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**From:** Cindy Sage, Sage Associates <sage@silcom.com>  
**Sent:** Tuesday, January 05, 2016 5:57 PM  
**To:** Statements  
**Cc:** tim.dodge@psncuc.nc.gov  
**Subject:** DOCKET NO. E100, SUB 141 - Oppose Smart Meter Tariffs  
**Attachments:** Final North Carolina Expert letter.pdf

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January 4, 2016

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Clerk's Office  
N.C. Utilities Commission

Edward S. Finley, Jr., Chairman

North Carolina Utilities Commission

4325 Mail Service Center

Raleigh, NC 27699-4300

Re: DOCKET NO. E100, SUB 141 - Oppose Smart Meter Opt-Out Tariffs  
and Wireless Utility Meter Risks and Liabilities

Dear Chairman Finley and Public Staff:

Please accept this comment on the proposed smart meter opt-out tariff proposal.

Our earlier submission today bounced back due to file size. The file size is now reduced, and should be available to you to read.

Thank you for your consideration.

Cindy Sage, MA

Sage Associates  
Co-Editor, BioInitiative Reports



January 4, 2016

Edward S. Finley, Jr., Chairman  
North Carolina Utilities Commission  
4325 Mail Service Center  
Raleigh, NC 27699-4300

Re: DOCKET NO. E100, SUB 141 - Oppose Smart Meter Opt-Out Tariffs  
and Wireless Utility Meter Risks and Liabilities

Dear Chairman Finley and Public Staff:

My name is Cindy Sage. My business address is 1396 Danielson Road, Montecito, California, 93108. I am the co-owner of Sage Associates in Santa Barbara, CA. Sage Associates is a nationally known environmental sciences consulting firm. The company specializes in translating complex technical and scientific information for the public and decision-makers. My specialty area of practice is the science and public health effects of electromagnetic fields and radiofrequency radiation (non-ionizing radiation).

I am the co-editor and principal author of the BioInitiative Reports (2007 and 2012) and a founder and organizer of the BioInitiative Working Group, which is dedicated to determining and promoting biologically-based exposure standards for low-intensity electromagnetic radiation. Briefly, the Bioinitiative Working Group includes 29 authors from 10 countries at various research and academic institutions. Participants include international university faculty in the fields of health, engineering, electromagnetic research, biology, environmental science, government policy and academic experts from:

Harvard Medical School, Boston, Massachusetts, USA  
Orebro University Hospital, Orebro, Sweden  
European Environmental Agency, Copenhagen, Denmark  
Russian National Committee on Non-Ionizing Radiation Protection, Moscow, Russia  
University of Siena, Siena, Italy

Lund University Department of Neurosurgery, Lund, Sweden  
University of Athens, Athens, Greece  
Bioelectromagnetics Laboratory, Jawaharlal Nehru University, India  
Columbia University, New York, NY, USA  
Department of Physics, Oakland University, Rochester Hills, Michigan, USA  
Cancer Research Institute, Slovak Academy of Science, Bratislava, Slovak Republic  
Medical University of Vienna, Vienna, Austria  
Public Health Department, Regional Government Office Land Salzburg, Austria  
University of Washington Bioelectromagnetics Laboratory, Seattle, Washington, USA  
McGill University, Montreal, Quebec, Canada  
University of Albany, New York, NY, USA

I have published many scientific studies on electromagnetic fields and radiofrequency radiation, including science, public health, public policy, and environmental consequences of exposures to EMF and RFR (partial listing below). I was the co-facilitator of the Collaborative for Health and the Environment EMF Group from 2006-2011 and am a full member of the Bioelectromagnetics Society. I am a co-author the 2010 Seletun (Norway) Scientific Consensus Statement on Wireless RFR Risks.

I have provided expert testimony and scientific briefings 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, FCC, FDA, public utilities commissions, LEED, state legislative committees, and numerous state and municipal agencies and commissions. I served as a member of the California Public Utilities Commission EMF Consensus Group, the Keystone Center Dialogue for Transmission Line Siting (a national group developing EMF Policy), and of the International Electric Transmission Perception Project. In 2002, I consulted with the California Department of Education on new EMF Title 5 School Siting Policies, and briefed the California Energy Commission Indoor Environmental Quality (IEQ) committee on EMF/RFR recommended exposure levels. In 2010 and 2011, I submitted expert testimony to the California Council on Science and Technology on smart meter technology flaws.

I have qualified as an expert witness in both state and federal courts.

#### RECOMMENDATIONS

It is in the best interest of the North Carolina Utilities Commission and its ratepayers to avoid the additional rollout of wireless utility meters and infrastructure. Further, it is an appalling burden to charge any tariff for opting out of the smart meter program, since many families cannot afford to pay "not to be harmed" for a device they do not want and cannot tolerate from a health perspective. The North Carolina Utilities Commission should require removal of all wireless components of their smart meter/WiMax/smart grid pilot program. Failing this, I strongly urge you to reject smart meter opt-out tariffs. Such tariffs penalize the people who can least afford it - those whose health suffers from electromagnetic exposures. This action will restore the public's perception that the North Carolina Utilities Commission is working to protect public health and safety. Without customer acceptance of these new sources of chronic exposure to radiofrequency radiation emitted by 'smart/digital meters' and wireless grid technologies, there will be little or no incentive for energy conservation achieved except through higher rates for electricity. Dissent can be highly counterproductive to your presumed energy conservation goals that depend on consumer support and compliance. In the long run, there will be little or no incentive for energy conservation achieved except through higher rates for electricity via punitive pricing structures. The program likely will result in increased liability and costs for defense experts; wasted staff and Commission time; extended rancor among those customers who feel their families are placed at risk; claims for uncompensated property value losses; claims for onset of electromagnetic hypersensitivity, and decreased consumer support for other North Carolina Utilities Commission programs due to loss of goodwill.

If the North Carolina Utilities Commission does not reject the 'smart meter' program in

your state, at least consider either no charge for opt-outs, or very reduced fees.

Ratepayers will have already paid for meter installation and operation once. They should not be charged for 'non-use' of such meters a second time. And finally, if fees are levied for opt-outs, then those charges should have a time limit (California investor-owned utilities can only charge a one-time fee and then a \$10 monthly fee for three years. Then, all fees for opt-outs expire.

The North Carolina Utilities Commission must take into account the clear evidence of possible wireless health risks, and the likelihood of increased liability not only for perceived health problems, but also the risk of smart meter explosions and fires, interference with proper operation of ground fault interrupters\* and arc interrupters, potential for security and personal information breaches, interference with medical devices (for example, wireless insulin pumps and other electronic medical aids), and RF interference with other electronic devices on which customers depend. Further wireless meters are more fragile than analogs, as shown by electronic failures due to voltage surges (tree limb downings, high winds, etc).

\*Pacific Gas and Electric has determined that certain models of Ground Fault Interrupter (GFI) circuit breakers, safety devices intended to protect from electrocution, may malfunction if they are installed in close proximity to smart meters and have asked smart meter manufacturers to develop transmitters with lower power output for such situations (Sage, 2011).

Recently, the National Electric Manufacturers Association (NEMA), a trade organization representing the electric utility industry's appliance arm issued educational materials on 'smart meters'. *"With utilities installing smart meters across the country in order to bring the benefits of a modernized electric grid to consumers, this page offers our website visitors convenient access to information about smart meter technologies to answer questions they may have about smart meters."* NEMA's webpage includes the SageReports.com Smart Meter Computer Modeling Report (2011) within its website at: <http://www.nema.org/Technical/Pages/Smart-Meter-Facts.aspx>

This report by Sage Associates provides evidence that wireless utility meter RFR emissions may exceed FCC safety limits for the general public, depending on the

manner in which they are located (how near to occupied space within a residence, for example on a bedroom wall), and how they are installed and operated. Sage Associates has documented potential violations of FCC public safety limits for wireless utility meters, rather than offered support for this technology rollout (<http://SageReports.com/smart-meter-rf>). Instead, we recommend that the safer analog meters be restored.

