

Before the PA Public Utility Commission

Lynn Force

v.

Docket No. C-2017-2634987

West Penn Power Company

Reply to Answer and New Matter of West Penn Power
Company to the Complaint of Lynn Force

1. Not contested

RECEIVED

2. Not contested

DEC 23 2017

3. Not contested

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

4(a) Denied in part. Deny Company's statement that at all times relevant to this proceeding, the Company's actions have been reasonable. The Company's actions up to the time of filing my complaint are stated in my first allegation. Letter of October 10, 2017 was not received. We have received all other mail as expected, nothing else missing. David says he did not get a message on his cell phone from the electric company. Letter of November 9, 2017 threatening disconnection and previously enclosed with my complaint was received by us on November 13,

2017. My call of November 16, 2017 to Company is mischaracterized. I did not refuse installation because I had not received the letter. I was simply relaying the experience of the encounter at the door. In talking to Sherry I did ask that installation be delayed because I already now had the neighbor's meter on my side of our single story duplex right beside my kitchen sink where I spend a lot of time in my day. I also told Sherry that I would probably be moving in just a few months outside of West Penn's service area. True she said deployment could not be delayed. Their answer states that I was provided with dispute rights, but that occurred much later. Instead she told me they would have to shut off my electricity. At that point, I told her that I was filing a formal complaint. Next, she said that I would have a 10 day reprieve from our power shut off to file my complaint. She told me I could file an informal complaint. I said no, I'm filing a formal complaint. She provided me with the address for my formal complaint as follows:

PA PUC

PO Box 3265

Harrisburg, PA 17105

(Note this is not the same mailing address listed on the formal complaint form, which was the address I used). She said that, "If PUC does not notify us - then the

process continues." Four days after this conversation on November 16, 2017 in which she was notified that I was filing a formal complaint, Company issued the further shut off Notice of November 20, 2017, received by us November 24, 2017.

4(b) I deny that the installation of 2 wireless microwave radiation emitting smart meters is safe or reasonable.

1. The allegations that I state in my complaint are true, they are not my beliefs, they are fact. They are my testimony of what occurred. My testimony is proof. As to my statement of what I said I think is their strategy. This I can't prove, but it seems likely to me based upon what occurred and is occurring. This is my belief. I have no proof. But when my next door neighbor returns in January from out of state for the holiday, I can ask him if he received such a letter regarding installation. I would be interested to know.

2. Company states youtube videos of scientists discussing smart meters are my belief. These are their beliefs. You can watch them speaking for themselves. There are many more doctors and scientists that I didn't have time to include in my complaint that

support the allegation that imposing a smart meter on a necessary service, particularly without the ability to opt out, violates the obligation to provide safe and reasonable service under § 1501 of Title 66 of the Pennsylvania Code. You tube video titled Dr. Martin Pall Testimony: Health Effects of Wireless Massachusetts State House 2017. This video is only 2:43 and was testimony regarding Senate Bill 1864: No Fee Opt Out For Smartmeters June 20, 2017. He testified, which you can view - this is not my belief but his:

"I'm Martin ~~Pall~~ Pall, Professor Emeritus at Washington State University. I live in Portland, Oregon, I've been giving talks on EMF effects, one just recently in New Haven, and I'll be giving two talks shortly in Spain, uhm, so you know I've published six papers on how electromagnetic fields impact the cells of our bodies. Uhm, so what I'm going to do, my comments are going to be focused specifically on smart meters. There are many different health effects that have been extensively documented as being caused by EMFs, most of them have never been looked at with smart meters, but three of them have been, and they've all been reported to be occurring at very substantial levels in response to smart meters. And those are that there are widespread neuropsychiatric effects,

there are cardiac effects on the electrical control of the heart, those are life threatening because the arrhythmias that occur can be, are often associated with sudden cardiac death, and then finally there's electromagnetic hypersensitivity uh which has just been referred to. Those three have all been reported to occur in response to smart meters. Now the smart meters were put out, as are all wireless communication devices, without any biological testing whatsoever, safety testing whatsoever. Uh the guarantees of safety that the industry has put forth is based on an assumption that only thermal, that is, only heating effects can occur, and there's been data from thousands of studies going all the way back to 1950s that that's not true, okay, that there are many nonthermal effects including the three that I just talked about. Uh so I think there should be no question that, uh, that smart meters have biological effects. Uh now there's some other issues here that are important. One is the pulsed fields. ^{The} ~~The~~ fields that pulse up and down are much more biologically active in most cases than nonpulsed fields or continuous wave fields. Uh, smart meters are highly pulsed and therefore, they are problematic for

that reason, as well. Uhm and so, and let me just say, everything I say here will be denied by industry, I guarantee it. This is what the science says. Thank you."

Then From YouTube Dr. Mercola Interviews Martin Pall on EMFs: at 56:00 into the presentation Dr. Pall says:

"The one thing to emphasize is that this whole nonsense that the industry has been putting forth is just that, it's just nonsense, and we are literally destroying our health in many different ways, and I think, you we talked about the extinction issue, and I think there are actually, uh 6 different ways in which uh, it's probable that we will generate our own extinction rather quickly from these EMFs, uh, but I think one of the things that's important here is that when you look at the effects of EMFs on the brain and when you look at the effects of EMFs on the reproductive system, they both develop slowly over time. Those are the things we're not aware of because they develop slowly, you know I mean it's not like getting you know hit in the head by something, uh, you you know, it develops over periods of months and sometimes years (Mercola: like smoking) you know and and so we're not aware of them even though they have you know they they're cumulative and they develop quite severe effects

and so so this is something where, you know, I think people are not aware of this because they develop slowly over time despite the severity of the eventual effects, and that's something that you know that I think all of us could keep in mind.")

Martin Pall has a Bachelor's in physics and a Ph.D. in biochemistry and genetics.

Then there's David Carpenter, M.D., Director, School of Public Health, State University of New York at Albany in YouTube video titled SmartMeters & EMF Radiation Poison - PSA - Pd :

at 7:30:

What is the evidence that smart meters are safe and have no adverse health effects and the answer to that question is that there is no such evidence and in fact while no one has actually done human health studies in relation to people living in homes with smart meters, we have evidence from a whole variety of other sources of radiofrequency exposure that demonstrates convincingly and consistently that exposure to radiofrequency radiation at elevated levels for long periods of time increases the risk of cancer, increases the damage to the nervous system, causes electrosensitivity, has adverse reproductive effects, and a variety of other effects on different organ systems."

David Carpenter, same video at 12:53:

"Well, it should be up to each individual to identify whether or not they want to be continuously exposed 24/7 to elevated levels of radio frequency radiation. The smart meter is for the benefit of the utility, it saves them money because they don't have to then have people going out and reading the meters and it's at the expense of the consumer that has to live in the house that has this constant exposure. So, an informed person should demand that they be allowed to keep their analog meter."

On November 16, 2017, at the very end of my phone conversation with Sherry just as we were hanging up, she interjects that these meters were tested by the California Council on Science and Technology. So I looked them up and found their Final report. I have copied just their one page highlighted summary of findings. It is enclosed along with many of the letters that were solicited by the Council (CCST) seeking comment by people with knowledge regarding the safety of smart meters. Please look at them. They are enclosed and most interesting.

The CCST report findings were deemed inexplicable by many of the contributors whose letters I have copied.

The Seletun Scientific Panel p. 3 of that report and p. 32 of my enclosure of scientific contributors to CCST "urges governments to make explicit that the burden of proof of safety rests with the producers and providers of EMF-producing technologies, not with the users and consumers."

