peer-reviewed journals on the biological or health effects of EMF and note that the overall weight-of-evidence strongly supports greater precaution.

Non-ionizing electromagnetic fields are considered the fastest growing forms of environmental pollution. Numerous scientific publications have found that EMF affects living organisms at levels far below international exposure guidelines adopted by most industrialized nations.

(D. "New York, NY, May 11, 2015. An Appeal has been submitted by now 230 scientists from now 40 nations to the United Nations, requesting the World Health Organization (WHO) adopt more protective exposure guidelines for non-ionizing electromagnetic fields (EMF) in the face of increasing exposures from many sources. Called the International EMF Scientist Appeal, the petition calls on the United Nations and its organizations to encourage precautionary measures and conduct an environmental assessment; for the WHO to educate the public about health risks, particularly to children and pregnant women; and for the United Nations Environmental Programme (UNEP) to assess the potential impact of EMF exposure on all living organisms. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plants and animals

EMF—a general term that includes frequencies along the electromagnetic spectrum—is generated in the radiofrequency bands (RF/EMF) by popular wireless devices like cell phones, cordless phones, baby monitors, tablets, Wi-Fi enabled computer equipment, cell phone towers/antenna arrays, radio/television broadcast facilities, and wireless smart meters, among others. Some electrical current flows along the ground and scientists have documented health effects on both livestock and farmers. In fact, all of nature is threatened —people and, animals, as well as trees and other plants.

The signatories of the International EMF Scientist Appeal have all published papers in peer-reviewed journals on the biological or health effects of EMF and note that the overall weight-of-evidence strongly supports greater precaution.

Non-ionizing electromagnetic fields are considered the fastest growing forms of environmental pollution. Numerous scientific publications have found that EMF affects living organisms at levels far below international exposure guidelines adopted by most industrialized nations.

The Appeal is being signed by scientists who have published peer-reviewed papers on the biological or health effects of non-ionizing electromagnetic fields, part of the electromagnetic field (EMF) spectrum that includes extremely low frequency fields (ELF) emitted by electrical devices; and, radiofrequency radiation (RFR), used for wireless communications. Scientists who have published peer-reviewed papers in related fields and have been significantly engaged in EMF education, are recognized as Supporting Scientists.

The Appeal urgently calls upon the United Nations, the WHO, UNEP and the UN Member States to: Address the global public health concerns related to exposure to cell phones, power lines, electrical appliances, wireless devices, wireless utility meters and wireless infrastructure in residential homes, schools, communities and businesses.

substantially lower human exposures to non-ionizing electromagnetic fields.”

<https://www.businesswire.com/news/home/20150511005200/en/International-Scientists-Appeal-U.N.-Protect-Humans-Wildlife>

<http://electromagnetichealth.org/electromagnetic-health-blog/media-advisory-international-scientists-appeal-to-u-n-to-protect-humans-and-wildlife-from-electromagnetic-fields-and-wireless-technology/>

David O. Carpenter, MD, MPH, is the director of the Institute for Health and the Environment at the State University of New York at Albany, School of Public Health

Cindy Sage, M.A. is an environmental sciences consultant and researcher on electromagnetic fields and radiofrequency radiation. She is a founder of the international BioInitiative Working Group, and the co-editor and principal author of the BioInitiative Reports (2007 and 2012). Ms. Sage has provided expert testimony and scientific briefings on non-ionizing radiation to the European Environmental Agency (Denmark), the European Commission (Brussels), UK Health Protection Agency, UK Children with Leukemia registered charity, and various international health agencies, US Department of Justice, Federal Communications Commission, US Food and Drug Administration, public utilities commissions, US Green Building Council, state legislative committees, and numerous state and municipal agencies and commissions. She co-authored the 2010 Seletun (Norway) Scientific Consensus Statement on Wireless RFR Risks. In 2002, she worked with the California Department of Education on new EMF Title 5 School Siting EMF/Transmission Line School Development Policies, and briefed the California Energy Commission Indoor Environmental Quality (IEQ) committee on EMF/RFR recommended exposure levels. She has developed science-based recommendations for limiting non-ionizing radiation exposures based on scientific benchmarks for adverse health impacts and safety margins, and publishes frequently in peer-reviewed scientific journals. She has testified as an expert witness on electromagnetic fields and EMF computer modeling in eminent domain cases in judicial proceedings of both US federal and state courts.