We are joined by another technical group in pointing out potential down-side risks. The Association of Electrical Equipment and Medical Imaging Manufacturers has just issued a statement about risks of wireless utility meters with respect to the safety and inspection of wireless meters. In comparison to today's situation where a meter reader visits monthly, and does a visual inspection of the analog meter while reading the electric usage for billing purposes, the AEEMIM says it could be 100 times as long between opportunities for a trained utility meter reader to inspect wireless meters. The installation of wireless utility meters means the visual inspection that now occurs monthly with analog meters that can identify factors like *"corrosion, excessive heating, loose connections, deformed socket jaws, broken components, failed insulation, damage due to ground settling or vandalism, or any exposed live parts"*- this opportunity is lost and may result in increased risk for house fires. Such 'smart' meter fires and explosions are occurring and a list is compiled at:

<http://emfsafetynetwork.org/smart-meters/smart-meter-fires-and-explosions/>

The Association of Electrical Equipment and Medical Imaging Manufacturers- Statement Concerning Meter Socket Lifespan and Inspections (Revised 1/28/2013) says:

*"New smart meters are often installed in pre-existing meter sockets. Meter sockets are expected to operate safely for many, many years. However, the safe operating life of the meter socket may be reduced by many factors including (but not limited to) excessive moisture, environmental contaminants, frequent changing of meters, excessive electrical load (overload or short circuit), vandalism, ground settling, storm damage, and many other conditions. As*



*utilities move to two -way communications for meters and remote meter reading, the opportunity for inspection of meter sockets is expected to decline radically. The interval between site visits by utility personnel could be as much as 100 times as long as the current monthly opportunity for inspection. Only the utility has the opportunity to inspect the socket due to the utility seal. . For this reason, NEMA strongly recommends that all existing meter sockets be thoroughly inspected when electrical meters are installed.*

*Inspection criteria should include (but not be limited to) indications of excessive heating, corrosion, loose connections or components, deformed socket jaws, broken components, failed insulation, damage due to ground settling or vandalism, or any exposed live parts.*

*If any damage is discovered, the meter socket should be replaced with a new meter socket that meets current specifications by a qualified electrician prior to the installation of the new meter."*

Your organization will show leadership and forward-thinking to require analog (electromechanical) meters instead of digital/wireless meters. A better way to achieve energy conservation goals is to assist your residents with information and education on other measures that conserve energy, and maintain citizen support for this necessary shift in consumer habits. Making a wise choice against wireless utility meters can alleviate the burden otherwise placed on thousands of families and their children who are at risk for neurological impairment and illness, sleep disruption and other health problems (Appendix A). Choosing a delivery technology that produces a toxic emission (radiofrequency and microwave radiation) that has recently been classified as a Possible Human Carcinogen (Baan et al, 2011) is unwise.

It is reckless to disregard existing health warnings from international science and public health experts by intentionally facilitating the proliferation of technologies already shown to degrade learning environments. It will create unnecessary liability and will waste ratepayer money when wireless must eventually be substituted out for wired alternatives. Surely, North Carolina Utilities Commission and North Carolina Public Health officials and ratepayers cannot afford to pay for new wireless meters and infrastructure, only to have to replace them in short order with safer hard wired

solutions that do not carry the burden of increased illness, loss of productivity, absenteeism and costs for health care.

Respectfully submitted this 4<sup>th</sup> day of January 2016 by

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## **APPENDIX A**

Children are known to be more vulnerable to environmental toxins and carcinogens than adults. There is overwhelming evidence that children are more vulnerable than adults to many different exposures (Sly and Carpenter, 2012), including RFR (Wiert et al, 2008), and that the diseases of greatest concern are cancer and adverse effects on neurodevelopment. The North Carolina Utilities Commission has a duty to protect the health and welfare of children, teachers, staff, students and disabled individuals on all campuses. Children, teachers and the disabled cannot remove themselves from potentially harmful wireless exposures if your organization adopts programs that cause additional exposure to RFR.

Prenatal and post-natal exposure to cell phone radiation has been reported to cause headaches and migraines in a study of Danish children at age seven (7). In *The Open Pediatric Medicine Journal* (2012), a report by Sudan et al. has found an association between mothers' reports of prenatal and postnatal cell phone exposures and headaches, including migraines in seven year-old children. Children with both prenatal and post-natal exposure to cell phones had a thirty (30) percent higher risk for migraines and other headache-related symptoms. Since both pregnant women as well children will be exposed to cell phone radiation from wireless, they should be

strongly cautioned about introducing pervasive wireless RFR exposures in home environments. This study provides support for an earlier evaluation of cell phone radiation effects by members of the same research team on the same Danish population of mothers and children. In 2008, this research team reported that maternal use of a cell phone resulted in behavioral and learning difficulties in the child by elementary school age (Divan et al, 2008)

Existing FCC safety standards are under formal review by the FCC (Proceeding 03-137). The US Government Accountability Office Report of 2012 recommends to the FCC that it formally reassess, and, if appropriate, change its current RF energy exposure limit and mobile phone testing requirements related to likely usage configurations, particularly when phones are held against the body (US GAO, 2012). The existing FCC public safety standards cannot be presumed for purposes of the City's decision on wireless to be protective of public health under these circumstances. The existing safety limits do not protect against chronic exposures nor against non-thermal effects of radiofrequency and microwave radiation on human health. They are specifically not protective of children or smaller-stature individuals (they are developed to be suitable to protect a six-foot man (in stature). They address acute, but not chronic exposures. And they are not protective against biological effects of non-thermal low-intensity RFR exposures for either children, adults, or the disabled. Biological effects of EMF and RFR are considered scientifically established; and can reasonably be presumed to result in health harm with long-term exposure of the kind under consideration by the City.

Appropriate measures will need to be adopted by the Commission to address the recent World Health Organization International Agency for Research on Cancer (IARC) classification of RFR as a Possible Human Carcinogen before subjecting widespread hundreds of thousands of its ratepayers to a preventable toxic exposure. The WHO IARC classified RF radiation as a Group 2B Possible Human Carcinogen; it joins the IARC classification of ELF-EMF (Extremely Low Frequency Electromagnetic Fields) as a Group 2B Possible Human Carcinogen. The evidence for carcinogenicity for RFR was primarily from cell phone/brain tumor studies **but IARC applies this classification to all RFR exposures.**

Governmental agencies have presumably been responsive to the need to reduce risks from chemicals and other potential toxins within your community. EMF and RFR exposures should be considered equally in decision-making. The combined effects of toxic agents (chemicals) and EMF/RFR are established. Juutilainen et al. (2006) reported that the combined effects of toxic agents and ELF magnetic fields together enhances damage as compared to the toxic exposure alone. In a meta-analysis of 65 studies; overall results showed 91% of the *in vivo* studies and 68% of the *in vitro* studies had worse outcomes (were positive for changes indicating synergistic damage) with EMF/RFR exposure in combination with toxic agents (Juutilainen et al, 2006).

Biologically-based public exposure safety regulations for low-intensity, chronic exposure to RFR (radiofrequency radiation) are absent – so there is no reasonable assumption by the City that it can rely on outdated (1996) and highly contested FCC

safety limits in this decision.

The City is likely required by law to conduct a full risk assessment of all toxic exposures by State code and this toxic exposure is not exempt. Federal agencies have advised the FCC to re-evaluate its public safety standards (GAO, 2012) and the City cannot hide behind a claim that compliance with FCC safety standards absolves them of responsibility. The evidence in 2012 is greater than in 2007 that RFR is associated with increased risk for cancer and neurological diseases; immune disorders, altered fetal brain development in pregnant women; sleep disruption, and impaired cognition, memory, learning, attention, concentration, and behavior in school aged children.

New scientific studies of radiofrequency radiation of the kind and at the levels associated with wireless environments report that chronic, whole-body RFR exposure at levels as low as 0.003 microwatts per square centimeter result in adverse health effects on children and adolescents (Thomas et al 2008; Heinrich et al 2010; Thomas et al 2010; Mohler et al 2010). Wireless environments will create unavoidable and involuntary exposure to RFR at levels shown to adversely affect memory, learning, cognition, attention, concentration and behavior. No level of RFR exposure has been conclusively determined to be safe.

Biologically-based public exposure safety regulations for low-intensity, chronic exposure to RFR (radiofrequency radiation) are absent – so there is no reasonable assumption by the City that it can rely on outdated (1996) and highly contested FCC safety limits in this decision.