Professor Olle Johansson, Assos. Prof., The Experimental Dermatology Unit, Department of Neuroscience, Karolinska Institute, Stockholm Sweden states on p. 3 of his letter I've enclosed, p. 4 of enclosure packet:

"The use of telephone lines (land-lines) or fiber optic cables for Smart Grid type energy conservation infrastructure is recommended. Utilities should choose options that do not create new, community-wide exposures from wireless components of Smart Grid-type projects. Future health risks from prolonged or repetitive wireless exposures of Smart Grid-type systems may be avoided by using fiber-optic cable. Energy conservation is endorsed but not at the risk of exposing millions of families in their homes to a new, involuntary source of wireless radiofrequency radiation, the effect of which on their health not yet known."

He ends his letter, p. 4, my enclosure p. 5:

"Many smart meters are close to beds, kitchens, playrooms, and similar locations. These wireless systems are never off, and the exposure is not voluntary. The smart meters are being forced on citizens everywhere. Based on this, the inauguration of smart meters with grudging and involuntary exposure of millions to billions of human beings to pulsed microwave radiation should immediately be prohibited until 'the red flag' can be hauled down once and for all."

From the American Academy of Environmental Medicine
p. 1 of their letter, p. 41 of my enclosure:

"The board of the American Board of Environmental Medicine wishes to point out that ~~the~~ existing FCC guidelines for RF safety that have been used to justify installation of 'smart meters' only look at thermal tissue damage and are obsolete, since many modern studies show metabolic and genomic damage from RF and ELF exposures below the level of intensity which heats tissues. The FCC guidelines are therefore inadequate for use in establishing public health standards. More modern literature shows medically and biologically significant effects of RF and ELF at lower energy densities. These effects accumulate over time, which is an important consideration given the chronic nature of exposure from 'smart meters'. The current medical literature

raises credible questions about genetic and cellular effects, hormonal effects, male fertility, blood/brain barrier damage and increased risk of certain types of cancers from RF or ELF levels similar to those emitted from 'smart meters'. Children are placed at particular risk for altered brain development, and impaired learning and behavior. Further, EMF/RF adds synergistic effects to the damage observed from a range of toxic chemicals. Given the widespread, chronic, and essentially inescapable ELF/RF exposure of everyone living near a 'smart meter', the Board of the American Academy of Environmental Medicine finds it unacceptable from a public health standpoint to implement this technology until these serious medical concerns are resolved. We consider a moratorium on installation of wireless 'smart meters' to be an issue of the highest importance."

p.2 of their letter p. 42 of enclosure continues on:

"The Board of the American Academy of Environmental Medicine also wishes to note that the US NIEHS National Toxicology Program in 1999 cited radiofrequency radiation as a potential carcinogen. Existing safety limits for pulsed RF were termed 'not protective of public health' by the Radiofrequency Interagency Working Group (a federal interagency working group

including the FDA, FCC, OSHA, the EPA and others). Emissions given off by 'smart meters' have been classified by the World Health Organization International Agency for Research on Cancer (IARC) as a Possible Human Carcinogen.

Hence, we call for:

- An immediate moratorium on 'smart meter' installation until these serious public health issues are resolved. Continuing with their installation would be extremely irresponsible.
- Modify the revised proposed decision to include hearings on health impact in the second proceedings, along with cost evaluation and community wide opt-out.
- Provide immediate relief to those requesting it and restore the analog meters. "

County of Santa Cruz Health Services Agency Memorandum of
Jan. 13, 2012

To: Santa Cruz County Board of Supervisors

From: Poki Stewart Nankung, M.D., M.P.H., Health Officer

SUBJECT: Health Risks Associated with Smartmeters

From 5th Page, page 54 enclosure:

"Safety Guidelines

... FCC guidelines have a much lower certainty of safety than standards. Meeting the current FCC guidelines only assures that one should not have heat damage from SmartMeter exposure. It says nothing about safety from the risk of many chronic diseases that the public is most concerned about such as cancer, miscarriage, birth defects, semen quality, autoimmune diseases, etc. Therefore, when it comes to nonthermal effects of RF, FCC guidelines are irrelevant and cannot be used for any claims of SmartMeter safety unless heat damage is involved. (Li, 2011)."

...

"Governmental agencies for protecting public health and safety should be much more vigilant towards involuntary environmental exposures because governmental agencies are the only defense against such involuntary exposure."

The Sage ~~Report~~ Letter of Comment on CCST's Smart Meter Report issued January 11, 2011. It notes on page 3, page 12 of enclosure:

"The Assessment [of Radiofrequency Microwave Radiation Emissions From Smart Meters by Sage

Associates] identified where and under what conditions smartmeters can cause FCC violations of public safety limits as the meters are typically installed and operated. The CCST report concludes that all smartmeter RF exposures will be well below the FCC safety limits, and this is erroneous. →

To date, there have been no other studies that provide sufficient information to support the claim that smartmeters comply with FCC regulations. In fact, there is solid evidence from a review of the FCC Grants of Authorization and attached FCC RF exposure studies that many thousands (perhaps millions) of meters are in clear violation of one or more of the explicit limitations noted on each FCC Grant of Authorization. The FCC Grants of Authorization are void unless meters are installed in compliance with every one of those limitations. →

The Assessment also shows many cases where, although the FCC safety limits may not be violated, excessively high RF levels from smart meters would be predicted to occur within the home or in other occupied space. In many instances, predicted RF levels are

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many times higher than those reported to cause adverse health effects.

Such exposures, if chronic, would reasonably be expected to result in increased disease and disability."

Doctor Karl Maret, Dove Health Alliance, Aptos, CA, Jan, 30, 2011
Conclusions p. 10 of 14, p. 25 enclosure:

"The dissemination of this Smart Meter technology could have been accomplished without using radio frequency radiation by using much safer power line, fiber optic or telephone communications technology. For example, a Smart Meter power line communications technology was used by Italian utilities in 27 million households using meters designed in California. In the Netherlands, the population concerned about the security and health issues of Smart Meters was given the options to opt out from having the meters installed."

Page 11, page 26 enclosure:

"In summary we find that the CCST report is incomplete and misleading giving California State

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regulators a false sense of security while potentially endangering the future health and well-being of Californians. It is requested that the current SmartMeter deployment be halted pending a more comprehensive scientific investigation of the response and health impacts of the nonthermal aspects of this technology."

Elihu Richter, M.D. MPH (Assoc. Professor) Hebrew University -
Ha dassa School of Public Health, 26 January, 2011

Letter of Comment on Smart Meter Report

p. 2, page 44 enclosure:

" ... this project exposes large percentages of the general population to highly alarming involuntary exposure risk scenarios, taking into account an array of modifying factors e.g. background exposures, distance, reflection, and factors influencing access to exposure areas.

3. Since the publication of the Benevento Resolution and the BioInitiative Report, the body of evidence concerning health risks from exposures to RF continues to accumulate. In particular from cell phone use. Cell phone use involves the delivery of a high concentration of non-ionizing

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radiation to the skull and brain for relatively brief periods of time over a 24 hour period as result of voluntary decisions by users - a situation far less aggressive to the general population than involuntary exposure from the proposed Smart Meters."

From p. 5, p. 47 of enclosure:

"But alternative technology - smart meters powered by fiber optics, which are without known risk, can be used to achieve the same objective."

3. Elihu Richter also speaks to my third allegation, which ~~is~~ Company wrongly denies:

p. 4, p. 46 of enclosure:

"9. Were these population-wide exposures to smart meters to be part of a project carried out in a medical setting, to test the risks and benefits of a new technology on human health and well being, it would be rejected by a Medical Institutional Review Board on ethical grounds as an unethical exercise in human experimentation."