Additional Information

Cancer Society “The frequency and power of the RF waves given off by a smart meter are similar to that of a typical cell phone, cordless phone, or residential Wi-Fi router.

RF radiation is classified by the International Agency for Research on Cancer (IARC), as “possibly carcinogenic to humans.” This is based on the finding of a possible link in at least one study between cell phone use and a specific type of brain tumor. Because RF radiation is a possible carcinogen, and smart meters give off RF radiation, it is possible that smart meters could increase cancer risk. Thw Cancer Society the risks are still not clear.

American Cancer Society <https://www.cancer.org/cancer/cancer-causes/radiation-exposure/smart-meters.html>

SYSTEMS “Some Smart Meters use the existing mobile-phone systems, where each Smart Meter contains the transmitting bit of a mobile phone, and communicates with the nearest base station when it needs to.

Others use a radio signal to send information to a collecting point, which collects the information for a few thousand or tens of thousands homes and sends it to the electricity company. These systems do not actually use mobile phones or mobile-phone base stations, but because the communication requirements are similar, they use fairly similar frequencies (hundreds of MHz) and powers (up to perhaps 1 W) to mobile phones.

Still others use a "mesh" system, where information is sent from one Smart Meter to another, and the information is only sent to the electricity company (either from one particular Smart Meter or from a separate data aggregation point) one for every few hundred homes. That radio signal is usually around 900 MHz, close to the frequency of many mobile phones, with a maximum power of 1 W, though as the range required from one meter to the next is lower, the power may be lower.

Other systems are also possible, using satellites, power line communications or fibre optics. Communication inside the home

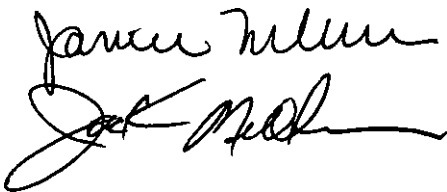
Inside the home, Smart Meters usually use wireless signals at 2.4 GHz, with a maximum power of less than 1 W. This is a similar frequency to Wi-Fi and Bluetooth.

Some remote reading meters don't send data to a central point, instead they send out information continuously every second or two, to enable the signal to be picked up by meter-reading equipment when driving along the street.

Smart Meters typically send bursts of data, lasting a fraction of a second, at intervals of minutes or hours. Different figures are quoted for the overall fraction of time Smart Meters transmit for - the duty cycle - and this is partly because meters are used in different ways by different utilities

<http://www.emfs.info/sources/meters/smart>

Smart meter radiation is the radio frequency, RF, waves emitted from the smart meter used to transmit its data to the utility companies. EMF, electromagnetic field, is the field generated by the RF wave. The electromagnetic waves are in the RF range, oscillate at about 900 to 2,400 million times per second, are at (900 MHz and 2.4 GHz). This is similar to the frequency range used in WiFi, cordless phones and cell phones. <https://smartmeterguard.com/pages/faq>



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Before The
Pennsylvania Public Utility Commission

Jan and Jack Milburn

v.

West Penn Power Company

CERTIFICATE OF SERVICE

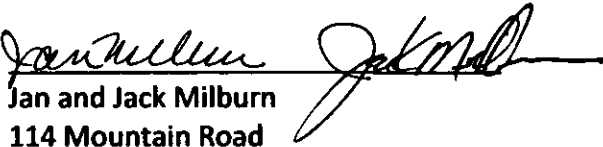
We hereby certify that we have this day served a true copy of the Brief of Jan and Jack Milburn upon the individuals listed below, in accordance with the requirements of 52 Pa. Code 1.54 (relating to service by a participant).

Service by First Class Mail, postage prepaid, as follows:

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Administrative Law Judge Jeffrey A. Watson
Pennsylvania Public utility Commission
Office of Administrative Law Judge
Piatt Place, Suite 220
301 5th Avenue
Pittsburgh, PA 15222

Dated: October 31, 2019

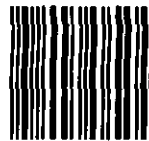

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