No positive assertion of safety of wireless technologies can be made.

The Commission may likely be required to conduct a full risk assessment of all toxic exposures by State code and this toxic exposure is not exempt. Federal agencies have advised the FCC to re-evaluate its public safety standards (GAO, 2012) and decision-makers can not hide behind a claim that compliance with FCC safety standards absolves them of responsibility. The evidence in 2012 is greater than in 2007 that RFR is associated with increased risk for cancer and neurological diseases, immune disorders, altered fetal brain development in pregnant women; sleep disruption, and impaired cognition, memory, learning, attention, concentration, and behavior in school aged children.

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- Thomas et al (2008) reported an increase in adult complaints of headaches and concentration difficulties with short-term cell phone use at 0.005 to 0.04  $\mu\text{W}/\text{cm}^2$  exposure levels.
- Heinrich et al (2010) reported that children and adolescents (8-17 years old) with short-term exposure to base-station level RFR experienced headache, irritation, and concentration difficulties in school. RFR levels were 0.003 - 0.02  $\mu\text{W}/\text{cm}^2$ .
- Thomas et al (2010) reported that RFR levels of 0.003 - 0.02  $\mu\text{W}/\text{cm}^2$  resulted in conduct and behavioral problems in children and adolescents (8- 17 years old) exposed to short-term cell phone radiation in school.
- Mohler et al (2010) reported that adults exposed to 0.005  $\mu\text{W}/\text{cm}^2$  cell phone radiation (base- station exposure levels) had sleep disturbances with chronic exposure, but this effect was not significantly increased across the entire population.

The North Carolina Utilities Commission should not accept positive assurances of safety from utilities, wireless technology providers or the FCC who claim that there is 'no proof' of harm. Proof of health harm is not and should not be required by decision-makers in order to make a choice for safer education. A standard of evidence that requires 'proof of harm' from wireless technologies should be rejected by the North Carolina Utilities Commission as a basis for deciding the question of whether to proceed with wireless utility meters.

There is more than sufficient evidence in hand today to show that wireless exposure over the long-term is inadvisable; and possible risk exists leading to health harm and learning impairments. Short-term effects on cognition, memory and learning, behavior, reaction time, attention and concentration, and altered brainwave activity (altered EEG) are also reported in the scientific literature (Sections 6 and 9, BioInitiative 2012 Report). EMF and RFR exposures cause bioeffects and adverse health effects consistent with those identified in children with autism spectrum disorders (ASDs) (Section 20, BioInitiative 2012 Report).

The North Carolina Utilities Commission should not encourage or mandate the use of wireless devices in the home like power transmitters in appliances that are associated with wireless utility meter energy conservation goals. There is evidence that is sufficient to warn against increases in cancer and neurological diseases, immune disorders, altered fetal brain development in pregnant women; sleep disruption, and impaired cognition, memory, learning, attention, concentration, and behavior in school aged children. Chronic wireless exposures near the body because of adverse effects on the testes, on male sperm quality and fertility, and tissues related to reproductive organs in both males and females (See Footnote 1). Power transmitters in appliances have the potential to expose families to high levels of RFR on a continuing basis in the kitchen, where the torso is quite close or touching an appliance control board with this wireless transmitter

In summary, the North Carolina Utilities Commission can better retain public confidence in its leadership decision-making, and achieve energy conservation motivation among its customers by rejecting wireless utility meters; or at a minimum offering an analog meter without cost on request. Any short-term economies that may seem attractive today with wireless technologies are likely to be dwarfed by long-term health costs, increased liability, opposition to other initiatives, and the eventual need to replace wireless with wired technological systems.

**Footnote 1** - Adverse effects are reported in more than 20 recent scientific studies on morphology and function of human male and female reproductive organs. Wireless devices that produce RFR exposure levels commonly associated with both 'in-use' and 'on stand-by' level 'normal usage' are associated with impairment of male reproductive organs (the testes), male hormone levels and sperm quality, motility and pathology. Wireless laptops and cell phones held close to the body are reported to negatively affect reproductive parameters in both human and animal studies (See Section 18 of the BioInitiative 2012 Report for references including Agarwal et al, 2008; Agarwal et al, 2009; Wdowiak et al, 2007; De Iuliis et al, 2009; Fejes et al, 2005; Aitken et al, 2005; Kumar, 2012). Other studies conclude that exposure to cell RFR such as phone radiation, or storage of a mobile phone close to the testes of human males affect sperm counts, motility, viability and structure (Aitken et al, 2004; Agarwal et al, 2007; Eroglu et al., 2006). Animal studies have demonstrated oxidative and DNA damage, pathological changes in the testes of animals, decreased sperm mobility and viability, and other measures of deleterious damage to the male germ line (Dasdag et al, 1999; Yan et al, 2007; Otutolu et al, 2010; Salama et al, 2008; Behari et al, 2006; Kumar et al, 2012). Panagopoulous et al. 2012 reported decreased ovarian development and size of ovaries, and premature cell death of ovarian follicles and nurse cells in *Drosophila melanogaster*. Gul et al (2009) report rats exposed to stand-by level RFR (phones on but not transmitting calls) caused decrease in the number of ovarian follicles in pups born to these exposed dams. Magras and Xenos (1997) reported irreversible infertility in mice after five (5) generations of exposure to RFR at cell phone tower exposure levels of less than one microwatt per centimeter squared ( $\mu\text{W}/\text{cm}^2$ ).

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Mount, Gail

**From:** Ronald M. Powell, Ph.D. <ronpowell@verizon.net>  
**Sent:** Tuesday, January 05, 2016 10:31 AM  
**To:** Statements  
**Cc:** Tim Dodge, Public Staff Attorney  
**Subject:** Oppose Smart Meter Opt-Out Tariffs (Docket No. E100, Sub 141)  
**Attachments:** The Health Argument for Replacing Wireless Smart Meters with a Safe Metering Technology in Maryland.pdf; Symptoms after Exposure to Smart Meter Radiation.pdf; Symptoms Resulting from Exposure to Radiofrequency-Microwave Radiation from Smart Meters.pdf

OFFICIAL COPY

January 5, 2016

Edward S. Finley, Jr., Chairman  
North Carolina Utilities Commission  
4325 Mail Service Center  
Raleigh, NC 27699-4300

FILED

JAN 05 2016

Clerk's Office  
N.C. Utilities Commission

Subject: DOCKET NO. E100, SUB 141 - Oppose Smart Meter Opt-Out Tariffs

Dear Chairman Finley and Public Staff:

I urge you to **oppose** any tariff for Opting Out of a Smart Meter in North Carolina. Please do not repeat the mistakes that have already been made in other states, including my state of Maryland. Learn from our experience. Be smarter than Maryland has been.

The first document attached presents the health argument against Smart Meters in Maryland, and describes the options available to Maryland to address the mistake made in installing Smart Meters in our state. The arguments and the options will be similar for North Carolina, whether action is taken by the North Carolina Utilities Commission or by the North Carolina General Assembly.

Our state of Maryland has been in turmoil ever since Smart Meters were MANDATED for installation in Maryland both on, and inside, the homes and businesses served by any Maryland electric power companies that chose to use Smart Meters. The result has been FORCED illness for many Maryland ratepayers, and understandable extreme public anger. To see the specific types of illness attributed to the radiation from Smart Meters, please see the second and third attached documents. They describe the findings of surveys taken of the health impact of Smart Meters.

Offering an **Opt Out with no associated tariffs** is the absolute minimum that you can do to help the ratepayers in your state. That option will let them eliminate the radiation caused by their own Smart Meter, regardless of their income, even though it will not eliminate the radiation caused by their neighbors' Smart Meters, unless the neighbors, too, Opt Out.

The Opt Out should be free. Any tariff charged for such an Opt Out is essentially extortion, and is equivalent to saying to the ratepayers: "Pay us a fee, every month forever, or we will irradiate you and your family, every day and every night, forever." The Opt Out should provide that the replacement meter be the safest of all electricity meters, which is the traditional analog mechanical meter with no wireless communications capability.