Karl Maret, who was quoted in support of the last allegation in my complaint also speaks to this one. In his conclusions on p. 10 of 14, p. 25 of enclosure, he says:

"This program represents an epidemiological experiment involving our unsuspecting population whose outcome will only be fully known after many years exposure. It is being shepherded through the regulatory process by the CPUC who has not seen fit to study the possible adverse health impacts of this technology before approving its usage. It has never shown any willingness to seriously consider the well-documented non-thermal effects of pulsed microwaves on living systems and will undoubtedly use the misleading CCST report to avoid any questions about future health implications of this technology. Because of the uncertainties of adverse long-term health impacts, the CCST ought to have recommended that a Precautionary Principle be invoked that would allow more time to directly study the effect of pulsed radiation with both in vitro and in vivo testing in realistic settings of the mesh network, especially in high density Smart Meter

environments in our cities.”

5. My request is very reasonable. Even the CCST report notes in #4 under Other Considerations, p. 1 of my enclosure:

“4. Consideration could be given to alternative smart meter configurations (such as wired) in those cases where wireless meters continue to be concern to consumers.”

6. Not contested

7. Not contested

8. ~~Not contested~~ applicable.

9. Not applicable

10. Not applicable

REPLY TO NEW MATTER

11.

12. Again, initial letter not received.
Again, David said phone message not received.
Again, the Company mischaracterizes my contact

on November 16, 2017 with Company. It fails to state that I told Sherry I may be moving quite a bit earlier than July. I have the same comments here that I made in 4(a), which begins at p. 1 of my Answer Reply to Answer and New Matter. I was unaware that the Formal Complaint was served on the company on November 22, 2017. I called Company again on November 27 to see if they were still planning to shut off my electricity on the 30th. I called the number on the shut off notice letter of November 20th. I waited 25-30 minutes on hold. Then the phone rang and said "you have reached the Met-Ed voice mail system. We are currently unable to handle your call at this time." It disconnected me. November 28, 2017, 10:00 am I called the number again given on the shut off notice. Got Jennifer - she transferred me to the Smart Meter Advance Team. I got Sherry again. I asked for a supervisor regarding my shut off notice. She said it won't change anything. (I took this to mean I will still be shut off on the 30th). I told her I talked to her before and I want a supervisor. She said she didn't think it was her that talked to me before. I said are you ID # and gave her number and she said yes. I said you are the same person I spoke with. She said she would get me a supervisor. She comes

back, "No supervisor is available - they're all in a meeting." "There are Resolution Specialists," but she didn't think they could help me. I asked what they were - she said a step below supervisor - I said, "Are they above you?" She said yes - I said let me talk to them. She said OK and put me on hold at 10:30 am. At 10:40 am Michael - Supervisor ID # 53 came on and said there is a hold on my shut off. He said they were notified 8:30 am on November 27, 2017. He asked me what date was my letter. I said the 20th. So he said I can disregard the letter of the 20th. So that is what I was told.

13. I have no knowledge. I have noticed that much of the State College area still has analog meters.

14. I have no knowledge. I don't know why any Commission would approve wireless technology when there are safe alternatives.

15. Admitted. I had heard nothing about this. The only thing I had heard about Smart Meters were that they were something you could opt out of.

16. Both the Company and Commission are able to

grant any relief they so choose. I deny this allegation.

18. Denied. The Commission has the ability to fashion any remedy it wishes. I'm tired of hearing that Company is under force of law to install these meters even if it kills people - that it has no responsibility for its actions, which it has furnished, and that it is just following orders, orders which it will be in violation of in the event of any deviation or delay, no matter who dies or is harmed in the process.

19. The Commission may do whatever it wishes. I am asking for a minor thing here. Not the impossible Mountain Company makes it out to be. In fact, the Commission could fashion an opt out remedy, or order that one be created, or could place a moratorium on this whole wireless debacle, which is what many scientific expert opinions to CCST recommended.

I request that my complaint be sustained in full. I would be open to mediation.

Respectfully submitted,

Lynn Force

Dated: December 23, 2017

Lynn Force

1387 University Dr.

State College, PA 16801

(814) 237-0578

Lynn Force

v.

Docket No. C-2017-2634987

West Penn Power Company

Certificate of Service

I hereby certify that I have this day served a true copy of the Reply to Answer and New Matter and of the Reply to Preliminary Objection to the Formal Complaint of Lynn Force

Service by First Class Mail as follows:

Lauren M. Lepkoski

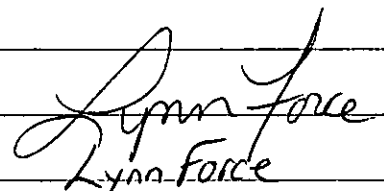
Tori L. Giesler

First Energy Service Company

2800 Pottsville Pike

P.O. Box 16001

Reading, Pennsylvania 19612-6001


Lynn Force

1387 University Dr.

State College, PA 16801

(814) 237-0578

Met-Ed
Penelec
Penn Power
West Penn Power
FirstEnergy Companies

Enclosure
Docket No. C-2017-2634987

76 South Main Street
Akron, Ohio 44308-1890

November 20, 2017

DAVE E FORCE
1387 UNIVERSITY DR
STATE COLLEGE PA 16801

Received
Friday evening
Nov. 24th

10-DAY NOTICE

RE: Service Address: 1387 UNIVERSITY DR
Account Number: 100126419546

Dear Dave E Force:

We have made several attempts to contact you and make arrangements to install a new smart meter at the service address shown above. As of the date on this letter, we have not been able to schedule a time with you to install the new meter.

It is important to note that the company is required by Pennsylvania law (Act 129) to install a smart meter for all of our Pennsylvania customers. You should also be aware that our tariff permits us to have access to your property for electric service-related matters, including exchanging the meter. As a result, you are required to allow our installers access to the electric meter so that we can safely install the new smart meter.

Unless you contact us by November 30, 2017 to replace the meter, the electric service for the account listed above will be subject to being shut off. In the event your service is shut off, the new meter must be installed at the premises before service will be restored.

Please contact us immediately by calling 1-855-344-3400 (Monday through Friday, 8:00 a.m. to 6:00 p.m.) to make the necessary arrangements to avoid the shut off of your electric service.

Sincerely,

Pennsylvania Meter Deployment

RECEIVED

DEC 23 2017

PA PUBLIC UTILITY COMMISSION
SECRETARY'S BUREAU

**Health Impacts of Radio Frequency from Smart Meters
Response to Assembly Members Huffman and Monning**

California Council on Science and Technology
April 2011

KEY REPORT FINDINGS

1. Wireless smart meters, when installed and properly maintained, result in much smaller levels of radio frequency (RF) exposure than many existing common household electronic devices, particularly cell phones and microwave ovens.
2. The current FCC standard provides an adequate factor of safety against *known thermally* induced health impacts of existing common household electronic devices and smart meters.
3. To date, scientific studies have not identified or confirmed negative health effects from *potential non-thermal* impacts of RF emissions such as those produced by existing common household electronic devices and smart meters.
4. Not enough is currently known about potential non-thermal impacts of radio frequency emissions to identify or recommend additional standards for such impacts

OTHER CONSIDERATIONS

Smart electricity meters are a key enabling technology for a "smart grid" that is expected to become increasingly clean, efficient, reliable, and safe at a potentially lower cost to the consumer. The CCST Smart Meter Project Team offers the following for further consideration by policy makers, regulators and the utilities. We appreciate that each of these considerations would likely require a cost/benefit analysis. However, we feel they should be considered as the overall cumulative exposure to RF emissions in our environment continues to expand.