My background is the following: I am a retired U.S. Government scientist (Ph.D., Applied Physics, Harvard University, 1975). During my Government career, I worked for the Executive Office of the President, the National Science Foundation, and the National Institute of Standards and Technology. For those organizations,

respectively, I addressed Federal research and development program evaluation, energy policy research, and measurement development in support of the electronics and electrical-equipment industries and the biomedical research community. I currently interact with other scientists and with physicians around the world on the impact of the environment – including the radiofrequency/microwave environment – on human health.

Thank you for considering my message.

Ronald M. Powell, Ph.D.  
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cc: Tim Dodge, Public Staff Attorney [tim.dodge@psncuc.nc.gov](mailto:tim.dodge@psncuc.nc.gov)

*A Message to the Maryland General Assembly*

## **The Health Argument for Replacing Wireless Smart Meters with a Safe Metering Technology in Maryland**

The electric power companies of Maryland made a dreadful mistake when they elected to install Wireless Smart Meters to measure electrical power. Wherever these meters are installed, they threaten the health of all residents in the community, violate their privacy, increase the cyber vulnerability of the supply of electricity to their homes, decrease their personal security and safety, and threaten property values in the community. And Wireless Smart Meters do all of this without any persuasive evidence of a financial benefit to the customers commensurate with the cost of the Wireless Smart Meter system.

All of these consequences are important for Marylanders; but the health threat is particularly tragic. If you care about the health of Marylanders, including the health of your own family, and about the cost of health care in Maryland, do consider the information presented here and the many supporting references cited. This document describes the health problems that the biomedical research community has found caused by exposure to the type of radiation -- radiofrequency radiation (at microwave frequencies) -- emitted by Wireless Smart Meters. ***These researchers work to protect the rest of us from harm, but we must be wise enough to listen. We, in Maryland, are late in listening.***

### **Who am I?**

I am a retired U.S. Government scientist (Ph.D., Applied Physics, Harvard University, 1975). During my Government career, I worked for the Executive Office of the President, the National Science Foundation, and the National Institute of Standards and Technology. For those organizations, respectively, I addressed Federal R&D program evaluation, energy policy research, and measurement development in support of the electronics and electrical-equipment industries and the biomedical research community. I currently interact with other scientists and with doctors around the nation on the impact of the environment -- including the radiofrequency environment -- on human health.

### **What is the health problem with Wireless Smart Meters?**

Wireless Smart Meters transmit radiofrequency (RF) radiation to transfer data about electric power consumption back to the electric power companies, to communicate with other Wireless Smart Meters, and, soon, to communicate with Wireless Smart Appliances inside each home. The installation of these Wireless Smart Meters was undertaken in spite of the fact that the international biomedical research community, and medical practitioners, are increasingly finding that a wide variety of biological effects are being caused by RF radiation at levels much lower than earlier understood, and well below the levels produced by Wireless Smart Meters.

The RF radiation from Wireless Smart Meters is particularly threatening to health because that radiation is so persistent and so powerful. California court documents, describing the same Wireless Smart Meters used here in Maryland, indicate that each of these meters issues its pulses of RF radiation, on average 10,000 times per day, and up to a maximum 190,000 times per day, 24/7, forever. Further, the



power level of each pulse is about 1000 milliwatts, placing Wireless Smart Meters among the most powerful RF radiators likely to be present in a residential environment.

References:

[http://emfsafetynetwork.org/wp-content/uploads/2011/11/PGERFDataOpt-outalternatives\\_11-1-11-3pm.pdf](http://emfsafetynetwork.org/wp-content/uploads/2011/11/PGERFDataOpt-outalternatives_11-1-11-3pm.pdf)

<http://stopsmartmeters.org/wp-content/uploads/2012/01/OWS-NIC514-FCC-specifications.pdf>

## **Why don't Federal regulations protect the public from such high levels of RF radiation?**

The Federal Communications Commission (FCC) is responsible for the regulations that set the Maximum Permitted Exposure (MPE) limits for RF radiation. Unfortunately, the current regulations are based primarily on outdated 1980s thinking, when only the heating effects of RF radiation on the body were considered. Since then, the biomedical research community has demonstrated, in hundreds of published studies, that there are an enormous number of biological effects of concern, entirely aside from heating. And the number of discovered effects continues to grow.

In short, current FCC regulations are entirely out of date and are too permissive to protect the public from harm. This problem has been recognized in legislation proposed in the U.S. House of Representatives (H.R. 6358). But, even if that legislation becomes law, it will be years before more protective regulations are developed and issued. In the meantime, each of the states in the USA is on its own to protect its residents. ***Thus, the question is: Will Maryland act to protect its residents?***

References:

Summary of H.R. 6358: (<http://marylandsmartmeterawareness.org/smart-meter-news/ask-your-congressional-rep-to-co-sponsor-h-r-6358>).

Full copy of H.R. 6358: ([http://thomas.loc.gov/home/gpoxmlc112/h6358\\_ih.xml](http://thomas.loc.gov/home/gpoxmlc112/h6358_ih.xml)).

## **What biological effects does exposure to RF radiation cause?**

Some of the biological effects of exposure to RF radiation can be readily sensed (the "symptoms"). Other biological effects cannot be readily sensed, at least not until an advanced state of harm has been reached. Unfortunately, you can be harmed by the latter even when you are free of the "symptoms". ***That is, you can be harmed with no warning.***

(1) Biological effects of RF radiation from Wireless Smart Meters that can be sensed (the "symptoms") include these:

- pressure in head
- difficulty concentrating
- ringing, buzzing/tinnitus in the ears
- insomnia
- headaches
- heart racing, arrhythmia
- memory problems
- agitation

dizziness  
tingling, burning skin  
fatigue  
involuntary muscle contractions  
eye/vision problems  
numbness

Reference:

Pre-Filed Testimony of Richard Conrad, Ph.D., Appendices 2 and 3  
(<http://www.mainecoalitiontostopsmartmeters.org/wp-content/uploads/2013/01/Exhibit-9-Conrad-Web.pdf>).

(2) Biological effects of RF radiation that cannot be readily sensed (except for some on the first line below), until they have reached an advanced state of harm, include these:

sleep, neuron firing rate, EEG, memory, learning, and behavior difficulties  
stress proteins, heat shock proteins, and disrupted immune function  
reproduction and fertility effects  
brain tumors and blood-brain barrier penetration  
cancer (other than brain) and cell proliferation  
oxidative damage, reactive oxygen species and DNA damage, and DNA repair failure  
disrupted calcium metabolism  
cardiac, heart muscle, blood pressure, and vascular effects

Reference:

BioInitiative Working Group, Cindy Sage and David O. Carpenter, Editors, BioInitiative Report: A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Radiation, December 31, 2012 (<http://www.bioinitiative.org>). See the RF Color Charts.

## **Where can you find analyses of the research literature documenting the biological effects of RF radiation?**

The published literature of the international biomedical research community on the adverse effects of RF radiation is so vast that it would be difficult to read it all. But three very wide ranging reviews of this literature have made the findings more accessible:

(1) The most massive review is the 1479-page BioInitiative 2012 Report, published in December 2012, which considered about **1800** biomedical research publications issued in the last five years. The BioInitiative 2012 Report was prepared by an international body of 29 experts, heavy in Ph.D.s and M.D.s, from 10 countries, including the USA which contributed the largest contingent of experts (10).

Reference:

BioInitiative Working Group, Cindy Sage and David O. Carpenter, Editors, BioInitiative Report: A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Radiation, December 31, 2012 (<http://www.bioinitiative.org>).



(2) A group of six doctors in Oregon, led by Paul Dart, M.D., published, in June 2013, their own 74-page review of **279** biomedical research publications. This review makes the health case against the installation of Wireless Smart Meters, explicitly. The review recommends that levels of RF radiation must be lowered to protect public health, not raised by the installation of Wireless Smart Meters. This review is posted on the website of the Federal Communications Commission, at the link entitled "Health Effects of RF - Research Review (97)".

Reference:

Biological and Health Effects of Microwave Radio Frequency Transmissions, A Review of the Research Literature, A Report to the Staff and Directors of the Eugene Water and Electric Board, June 4, 2013 (<http://apps.fcc.gov/ecfs/comment/view?id=6017465430>).