1. As wireless technologies of all types increase in usage, it will be important to: (a) continue to quantitatively assess the levels of RF emissions from common household devices and smart meters to which the public may be exposed; and (b) continue to investigate potential thermal and non-thermal impacts of such RF emissions on human health.
2. Consumers should be provided with clearly understood information about the radiofrequency emissions of all devices that emit RF including smart meters. Such information should include intensity of output, duration and frequency of output, and, in the cases of the smart meter, pattern of sending and receiving transmissions to and from all sources.
3. The California Public Utilities Commission should consider doing an independent review of the deployment of smart meters to determine if they are installed and operating consistent with the information provided to the consumer.
4. Consideration could be given to alternative smart meter configurations (such as wired) in those cases where wireless meters continue to be concern to consumers.



Karolinska Institutet
Department of Neuroscience
Experimental Dermatology Unit

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Stockholm, January 17, 2011

To whom it may concern

The California Council on Science and Technology, 1130 K Street, Suite 280, California 95814, USA, has recently released its report on wireless smart meters ("Health Impacts of Radio Frequency from Smart Meters"). In it, the possibility of any low-intensity health consequences of chronic exposure to pulsed microwave exposure is denied. However, in the current field of science, the present state-of-the-art regarding this issue is not so simple.

Wireless communication is now being implemented in our daily life in a very fast way. At the same time, it is becoming more and more obvious that the exposure to electromagnetic fields not only may induce acute thermal effects to living organisms, but also non-thermal effects, the latter often after longer exposures. This has been demonstrated in a very large number of studies and includes cellular DNA-damage, disruptions and alterations of cellular functions like increases in intracellular stimulatory pathways and calcium handling, disruption of tissue structures like the blood-brain barrier, impact on vessel and immune functions, and loss of fertility. Whereas scientists can observe and reproduce these effects in controlled laboratory experiments, epidemiological and ecological data derived from long-term exposures reflect in well-designed case-control studies the link all the way from molecular and cellular effects to the living organism up to the induction and proliferation of diseases observed in humans. It should be noted that we are not the only species at jeopardy, practically all animals and plants may be at stake. Although epidemiological and ecological investigations as such never demonstrate causative effects, due to the vast number of confounders, they confirm the relevance of the controlled observations in the laboratories.

Because the effects are reproducibly observed and links to pathology cannot be excluded, the precautionary principle should be in force in the implementation of this new technology within the society. This will be the only method to support the sustainability of these innovative wireless communication technologies. The February 2, 2000 European Commission Communication on the Precautionary Principle notes: "The precautionary principle applies where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the high level of protection chosen by the EU". Therefore, policy makers immediately should strictly control exposure by defining biologically-based maximal exposure guidelines also taking into account long-term, non-thermal effects, and including especially vulnerable groups, such as the elderly, the ill, the genetically and/or immunologically challenged, children and fetuses, and persons with the functional impairment electrohypersensitivity.

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Experimental Dermatology Unit
Department of Neuroscience
Karolinska Institutet
171 77 Stockholm
Sweden

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Karolinska Institutet
Department of Neuroscience
Experimental Dermatology Unit

In November, 2009, a Scientific Panel comprised of international experts on the biological effects of electromagnetic fields met in Seletun, Norway, for three days of intensive discussion on existing scientific evidence and public health implications of the unprecedented global exposures to artificial electromagnetic fields (EMF) from telecommunications and electric power technologies. This meeting was a direct consequence of on-going discussions already from the mid-nineties, when cellular communications infrastructure began to rapidly proliferate, and stretching through, among many, the Benevento (2006), Venice (2008) and London (2009) Resolutions from this decade, and involving important conclusions drawn from the 600-page Bioinitiative Report published August 31, 2007, which was a review of over 2,000 studies showing biological effects from electromagnetic radiation at non-thermal levels of exposure, which partly was published subsequently in the journal Pathophysiology (Volume 16, 2009).

The Seletun Scientific Statement (2011) recommends that lower limits be established for electromagnetic fields and wireless exposures, based on scientific studies reporting health impacts at much lower exposure levels. Many researchers now believe the existing safety limits are inadequate to protect public health because they do not consider prolonged exposure to lower emission levels that are now widespread.

The body of evidence on electromagnetic fields requires a new approach to protection of public health; the growth and development of the fetus, and of children; and argues for strong preventative actions. These conclusions are built upon prior scientific and public health reports documenting the following:

- 1) Low-intensity (non-thermal) bioeffects and adverse health effects are demonstrated at levels significantly below existing exposure standards.
- 2) ICNIRP/WHO and IEEE/FCC public safety limits are inadequate and obsolete with respect to prolonged, low-intensity exposures.
- 3) New, biologically-based public exposure standards are urgently needed to protect public health world-wide.
- 4) It is not in the public interest to wait.

- EMR exposures should be reduced now rather than waiting for proof of harm before acting. This is in keeping with traditional public health principles, and is justified now given abundant evidence that biological effects and adverse health effects are occurring at exposure levels hundreds to thousands of times below existing public safety standards around the world.

- There is a need for mandatory pre-market assessments of emissions and risks before deployment of new wireless technologies. There should be convincing evidence that products do not cause health harm before marketing. Such decisions may have to be quickly revised given new evidence.

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Karolinska Institutet
Department of Neuroscience
Experimental Dermatology Unit

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• The use of telephone lines (land-lines) or fiber optic cables for SmartGrid type energy conservation infrastructure is recommended. Utilities should choose options that do not create new, community-wide exposures from wireless components of SmartGrid-type projects. Future health risks from prolonged or repetitive wireless exposures of SmartGrid-type systems may be avoided by using fiber-optic cable. Energy conservation is endorsed but not at the risk of exposing millions of families in their homes to a new, involuntary source of wireless radiofrequency radiation, the effect of which on their health not yet known.

I encourage governments to adopt a framework of guidelines for public and occupational EMF exposure that reflect the Precautionary Principle. The Precautionary Principle states when there are indications of possible adverse effects, though they remain uncertain, the risks from doing nothing may be far greater than the risks of taking action to control these exposures. The Precautionary Principle shifts the burden of proof from those suspecting a risk to those who discount it — as some nations have already done. Precautionary strategies should be based on design and performance standards and may not necessarily define numerical thresholds because such thresholds may erroneously be interpreted as levels below which no adverse effect can occur.

You often hear about "safe levels" of exposure and that there is "no proof of health effects", but my personal response to these seemingly reassuring statements is that it is very important to realize, from a consumer's point of view, that "no accepted proof for health effects" is not the same as "no risk". Too many times, 'experts' have claimed to be experts in fields where actually the only expert comment should have been: "I/we just do not know". Such fields were e.g. the DDT, X-ray, radioactivity, smoking, asbestos, BSE, heavy metal exposure, depleted uranium, etc., etc., etc., where the "no risk"-flag was raised before true knowledge came around. Later on, the same flag had to be quickly lowered, many times after enormous economic costs and suffering of many human beings. Along those lines, it is now (regarding "the protection from exposure to electromagnetic fields" issue) very important to clearly identify the background and employment (especially if they sit, at the same time, on the industry's chairs) of every 'expert' in different scientific committees, and likewise. It is, of course, very important (maybe even more important?) to also let 'whistleblowers' speak at conferences, to support them with equal amounts (or even more?) of economical funding as those scientists and other 'experts' who, already from the very beginning, have declared a certain source or type of irradiation, or a specified product, to be 100% safe.

In the case of "protection from exposure to electromagnetic fields", it is thus of paramount importance to act from a prudence avoidance/precautionary principle point of view. Anything else would be highly hazardous! Total transparency of information is the key sentence here, I believe consumers are very tired of always having the complete truth years after a certain catastrophe already has taken place. For instance, it shall be noted, that today's recommendation values for wireless systems, the SAR-value, are just recommendations, and not safety levels. Since scientists observe biological effects at as low as 20 microWatts/kg, is

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it then really safe to irradiate humans with 2 W/kg (i.e., with 100,000 times stronger radiation!), which is the recommendation level for us? And, furthermore, it is very strange to see, over and over again, that highly relevant scientific information is suppressed or even left out in various official documents, as high up as at the governmental level of society. This is not something that the consumers will gain anything good from, and, still, the official declaration or explanation (from experts and politicians) very often is: "If we (=the experts) would let everything out in the open, people would be very scared and they would panic." Personally, I have never seen this happen, but instead I have frequently seen great disappointment from citizens who afterwards have realized they have been fooled by their own experts and their own politicians.

Another misunderstanding is the use of scientific publications (as the tobacco industry did for many years) as 'weights' to balance each other. But you can NEVER balance a report showing a negative health effect with one showing nothing! This is a misunderstanding which, unfortunately, is very often used both by the industrial representatives as well as official authorities. The general audience, naturally, easily is fooled by such an argumentation, but if you are bitten by a deadly poisonous snake, what good does it make for you that there are 100 million harmless snakes around?

In many commentaries, debate articles and public lectures - for the last 20-30 years - I have urged that completely independent research projects must be inaugurated immediately to ensure our public health. These projects must be entirely independent of all types of commercial interests; public health cannot have a price-tag! It is also of paramount importance that scientists involved in such projects must be free of any carrier considerations and that the funding needed is covered to 100%, not 99% or less. This is the clear responsibility of the democratically elected body of every country.

Many smart meters are close to beds, kitchens, playrooms, and similar locations. These wireless systems are never off, and the exposure is not voluntary. The smart meters are being forced on citizens everywhere. Based on this, the inauguration of smart meters with grudging and involuntary exposure of millions to billions of human beings to pulsed microwave radiation should immediately be prohibited until 'the red flag' can be hauled down once and for all.

With my very best regards,
Yours sincerely,

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January 30,2011

CCST

Dear Sirs,

Some citizens are worried about the involuntary application of wireless real time monitoring of their electricity use. Their concerns relate to the invasion of privacy and the addition of radio frequency (RF) electromagnetic and electric and magnetic exposures from meters in their own homes and in their neighborhoods. Some have pointed out that there are other technologies now in use in other countries that avoid the exposures.

Public officials approached you with a very narrow framing of the issue asking you:

- (a) if one could guarantee an absence of health effects if RF exposures were always below current thermally based standards.
- (b) If other standards were needed to deal with non-thermal health effects

You answered:

- 1. The FCC standard provides a currently accepted factor of safety against known thermally induced health impacts of smart meters and other electronic devices in the same range of RF emissions. Exposure levels from smart meters are well below the thresholds for such effects.
- 2. There is no evidence that additional standards are needed to protect the public from smart meters.

Your first answer doesn't respond to the official's first question at all, instead it states what all parties agree to, the standard protects against thermal effects and smart meters emit fields that are below the standard.

Your second answer is technically a falsehood. There is lots of evidence that would suggest that RF and ELF exposures well below the current standards may be capable of causing added lifetime risk that exceed the benchmark which triggers health based regulations (1 per hundred thousand). You could have turned your second answer into a true statement by saying something like this:

“When our panel, that included no epidemiologists, reviewed the extensive literature, epidemiological and non epidemiological on non-thermal RF exposures, we concluded that it is *not* beyond a reasonable doubt that non-thermal exposures are capable of adding life-time risks of regulatory concern. This is because we would require a clear understanding of the physical induction

mechanism , the carcinogenic mechanism and toxicological and epidemiological effects well above the resolution power of the studies before we would say that non-thermal exposures can cause significant risk at the 'beyond a reasonable doubt level'."

A beyond a reasonable doubt standard is required in criminal proceedings and would be inappropriate in a civil proceeding, where only a "more likely than not" standard is required. We were all reminded of this in the famous OJ Simpson trials.

So, what certainty standard is applicable here? How certain to we have to be of how much risk before we move from the status quo to cheap and expensive measures to reduce smart phone exposures? On page 24 you say ".. retrofitting millions of smart meters with hard wired technology could be difficult and costly. Perhaps more importantly, retrofitting smart meters would not address the significantly greater challenge presented by the billions of mobile phones in use globally."

This sentence also includes important unstated assumptions:

- a) If other actors are exposing you to harm more intensely than I, then I have no moral duty to remove my less intense harm until he removes his.
- b) It would not be cost beneficial to switch to wired smart meters
- c) It would raise utility rates substantially to switch to wired smart meters.
- d) I have no moral duty to switch to a lower exposure meter, even if the impact on utility bills are minimal.

I provided your staff with a link to the many projects of the California EMF Program at www.ehib.org/emf. In it they would have found our analysis of policy issues with regard to power lines and house wiring and our extensive risk evaluation. In it we assessed the available options and their costs. You made no attempt to do this even in a rough way. Then we examined what the adoption of these options would do to utility rates. You did not do that either. Then we asked how certain we would have to be of how much added lifetime risk of disease before it would be cost beneficial to move to the cheap and expensive options. A certainty well below the "more likely than not" standard would have sufficed to justify cheap options to even a hard hearted utilitarian. We also explicitly carried out a duty ethics analysis of the situation which you did not do. In our risk evaluation we tried to avoid the pitfalls of misleading language, such as using the phrase "no evidence" to stand for " the evidence doesn't convince us." As you know this phrase is much beloved by those who deny human influences on global climate change. Then we avoided expressing exposures as fractions of irrelevant standards as you have done. We avoided expressing our scientific certainty as a dichotomy between "beyond a reasonable doubt" and "not beyond a reasonable doubt" as you effectively have done. This dichotomous formulation has also been avoided in reports on the human effects in

Global Climate Change. Finally we made explicit the rules for weighting various streams of scientific evidence to develop our degree of certainty. You provided neither your factual grounds nor rules of inference for justifying your “no evidence” statement. Expressing smart phone exposures as a fraction of the thermal standard makes it sound small, expressing it as a multiple of the background would make it sound alarming. Your graph was enough.

I said at the beginning that the public officials framed their question in a narrow way and a way that was overly focused on numerical standards as a solution to environmental and occupational hazards. We don't control automobile trauma with a standard, we control it with a technical solution, seat belts, airbags and traffic rules. We don't control the carcinogenic risk from wood dust by a wood dust standard, we mandate dust masks and air vents. I personally don't think we know enough about the exposure metric to set a standard at this time.

The solution to any risks of regulatory concern from PG &E's smart meters could be to switch to wired smart meters now and gradually replace the wireless ones *if the rate payers can live with the impact to their utility bills.*

If the public officials narrowed their questions with the intent of receiving an answer that would take this issue off their radar screen, than you have responded in a narrow way that would serve such a purpose.

This is not the way I would like to see public policy pursued. Unfortunately you are not alone in this pattern of language use, hidden assumptions and making the uncertain seem certain so as to provide cover for policy.