(3) Michael Bevington, in 2013, published a book that summarizes the findings of **1828** biomedical research publications. The book describes the symptoms caused by exposure to electromagnetic radiation, the many diseases associated with such exposure, and the relative risk levels associated with specific sources of electromagnetic radiation. Wireless Smart Meters are in the highest of those risk categories.

Reference:

Michael Bevington, Electromagnetic Sensitivity and Electromagnetic Hypersensitivity: A Summary, 2013 (<http://www.es-uk.info>).

### **Are some groups of people at especially high risk of harm from RF radiation?**

Yes. The above literature reviews indicate that some groups of individuals are at especially high risk of harm from exposure to RF radiation: pregnant women and their unborn children, very young children, teenagers, men of reproductive age, seniors, and anyone with a chronic health condition.

### **What is the latest disquieting information about the biological effects of RF radiation?**

As the research community's investigations proceed, additional biological effects are being found and others are coming under investigation. One of the most important coming under investigation now is the plausibility of a link between RF radiation and autism. A link is suspected because the biological effects known to be caused by RF radiation are remarkably similar to the biological anomalies exhibited by autistic children.

That link has not yet been scientifically established. But if that link does prove true, and thus that RF radiation is found to be one of the environmental stressors contributing to autism, then we may, at last, have an explanation as to why the incidence of autism is growing as quickly as the use of wireless devices themselves. Autism now affects 1 in about 50 children, mostly boys.

Reference:

Martha R. Herbert, Cindy Sage, Autism and EMF? Plausibility of a pathophysiological link part I and part II, Pathophysiology, Volume 20(3), pages 191-209 and 211-34, June 2013 (<http://www.pathophysiologyjournal.com/article/S0928-4680%2813%2900037-0/abstract>).

## What are medical associations saying about RF radiation from Wireless Smart Meters and other wireless devices?

The American Academy of Environmental Medicine, which trains medical doctors in preparation for the tests required for Board Certification in Environmental Medicine, recommends:

*"Avoidance of smart meter EMF/RF emissions based on health considerations, including the option to maintain analog meters."*

*"A moratorium on smart meters and implementation of safer technology."*

Reference:

AAEM, "Smart Meter Case Series", October 23, 2013  
(<http://marylandsmartmeterawareness.org/wp-content/uploads/2014/02/AAEM-Smart-Meters.pdf>).

The American Academy of Environmental Medicine also states:

*"The AAEM strongly supports the use of wired Internet connections, thereby encouraging prudent minimization of exposure to RF such as from WiFi, cellular and mobile phones and towers, and "smart meters."*

*"The peer reviewed, scientific literature demonstrates the correlation between RF exposure and neurological, cardiac, and pulmonary disease as well as reproductive and developmental disorders, immune dysfunction, cancer and other health conditions. The evidence is irrefutable."*

Reference:

AAEM, "Wireless Radiofrequency Radiation in Schools", November 14, 2013  
(<http://aaemonline.org/docs/WiredSchools.pdf>).

The American Academy of Pediatrics (AAP), whose 60,000 doctors care for our children, has supported the development of more restrictive standards for RF exposure that would better protect the public:

*"It is essential that any new standards for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes."*

Reference:

Letter from the AAP to the Honorable Dennis Kucinich, U.S. House of Representatives, December 12, 2012 (<http://www.scribd.com/doc/118348085/AAP-Supports-Child-Cell-Phone-Protection>).



## How are other states and communities responding to Wireless Smart Meters?

In California, which got Wireless Smart Meters early (2010), 57 towns, cities, counties, and other jurisdictions have opposed the mandatory installation of Wireless Smart Meters. Of these jurisdictions, 15 have banned the installation of Wireless Smart Meters altogether.

Reference:

<http://stopsmartmeters.org/how-you-can-stop-smart-meters/sample-letter-to-local-government/ca-local-governments-on-board/>

The Attorneys General of three states have opposed Wireless Smart Meters because they find that the costs outweigh any claimed financial benefits to the customers.

The Attorney General of Illinois, Lisa Madigan, indicates the following:

*"The utilities want to experiment with expensive and unproven smart grid technology, yet all the risk for this experiment will lie with consumers."*

*"Consumers don't need to be forced to pay billions for so-called smart technology to know how to reduce their utility bills. We know to turn down the heat or air conditioning and shut off the lights. The utilities have shown no evidence of billions of dollars in benefits to consumers from these new meters, but they have shown they know how to profit."*

*I think the only real question is: How dumb do they think we are?"*

Reference:

<http://www.lisamadigan.org/Newsroom/lisainthenews/item/2011-06-lisa-madigan-opinion-editorial-come-experiment-too>

The Attorney General of Connecticut, George Jepsen, concluded the following:

*"Connecticut Light & Power Co.'s plan to replace existing electric meters with advanced technology [that is, Wireless Smart Meters] would be very expensive and would not save enough electricity for its 1.2 million customers to justify the expense, Attorney General George Jepsen said Tuesday."*

*' "The pilot results showed no beneficial impact on total energy usage," Jepsen said. "And, the savings that were seen in the pilot were limited to certain types of customers and would be far outweighed by the cost of installing the new meter systems," he said.'*

Reference:

[http://www.ct.gov/ag/lib/ag/press\\_releases/2011/020811clpmeters.pdf](http://www.ct.gov/ag/lib/ag/press_releases/2011/020811clpmeters.pdf)

The Attorney General of Michigan, Bill Schuette, stated the following:

*"A net economic benefit to electric utility ratepayers from Detroit Edison's and Consumers smart meter programs has yet to be established. In the absence of such demonstrated benefit, the Attorney General has opposed, and will oppose any Commission action that unjustly and unreasonably imposes the costs of such programs upon ratepayers."*

Reference:

<http://efile.mpsc.state.mi.us/efile/docs/17000/0408.pdf>

Throughout the USA, 33 of the 50 states now have Wireless Smart Meter opposition groups, providing strong evidence of growing public awareness and concern.

Reference:

<http://www.takebackyourpower.net/directory/us/>

### **Left unattended, will the health problem posed by Wireless Smart Meters get better or worse?**

The health problem will get much worse and quickly. Wireless Smart Appliances, such as smart electric stoves, and smart electric clothes dryers, are in the offing. They, too, will contain wireless RF transmitters and receivers. These Wireless Smart Appliances are designed to use RF radiation to communicate with Wireless Smart Meters so that the electric power company will know what each Wireless Smart Appliance in every home is doing all the time. Thus, not only will the Wireless Smart Meters be sending RF radiation into the home to probe for data from the Wireless Smart Appliances, but also the Wireless Smart Appliances will be responding by sending their own RF radiation throughout the home. The result will be a steadily increasing level of RF radiation in the home, further increasing the health risk.

### **Why is there a special urgency to this problem?**

While some of the biological effects of RF exposure can be reversed by reducing exposure, a quick examination of the lists of biological effects above will indicate that many of these effects are not reversible. For example, once you have cancer, reducing RF exposure may not be sufficient to enable recovery, even though it may help with recovery. Simply stated, the longer that RF exposure at high levels is permitted to persist, the more difficult it will become to undo the harm. Many Marylanders have already been exposed to the RF radiation from Wireless Smart Meters for more than one year.

### **Why are Wireless Smart Meters a community issue, not just an individual issue?**

The RF radiation from each Wireless Smart Meter does not stop at the boundaries of the property on which that Wireless Smart Meter has been installed. Also, the radiation readily penetrates ordinary home-construction materials. If this were not true, Wireless Smart Meters would be of no use to the electric power companies for returning consumption data to them or for communicating with forthcoming Wireless Smart Appliances inside the home.



In fact, *every resident in a community is irradiated by every Wireless Smart Meter in that community, just to varying degrees*. Each Wireless Smart Meter near to a given resident produces more radiation in his home than each Wireless Smart Meter farther away. But there are so many more Wireless Smart Meters that are farther away that, together, they count, too. For example, in my community of Montgomery Village, MD, there are more than 14,000 Wireless Smart Meters installed on our homes. Together, they issue an average of 140 million pulses of RF radiation every day, up to a maximum of 2.7 billion pulses per day. There is now ***no place in our community*** where a resident can go where he is not *near to* many Wireless Smart Meters and within reach of so many more Wireless Smart Meters that are farther away.