Sincerely yours

Raymond Richard Neutra MD. DrPH



January 17, 2011

Susan Hackwood, PhD
Executive Director
California Council on Science and Technology

Lora Lee Martin, Director
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California Council on Science and Technology

Subject: Letter of Comment on Smart Meter Report

This letter addresses the CCST Smart Meter Report issued on January 11, 2011. Overall, the report does begin to highlight international scientific concerns about chronic, low-intensity radiofrequency radiation exposures. Radiofrequency radiation health risks have been and continue to be addressed by scientific bodies around the world as a credible threat to health.¹⁻⁴

The Report text provides an introduction to the science and public health questions on health impacts that can reasonably be expected from chronic exposure to low levels of RF in close proximity to occupied space in homes, schools and other daily living environments.

Conclusions Are Not Supported by Evidence of Compliance with FCC Safety Limits

There is no solid basis in the CCST report to conclude (or to support the contention) that FCC public safety limits are met for smart meters, in the manner installed and operated.

Conclusions Disregard Evidence in the Report for Possible Health Risk

The text of the report only partially documents potential health risks from low-level, chronic exposure to radiofrequency radiation. The conclusions ignore this discussion.

Conclusions Do Not Follow from Report

Conclusions of the report are inconsistent with the report's more balanced warnings about possible risks to health. The overall legitimacy of the report is cast into doubt as a result.

CCST's report could equally well have concluded *'there is ample evidence to advise the California Legislature that, based on multiple studies of radiofrequency radiation below current FCC safety limits, it is advisable to issue a cautionary warning on the wireless component of smart meters until a full assessment of their effects is completed by*

independent experts. Further, it can be concluded that the continued rollout of wireless smart meters may increase public health risks on a widespread basis and should be reconsidered in light of the existing scientific evidence and public health warnings for such chronic exposures to pulsed RF.'

I was one of the expert reviewers invited by CCST to submit comments for the Committee. CCST asked several experts to answer two questions (see below). Since the Report conclusions apparently ignored much of the expert and committee input – only intervention by the final editor(s) to disregard key evidence explains how CCST's final conclusions could give rise to the "all clear" message.

Questions asked of Invited Expert Reviewers

- 1) Are the current FCC standards for smart meters sufficiently protective of public health, taking into account current exposure levels to radiofrequency (RF) and electromagnetic fields?**
- 2) Are additional technology-specific standards needed for smart meters and other devices that are commonly found in and around homes, to ensure adequate protection from adverse health effects?**

CCST Report Conclusions

1) *"The FCC standard provides a currently accepted factor of safety against known thermally induced health impacts of smart meters and other electronic devices in the same range as RF emissions. Exposure levels from smart meters are well below the thresholds for such effects."*

This conclusion presents a partial response to Question 1 – only that the FCC's thermal standards are adequate (these standards prevent only heating and burning of tissues, and shock hazard, however). The conclusion does not address non-thermal (or low-intensity) RF exposures, which is really the point. It also is silent on FCC violations of public safety limits, which have been calculated to occur.¹³

2) *"There is no evidence that additional standards are needed to protect the public from smart meters."*

By ignoring evidence for low-intensity RF adverse health effects, the Report essentially then dismissed the need for changes in public safety standards for pulsed RF. This conclusion simply cannot be reconciled with the evidence presented in the report (thin as it is), nor with the larger body of evidence known to experts in this field. That evidence is now widely discussed by international health and safety experts who find the existing thermal standards inadequate to protect public health.^{1,2}

FCC Violations and Excessively High RF Exposures are Ignored

Another report issued on January 1, 2011 is titled *Assessment of Radiofrequency Microwave Radiation Emissions from Smart Meters* by Sage Associates.¹³ It documents what RF levels may be expected. The Assessment seems not to have been considered either by the CCST experts nor the Committee.

The Assessment identified where and under what conditions smart meters can cause FCC violations of public safety limits as the meters are typically installed and operated. The CCST report concludes that all smart meter RF exposures will be well below the FCC safety limits, and this is erroneous.

To date, there have been no other studies that provide sufficient information to support the claim that smart meters comply with FCC regulations. In fact, there is solid evidence from a review of the FCC Grants of Authorization and attached FCC RF exposure studies that many thousands (perhaps millions) of meters are in clear violation of one or more of the explicit limitations noted on each FCC Grant of Authorization. The FCC Grants of Authorization are void unless meters are installed in compliance with every one of those limitations.

The Assessment also shows many cases where, although the FCC safety limits may not be violated, excessively high RF levels from smart meters would be predicted to occur within the home or in other occupied space. In many instances, predicted RF levels are many times higher than those reported to cause adverse health effects.⁵⁻¹²

Such exposures, if chronic, would reasonably be expected to result in increased disease and disability.

Misleading Comparisons Are Made to Cell Phones

CCST's report makes misleading comparisons of RF exposures from cell phone use and from smart meters, an apparent effort to minimize public health concern. If the FCC had thought smart meters would be held to the head in normal operation, they would have required smart meters to be tested for SAR compliance, not power density. These are not the same, and to compare them is wrong.

Cell phones produce a high, localized RF exposure at the head. They are presumed to be used within 20 centimeters (8") of the body. Smart meters, like cell towers, create whole-body exposure rather than localized exposure in most circumstances, and specific FCC compliance depends on keeping a 20 cm or greater distance from the meter. Cell phone use is voluntary; smart meter exposure is involuntary. Cell phone use is sporadic or intermittent, but smart meter exposure estimates are 'all over the map'. There is great uncertainty on this point, and as such, the outcome cannot be known; therefore, no assertion of safety or compliance can be given.

RF Levels from Smart Meters are Unreconciled and Need Assessment

PG&E's sole figure for RF exposure was given during CPUC proceedings as 1/6000th of the federal health (sic) limit. Nothing is given about the specific conditions under which this estimate might be true (antenna make and model, duty cycle, which FCC formula, what reflection factor, one meter or multiples, etc). However, from that single data point, we calculate that RF exposure to be 0.11 uW/cm² at 10 feet (where the FCC safety limit is known to be 655 uW/cm² at the frequencies 915 MHz and 2405 MHz). This means that at 10 feet from the meter, PG&E says the RF level will be 0.11 uW/cm².

Kundi and Hutter (Pathophysiology, 2009)² say they *don't yet find RF health impacts at levels below 0.05 to 0.1 uW/cm²* but do find consistent evidence of adverse health impacts at levels generally above that (based on at least eight cell tower studies conducted internationally). These figures were for healthy adult populations.

From the CCST Report, figures 1 and 7 (identical) give a comparison of RF levels from various sources, including two estimates for smart meters. They are 4 uW/cm² at 10 feet, and 40 uW/cm² at 3 feet away (no source is identified for these estimates, and again, the operational conditions are unspecified). Another estimate from CCST's report (pages 17 and 22) says that a 'worst case' RF estimate – a meter that transmits continuously – would produce 60% of the FCC limit (which is 655 uW/cm² for the combined antenna frequencies), or 393 uW/cm². However, the location at which this RF exposure level is calculated to occur is not given. The information is not useful. But, given the peer-reviewed scientific literature, any of these estimates is too high for chronic exposure to pulsed RF.^{1,2}

No one can reconcile or separate reasonable from unreasonable RF predictions without some better, more systematic computer modeling of RF exposures.

Cumulative RF is Not Assessed Prior to Meter Installation

None of the PG&E or the EPRI estimates includes any provision for 'what amount of RF exists already' and does the smart meter's additional RF burden push that location over the FCC limit. The CCST report does not consider cumulative sources of RF (WI-FI, nearby cell tower(s), AM, FM, TV, HAM transmitters, etc). The cumulative RF burden must be considered, including ongoing RF exposures from existing sources.

Further, since these meters are part of a radiofrequency surveillance and communications system that includes cell antennas (to relay RF signals to the utility) and eventually, power transmitters on/within appliances (to relay RF signals within the home to the smart meter), these critical omissions in the overall RF burden placed on people from the 'smart meter program' should be assessed. No one can install a smart meter and make a blanket assertion the environment still complies with public safety standards in the after condition, if the before condition is not known. RF exposures from multiple sources are additive.

Recommendations to CCST

- 1) Advise the California Legislature that further assessment of smart meter impacts to public health and safety are necessary before further deployment.
- 2) Recommend de-activation of wireless transmitters in meters already installed pending further review.
- 3) Recommend that California Legislative hearings be scheduled on smart meters.
- 4) Post in their entirety each of the written expert review letters to CCST.
- 5) Recommend that the California Department Public Health receive and log smart meter health complaints.

Thank you for the opportunity to comment on the CCST draft report on smart meters.

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

**By Dr. Karl Maret
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January 30, 2011**

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.

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).

My specific concerns with the report are as follows:

1. The minimization of the problem of non-thermal microwave radiation;
2. The minimization of the need for lower exposure standards;
3. The increase in radiation levels at potential local hotspots through reflection;
4. The lack of information about the impact of pulsed radiation from Smart Meters;
5. The lack of information on the health impacts of night-time radiation from Smart Meters;
6. The lack of modeling or actual measurements of the contribution from Smart Meters to the existing background microwave radiation;
7. The lack of health and environmental consideration by the CPUC when the Advanced Metering Infrastructure (AMI) was approved.

Until these issues are more fully addressed it is recommended that the current Smart Meter deployment using radiofrequency radiation (RFR) be halted pending a more unbiased reassessment of the potential health issues associated with these meters, including a reassessment of the Advanced Metering Infrastructure (AMI) program approved by the California Public Utilities Commission (CPUC) without any environmental impact assessment. Further, that the California public be offered the option to opt out of this program, which at present is mandatory for every dwelling.

1. Minimization of Non-thermal Microwave Radiation from Smart Meters

On page 4 of the CCST report it states that *“To date, scientific studies have not identified or confirmed negative health effects from potential non-thermal impacts of RF emissions such as those produced by existing household electronic devices or smart meters.”* This finding minimizes the extensive body of scientific research on the biological effects of non-thermal electromagnetic fields. The biological effects of low-level, non-thermal electromagnetic fields have been researched for over 30 years. The respected 2007 Handbook of Biological Effects of Electromagnetic Fields edited by Barnes and Greenebaum (1) states on page 377:

“The biophysical lore prevailing until the late 1980s and lingering to this day is that, unless the amplitude and frequencies of an applied electric field were sufficient to trigger an excitable membrane (e.g. heart pacemaker), produce tissue heating or move an ion along a field gradient, there could be no effect. However, this position had to be changed as the evidence for weak (non-thermal) EMF bioeffects became overwhelming.”

Prof. Arthur Pilla, PhD

Professor of Biomedical Engineering, Columbia University

There are numerous reports on the potential health effects of non-thermal electromagnetic fields. Early reports include papers by Frey (1993), Lai (2000) and Hyland (2000), among many others. An international working group has delineated many additional scientific findings (Bioinitiative report, 2007). Special editions of the journal Pathophysiology were specifically dedicated to this topic recently (Pathophysiology, 2009). Recently, the European Journal of Oncology published an entire monograph entitled “Non-Thermal Effects and Mechanisms of Interaction between Electromagnetic Fields and Living Matter” outlining non-thermal effects on living systems. This came from the National Institute for the Study and Control of Cancer and Environmental Diseases “Bernardino Mamazzini” (Giuliani & Soffriti, 2010).

The CCST report further states that, *“Without a clearer understanding of the biological mechanisms involved, identifying additional standards or evaluating the relative costs and benefits of those standards cannot be determined at this time.”* I strongly disagree with this conclusion as 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 ion 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. Until the authors of the CCST report can clearly substantiate their conclusions that the California population will not be adversely affected by the Smart Meter program, a precautionary approach should have been recommended.

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.

Dr. Richard Gautier in France offered a full description of active mechanisms for the action of non-thermal EMFs. There are peer-reviewed scientific studies for each step of the processes that can lead to chronic diseases such as cancer, leukemia and neurological diseases. These conditions often require longer time periods to develop and the Precautionary Principle (see later) ought to be applied when adding new sources of microwave radiation such as those from Smart Meters that are active night and day in our homes and places of work.

On page 14 of the CCST report, the statement "*There is currently no definitive evidence linking cell phone usage with increased incidence of cancer*" is another misleading statement that tends to minimize the cancer risk from cell phones. If the authors of the CCST report had looked at other papers from the scientific literature (not mentioned in pages 38-44 of the CCST report), they might come to different conclusions.

There is mounting evidence of various types of tumors being caused from cell phone usage including parotid gland tumor (Czerminski, 2011), meningioma (Hardell et al., 2006), acoustic neuroma (Sato et al. 2011), brain tumors (Hardell&Carlberg, 2009) and testicular tumors (Hardell et al., 2007), to name only some. Considering the increasing number of scientific papers describing various types of tumors associated with non-thermal radiation from cell phones that are appearing in the medical literature, it is not helpful that non-thermal radiations from Smart Meters, which might potentially add to our long-term susceptibility to serious diseases, be minimized as was done in the report.

2. The minimization of the need for lower exposure standards

The report states on page 8 that “...given the existing uncertainty about non-thermal effects, there is no generally accepted, definitive, evidence-based indication that additional standards are needed.” This statement is misleading since an international collaboration of researchers in this field have called for a reexamination of the current ANSI standard based on the increasing evidence of the adverse effects of low-level electromagnetic fields (Hardell and Sage, 2008) Various research groups have consistently warned that the existing guidelines may be inadequate (Hyland, 2000; Levitt & Lai 2010; Bioinitiative Report, 2007).

Even the International Commission on Non-Ionizing Radiation Protection (ICNIRP) stated in 1998 that “interpretation of several observed biological effects of electromagnetic fields is further complicated by the apparent existence of “windows” of response in both the power density and frequency domains. There are no accepted models that adequately explain these phenomena, which challenge the traditional concept of a monotonic relationship between the field intensity and the severity of the resulting biological effects.” (ICNIRP, 1998). In other words, there are windows of sensitive biological response in which potential health effects can occur at much lower exposure levels than currently mandated by the FCC standards.

Already in 1999, the federal government’s Radiofrequency Interagency Work Group (RFIAWG) had “identified certain issues that we believe need to be addressed to provide a strong and credible rationale to support RF exposure guidelines.” Dr. Gregory Lotz from the Department of Health and Human Services, National Institute for Occupational Safety and Health addressed these specific issues in a letter dated June 17, 1999 to Mr. Richard Tell, then Chair of the IEE SCC28 (SC4) Risk Assessment Work Group. Ironically, it was this same Richard Tell Associates of Las Vegas, NV who wrote the report for PG&E describing the apparent safe exposure limits of the Smart Meter program that was also referenced in the CCST report (Tell, 2005; Tell, 2008).

The Tell Associates report simplified the apparent safety of the Smart Meter radiation by: 1. Only considering a single isolated Smart Meter radiator in free space; 2. Time averaging the pulse RF radiation so that it appeared as a low level of 8.8 uW/cm²; 3. Not considering other RF microwave emitters in the home environment; and 4. Considering only ground wave reflections of the microwave emissions and no other reflective surfaces (see below). The report also does not address the concerns of the federal RF Interagency Work Group including among other concerns: 1. The biological basis for local SAR limit; 2. the selection of an adverse effect level; 3. the nature of acute versus chronic exposure; 4. the intensity or pulsed or frequency modulated RF exposure; and 5. the issue of time averaging. These are critical issues which makes the issue of proper exposure guidelines a central issue in this matter. It further casts great doubt on the conclusions of the CCST report that downplays the need for new, lower exposure standards.