The implication is that no resident can solve his radiation problem just by having his own Wireless Smart Meter replaced with a safe meter, even though his own Wireless Smart Meter is the single greatest contributor to the radiation level in parts of his home. Rather, all of his neighbors must have their Wireless Smart Meters replaced, too. This fact is already stressing relationships among neighbors who have varying degrees of understanding of the health threat. If Wireless Smart Meters are allowed to continue in use, this stress can tear communities apart.

In short, once Wireless Smart Meters have been installed on your home and in your community, your home is no longer your castle. Rather, your home is now your electric power company's castle.

### **How can the Maryland General Assembly help through legislation?**

#### **(1) If you want to provide SOME help to SOME Maryland residents, then at least:**

Write into law a permanent permission for individual ratepayers to opt out of having any type of wireless meter, including a Wireless Smart Meter, and without fees. No one should have a wireless meter imposed upon him. Nor should anyone have to pay a penalty to protect the health of his family and his community. Specifically, grant ratepayers the right to have a safe meter, including especially the safest meter of all which is the "traditional analog mechanical meter with no wireless communications capability". This type of meter does not emit RF radiation at all. And this type of meter also has a long history of reliability and accuracy.

#### **(2) If you want to provide SOME help but to MORE Maryland residents:**

Extend to all renters, including those renting office space, the same rights extended to ratepayers in (1) above. Otherwise, their health will remain at the mercy of their landlords, who may not understand, or care, about the health risks to their renters.

#### **(3) If you want to SOLVE the health problem for ALL Maryland residents equally:**

Place a moratorium on the further installation of wireless meters, including Wireless Smart Meters, throughout Maryland. Then mandate a rollback of the installation of all wireless meters, including all Wireless Smart Meters, throughout the state. Specifically, grant homes and businesses the right to have a safe meter, including especially the "traditional analog mechanical meter with no wireless communications capability". That is the ***only way*** to protect ***all*** of the residents of the state, because each resident is irradiated not only by his own Wireless Smart Meter but also by the Wireless Smart Meters of his neighbors. Finally, right at least part of the wrong done to those who have opted out by

ordering the refunding of all Opt Out fees that they have paid.

If I can be of assistance to you or your staff in assessing the documentation justifying such steps, please do not hesitate to contact me.

I urge you to look deeply into this major challenge to the health of all Marylanders. Only you can prevent the dreadful mistake made by the electric power companies from becoming a health disaster for all Maryland residents. Please take protective action now.

Thank you for your attention.

Regards,

Ronald M. Powell, Ph.D.  
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Montgomery Village, MD 20886-4007  
E-mail: [ronpowell@verizon.net](mailto:ronpowell@verizon.net)  
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# Symptoms after Exposure to Smart Meter Radiation

People from coast to coast in the USA, and from one side of the world to the other, are becoming ill after exposure to the radiofrequency radiation emitted by Wireless Smart Meters. Attached are the results of two surveys of the symptoms being reported.

The first survey comes from the United States and includes 318 respondents, from 28 states from California to New York, and addresses wireless utility meters that are principally Wireless Smart Meters. The second survey comes from the other side of the world, Victoria, Australia, and includes 92 respondents, and addresses Wireless Smart Meters exclusively. Altogether, 410 adults and children are included. Both surveys report new or worsened symptoms after exposure to the radiation from Wireless Smart Meters in the respondent's environment.

The attached two bar graphs show the percentage of respondents who experienced each symptom. Most individuals in both surveys developed multiple symptoms. Each bar graph is followed by one page of additional information written by the person who analyzed the survey data.

The two surveys group symptoms into somewhat different clusters, but many of these clusters are similar enough to enable comparison between the surveys. Of the top seven clusters of symptoms in both surveys, six clusters are similar in description and nearly identical in order of occurrence: (1) sleep disruption; (2) headaches; (3) ringing or buzzing in the ears; (4) fatigue; (5) loss of concentration, memory, or learning ability; and (6) disorientation, dizziness, or loss of balance.

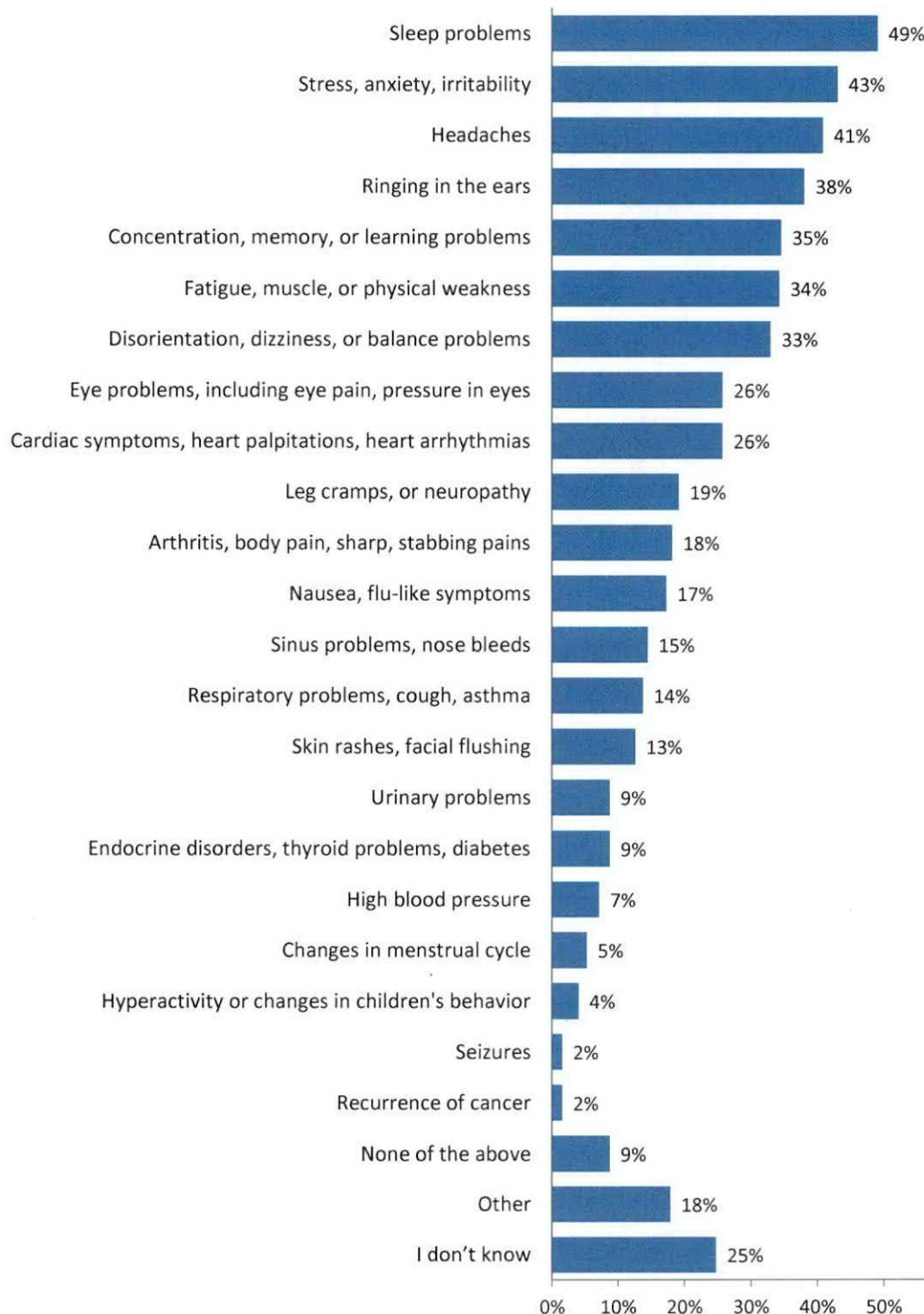
The surveys do not tell us how likely a given individual is to become symptomatic after exposure to the radiation from Wireless Smart Meters. But the surveys do tell us which symptoms a person who does become symptomatic is most likely to experience. The many symptoms found reflect the many body systems that are disrupted by such radiation.

A symptom, of course, is something that can be sensed by an individual, and thus can serve as a warning. Unfortunately, many health effects caused by radiofrequency radiation have no early symptoms and thus give no warning. These health effects become evident only after significant harm has been done. Examples are DNA damage, cancer, and reproduction effects.

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<sup>1</sup> Ronald M. Powell is a retired career U.S. Government scientist. He holds a Ph.D. in Applied Physics from Harvard University. During his Government career, he worked for the Executive Office of the President, the National Science Foundation, and the National Institute of Standards and Technology.

# New or Worsened Symptoms Reported by 318 Individuals after Exposure to Wireless Utility Meters in the USA<sup>1</sup>



<sup>1</sup> Ed Halteman, Ph.D., statistics, Wireless Utility Meter Safety Impacts Survey: Final Results Summary, September 13, 2011, p. 22 (<http://emfsafetynetwork.org/wp-content/uploads/2011/09/Wireless-Utility-Meter-Safety-Impacts-Survey-Results-Final.pdf>). 97 percent of respondents to full survey were in the USA, from 28 states, with most in California (78 percent) and New York (16 percent). In the Final Results Summary, the four clusters of symptom's with the fewest responses (2 to 5 percent each, totaling 13 percent) were included in "Other" but are broken out separately in the above bar graph, reducing the responses listed as "Other" (from 31 percent to 18 percent, a reduction of 13 percent).

## **Executive Summary by Ed Halteman, Ph.D.**

### **Wireless Utility Meter Safety Impacts Survey**

#### **OBJECTIVES**

- To investigate reported public health and safety complaints about wireless utility meters.
- To evaluate the impacts on health and safety due to wireless utility meters.
- To determine whether further study is warranted.

#### **METHODS**

- Survey was designed by the EMF Safety Network (Network).
- The survey was circulated online through various social media outlets including Network's email list, Facebook, and the California EMF Safety Coalition (a discussion group).
- The survey was also posted on Network's website: [www.emfsafetynetwork.org](http://www.emfsafetynetwork.org) where visitors were invited to take the survey.
- 443 responses were received from 7/13/2011 through 9/2/2011. *(318 of the 443 answered the health questions that formed the basis for the bar chart on symptoms. RMPowell)*
- Network commissioned Survey Design and Analysis (SDA) to provide this report of the survey findings.

#### **RESPONDENT MAKEUP**

- 93% are over 40 years old and 43% are over 60 years old.
- 73% are women.
- 78% are from California.
- 68% have Pacific Gas and Electric (PG&E) as their utility provider.
- 49% are EMF Sensitive.
- 41% have had a new wireless meter installed in their home; of these . . .
  - 56% have had it installed for at least six months
  - 89% have electric meters, 53% gas meters and 10% water meters
  - 35% saw an increase in their utility bill
  - 26% have experienced some type of interference
  - 8% experienced burned out appliances or damaged electronics including TV, stereo, computer, refrigerator and other.
- 76% indicated they have wireless utility meters installed in their neighborhood, town or city.
  - 44% near their home
  - 36% in town

#### **TOP HEALTH ISSUES SINCE NEW METERS INSTALLED**

- Sleep problems (mentioned by 49%)
- Stress, anxiety and irritability (43%)
- Headaches (40%) *(Listed as 41% on symptoms bar graph, rounded up from 40.9%. RMPowell)*
- Ringing in the ears (38%)
- Heart problems (26%)

#### **UTILITY and PUBLIC UTILITY COMMISSION INTERACTIONS** *(Title inserted by RMPowell.)*

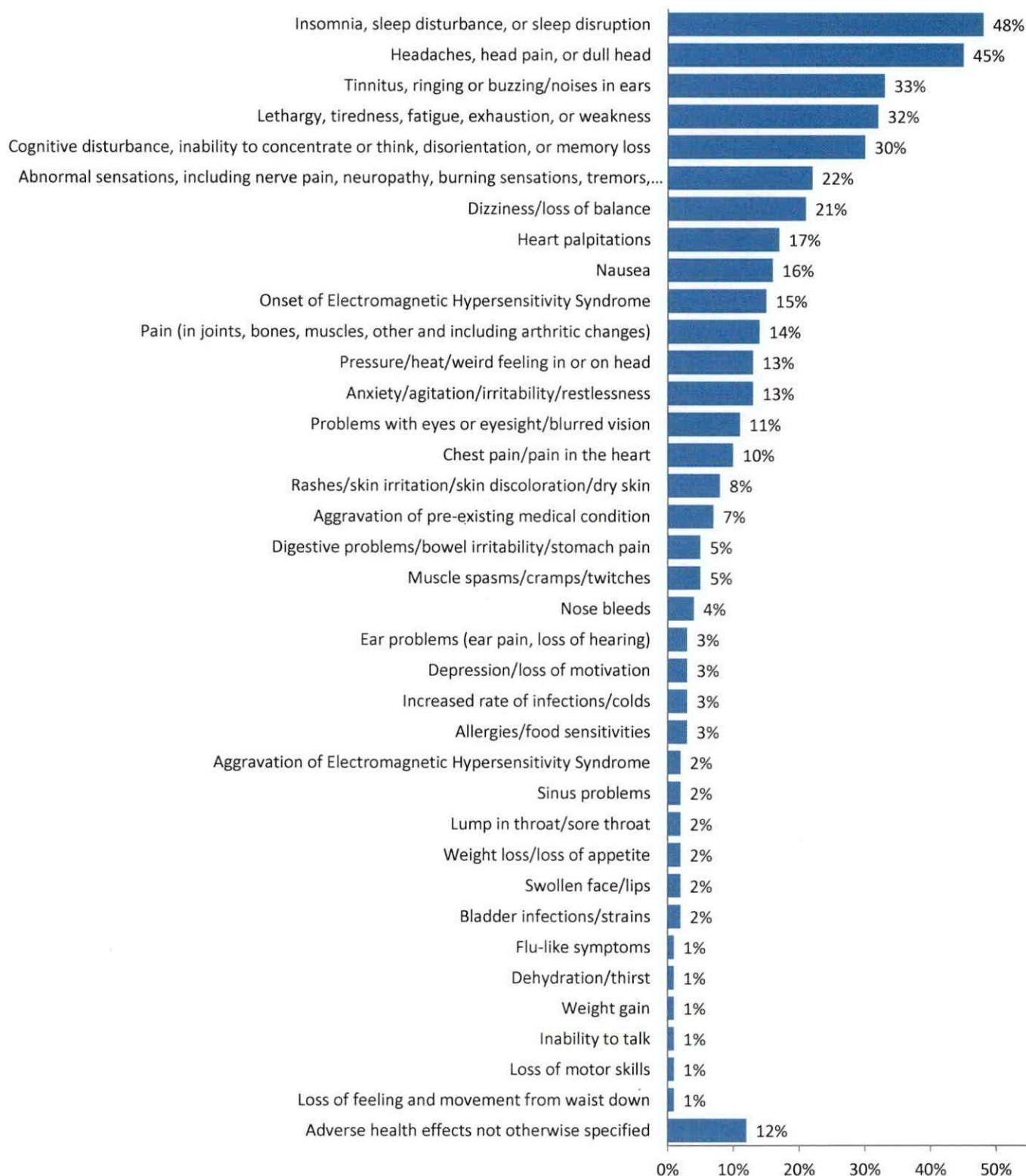
- 40% (111 people) of those having wireless meters in their homes or community have complained to their utility provider.
  - 96% of these people were either "Unsatisfied" or "Very Unsatisfied" with the handling of their complaint.
- 32% (88 people) complained to the utilities commission.
  - 96% of these people were either "Unsatisfied" or "Very Unsatisfied" with the handling of their complaint
- 94% of respondents want to retain or restore their analog meters and 92% of these respondents do not think they should have to pay any additional money.

#### **STATISTICAL TESTING SHOWS THE TOP HEALTH SYMPTOMS ARE POSITIVELY ASSOCIATED WITH**

- EMF Sensitivity
- Wireless meters installed in the home



# New or Worsened Symptoms Reported by 92 Individuals after Exposure to Wireless Smart Meters in Australia<sup>1</sup>



<sup>1</sup> Federica Lamech, MBBS, Self-Reporting of Symptom Development from Exposure to Radiofrequency Fields of Wireless Smart Meters in Victoria, Australia: A Case Series. *Alternative Therapies*, Nov/Dec 2014, Vol. 20, No. 6, pages 28-38. NIH PMID 25478801 (<http://www.alternative-therapies.com> and <http://www.ncbi.nlm.nih.gov/pubmed/25478801>).

## **Abstract of Dr. Federica Lamech's Article from the National Institutes of Health PubMed Index**

Altern Ther Health Med. 2014 Nov-Dec;20(6):28-39.

### **Self-reporting of symptom development from exposure to radiofrequency fields of wireless smart meters in Victoria, Australia: a case series.**

Lamech F.

#### **Abstract**

#### **CONTEXT:**

In 2006, the government in the state of Victoria, Australia, mandated the rollout of smart meters in Victoria, which effectively removed a whole population's ability to avoid exposure to human-made high-frequency nonionizing radiation. This issue appears to constitute an unprecedented public health challenge for Victoria. By August 2013, 142 people had reported adverse health effects from wireless smart meters by submitting information on an Australian public Web site using its health and legal registers.

#### **OBJECTIVE:**

The study evaluated the information in the registers to determine the types of symptoms that Victorian residents were developing from exposure to wireless smart meters.

#### **DESIGN:**

In this case series, the registers' managers eliminated those cases that did not clearly identify the people providing information by name, surname, postal address, and/or e-mail to make sure that they were genuine registrants. Then they obtained consent from participants to have their deidentified data used to compile the data for the case series. The author later removed any individual from outside of Victoria.

#### **PARTICIPANTS:**

The study included 92 residents of Victoria, Australia.

#### **OUTCOME MEASURES:**

The author used her medical experience and judgment to group symptoms into clinically relevant clusters (eg, pain in the head was grouped with headache, tinnitus was grouped with ringing in the ears). The author stayed quite close to the wording used in the original entries. She then calculated total numbers and percentages for each symptom cluster. Percentages were rounded to the nearest whole number.

#### **RESULTS:**

The most frequently reported symptoms from exposure to smart meters were (1) insomnia, (2) headaches, (3) tinnitus, (4) fatigue, (5) cognitive disturbances, (6) dysesthesias (abnormal sensation), and (7) dizziness. The effects of these symptoms on people's lives were significant.

#### **CONCLUSIONS:**

Review of some key studies, both recent and old (1971), reveals that the participants' symptoms were the same as those reported by people exposed to radiofrequency fields emitted by devices other than smart meters. Interestingly, the vast majority of Victorian cases did not state that they had been sufferers of electromagnetic hypersensitivity syndrome (EHS) prior to exposure to the wireless meters, which points to the possibility that smart meters may have unique characteristics that lower people's threshold for symptom development.

PMID: 25478801

## **Symptoms Resulting from Exposure to Radiofrequency/Microwave Radiation from Smart Meters**

In February 2013, the expert testimony<sup>2</sup> of Richard H. Conrad, Ph.D.<sup>3</sup>, and many other experts worldwide, was submitted to the Maine Public Utilities Commission when the Commission was considering the future of Smart Meters in that state. Dr. Conrad reported the results of a survey of 210 individuals who had experienced symptoms resulting from exposure to Smart Meters.

### ***What the survey does and does not tell us***

The survey does not address the frequency of occurrence of symptoms in the general population when exposed to Smart Meters. So the survey does not tell us how likely it is that a person in the general population will experience symptoms after exposure to Smart Meters. But the survey does tell us what types of symptoms *are* being experienced by those who *do become* symptomatic after exposure to Smart Meters.

### ***Individuals who reported previous symptoms that worsened to severe***

Appendix 2 of Dr. Conrad's report shows the number of persons, out of the 210, who reported

*...previous symptoms that worsened to severe intensity (from either mild or moderate intensity) following smart meter exposure.<sup>4</sup>*

A copy of Appendix 2 is attached.

### ***Individuals who reported new symptoms***

Appendix 3 of Dr. Conrad's report shows the number of individuals, out of the 210, who

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<sup>1</sup> Ronald M. Powell holds a Ph.D. in Applied Physics from Harvard University and has worked for the Executive Office of the President, the National Science Foundation, and the National Institute of Standards and Technology.

<sup>2</sup> Richard H. Conrad, Ph.D., Exhibit D – Smart Meter Health Effects Survey and Report, 2013 (<http://www.mainecoalitiontostopsmartmeters.org/wp-content/uploads/2013/02/Exhibit-D-Smart-Meter-Health-Effects-Report-w-AppendicesV3-1-9Reduced-Appendices.pdf>). Appendix 2 is on page 59. Appendix 3 is on page 60. Additional information, including the author's qualifications, can be found here: Pre-Filed Testimony of Richard Conrad, Ph.D., MPUC Docket No. 2011-00262, February 2013 (<http://www.mainecoalitiontostopsmartmeters.org/wp-content/uploads/2013/01/Exhibit-9-Conrad-Web.pdf>).

<sup>3</sup> Richard H. Conrad holds a Ph.D. in Biochemistry from Johns Hopkins University and conducted postdoctoral research at the Institute of Molecular Biophysics of Florida State University and in the Department of Biochemistry of Cornell University.

<sup>4</sup> See the first reference in footnote 2, Exhibit D – Smart Meter Health Effects Survey and Report, page 3.



reported symptoms that were new, that is,

*...symptoms suffered for the first time in their lives, symptoms they had never experienced before smart meters<sup>5</sup>*

and that were either severe or moderate in intensity after exposure to Smart Meters. A copy of Appendix 3 is also attached.

## **Causality**

Because the symptoms in both Appendix 2 and Appendix 3 can have causes other than exposure to Smart Meters, the survey included an extensive list of questions designed to determine whether Smart Meters were the cause. Only individuals whose answers were persuasive of a causal connection were included in the survey results.

## **Symptoms versus biological effects more broadly**

Symptoms, as that term is used here, are biological effects that can be sensed. But an absence of symptoms does not mean an absence of biological effects. Many of the biological effects associated with exposure to radiofrequency/microwave radiation either cannot be sensed at all, such as a loss of male fertility, or cannot be sensed until an advanced state of disease has been reached, such as cancer. A broad range of biological effects, both those that can be sensed and those that cannot be sensed, have been researched extensively by the international biomedical research community. The findings are described in detail in three comprehensive reviews and summaries of the published research literature.<sup>6,7,8</sup>

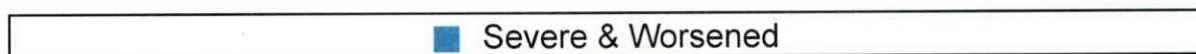
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<sup>5</sup> See the first reference in footnote 2, Exhibit D – Smart Meter Health Effects Survey and Report, page 3.

<sup>6</sup> BioInitiative Working Group, Cindy Sage and David O. Carpenter, M.D., Editors, BioInitiative Report: A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Radiation, December 31, 2012 (<http://www.bioinitiative.org>). This review is 1479 pages long and considered the findings of about 1800 biomedical research publications. This report was prepared by an international body of 29 experts, heavy in Ph.D.s and M.D.s, from 10 countries, including the USA which contributed the largest contingent of experts (10).

<sup>7</sup> Paul Dart, M.D., Kathleen Cordes, M.D., Andrew Elliott, N.D., James Knackstedt, M.D., Joseph Morgan, M.D., Pamela Wible, M.D., and Stephen Baker (technical advisor), Biological and Health Effects of Microwave Radio Frequency Transmissions, A Review of the Research Literature, A Report to the Staff And Directors of the Eugene Water And Electric Board, June 4, 2013 (<http://apps.fcc.gov/ecfs/comment/view?id=6017465430>). This review is 74 pages long and references the findings of 279 biomedical research publications. Also included on this web site are six files containing viewgraphs of a presentation given to the Eugene Water and Electric Board on this subject.

<sup>8</sup> Michael Bevington, Electromagnetic Sensitivity and Electromagnetic Hypersensitivity: A Summary, 2013 (<http://www.es-uk.info>). This book is 112 pages long and summarizes the findings of 1828 biomedical research publications. The book describes the symptoms caused by exposure to electromagnetic radiation, the many diseases associated with such exposure, and the relative risk levels associated with specific sources of electromagnetic radiation. Wireless Smart Meters are in the highest of those risk categories.



Number of respondents who checked both Severe & Worsened