Epidemiologic evidence is a major contributor to the understanding of the potential effects of EMF on health. The International Agency for Research on Cancer (IARC) classified EMF as a “possible human carcinogen”, or a Group 2B carcinogen; (IARC, 2002) this classification was mostly based on consistent epidemiological evidence. Although the body of evidence is

always considered as a whole, based on the weight of evidence approach and incorporating different lines of scientific enquiry, epidemiologic evidence, as most relevant, is given the greatest weight.

Several European countries, having taken a deeper look at recent scientific data, are beginning to follow a different approach to the RFR question. They recommend prudent avoidance in siting cell tower antenna installations near schools, hospitals or wherever people congregate. This approach is part of what is called the Precautionary Principle, which has been adopted in many countries, including the U.S., for various applications in international treaties. The Precautionary Principle holds that when questions of safety are concerned, precautions should be taken to protect public health even if scientific data is incomplete, or the mechanisms of action are not understood (Levitt, 2000; Kheifets et al., 2001).

3. The increase in radiation levels at potential local hotspots through reflection

Although it is true that the Smart Meters comply with current U.S. Federal Communications Commission (FCC) guidelines because they operate below the existing power density thresholds, power density is not the only factor determining biological effects from radiofrequency radiation. The power density level safety standards are solely based on thermal considerations, yet it is the non-thermal radiation levels that are the key to potential health impacts. The non-thermal effects occur at lower levels from various emitting radiators now in common use including cell phones, cordless phones, Wi-Fi, Wi-Max, to name only some. Smart Meters add to this cumulative ubiquitous low-level background microwave environment.

RFR can increase to higher levels than anticipated due to surface and ground reflections from the various radiators. (Hondou, 2002; Hondou et al, 2006; Vermeeren et al, 2010), even at some distance from the sources. These scientific studies suggest that reflectivity from other metallic surfaces and reflective materials could increase the power density of the RF fields significantly, leading to the development of hot spots in our homes. Richard Tell Associates report commissioned by PG&E in 2005, and updated in 2008, contained calculations of the intensity of RF fields produced by the Smart Meters that included only ground reflections estimated to increase the field strength by 1.6 times (equivalent to a 2.56-fold increase in the power density). In light of recent scientific findings and actual computer modeling studies, the Tell estimate of ground reflectivity may be significantly too low and does not address the development of possible hotspots in the home. If microwave hotspots occurred near sleeping quarters or near a baby's crib, their health impact could be highly significant. Sage Associates report, which made some estimates of Smart Meter impacts through computer modeling, even suggests that under certain assumptions the emissions from Smart Meters and their local reflections might even exceed FCC standards (Sage, 2011).

The CCST report never even acknowledged the need for computer modeling to ascertain the potential risk of higher microwave radiation levels in our homes as a result of Smart Meter installation, alone or in interaction with other microwave emitters. We believe that such modeling is vital if the public is to know the potential for the development of hot spots in sensitive living areas. The Richard Tell Associates study carried out for PG&E did not consider other microwave sources in the environment stating, "*The study does not take into*

account the potential for RF fields that may be produced by other devices or systems that are not part of the Smart Meter program upgrade. Such devices or systems include cellular telephones, cellular telephone base stations, broadcast radio and TV stations, microwave ovens used in the home or any other source of RF energy."

4. The lack of information about the impact of pulsed radiation from Smart Meters

There is a considerable difference between the biological impact of pulsed microwaves, as produced by Smart Meters, compared to continuous waves, such as those produced by microwave ovens. No distinction is made in the safety criteria between continuous and pulsed waves because of the narrow-minded focus on thermal damage alone. Many scientific studies have pointed out that radiofrequency radiation with different modulations and pulse characteristics produce different biological effects even though they may produce the same pattern of different specific absorption rate distribution and tissue heating (Levitt & Lai, 2010).

Peer-reviewed studies have shown that the differences in modulation patterns and waveforms can produce quite different biological effects. They include the works of Arber and Lin (1985); Campisi et al (2010); Huber et al. (2002); Luukkonen et al. (2009); d'Ambrosio et al (2002), among many others. Already Soviet research in the 1960s showed that pulsed waves induced stronger and often inhibitory biological and neurological effects than continuous waves (Osipov, 1965). A review of the hazards to U.S. military personnel from high frequency electromagnetic radiation was provided by Pollack (1967) which gives an overview of the extensive Eastern European research in this field.

Marha (1963) described allowable intensities for frequencies above 300 MHz in Czechoslovakia for continuous waves as 25 $\mu\text{W}/\text{cm}^2$ but limited pulsed waves to only 10 $\mu\text{W}/\text{cm}^2$. Note that these Czech recommended levels were considerably lower than the approximately 600 $\mu\text{W}/\text{cm}^2$ allowed for the RFR from Smart Meters operating in the low 900 MHz band mandated by the FCC based on only thermal consideration. Also not well known in the West is the Soviet work showing the adverse effect of non-thermal pulsed microwave radiation on cardiac rhythms in animals (Presman & Levitina, 1962).

The CCST report is misleading because it compares the Smart Meter emissions to those of microwave ovens. Microwave ovens produce much higher power output but are not modulated or pulsed in any way. It is imperative to understand that it is the modulation or pulsation pattern that leads to biological effects at non-thermal power levels. Biologically-sensitive amplitude windows have been found at specific frequencies that lead to the selective release of calcium from cell membranes. However, above and below these unique power densities there is no observable effect. Pulses and square waves have the greatest biological impact because they produce rapid changes in voltage across biological membranes. Un-modulated carrier waves have little or no biological effect except if their power is sufficient high, such as in microwave ovens. Comparing the power levels between modulated and un-modulated devices, as the CCST report does, is thus misleading.

The potential health effects from chronic exposure to pulsed, low power density level electromagnetic fields might take several years to appear. These types of radiations produced

by Smart Meters are of concern for their potential health impacts on the electrically hypersensitive part of the population. In Sweden, electrohypersensitivity (EHS) is an officially recognized functional impairment; however it is not regarded as a disease (Johansson, 2006). Electrical hypersensitivity has been reported by many authors from various industrialized countries over the last 20 years. The CCST report does not consider this segment of our population at all. Yet in the United Kingdom there are excellent resources about this condition, especially the work of Bevington (2010) containing over 700 references.

The ICNIRP, IEEE and ANSI standards that are currently in effect consider only thermal effects of microwave radiation where the energy absorption is fairly linear and thus the protective guidelines are logical. However these energy absorption guidelines would not be appropriate when frequency-specific amplitude windows are involved leading to adverse biological effects that can depend on modulation patterns, pulse repetition rates, duty cycles, and other frequency spectrum characteristics. With the current PG&E-mandated Smart Meter program having a 20-year life expectancy, Californians will be living with potential health impacts from this unproven technology in our homes for the next two decades.

5. The lack of information on the health impacts of night-time radiation from Smart Meters

Another problem that was not addressed in the CCST report is potential health effect of microwave radiation exposure during our sleep which may adversely affect our biological and circadian rhythms (daily physiological regulatory cycles). Smart Meters will pulse intermittently day and night and may have an adverse effect on sleep cycles. We do not use our cellphones during sleep, yet Smart Meters will continue to emit pulsed RFR all night long.

Exposure to microwave/radiofrequency fields affect the neuroendocrine system causing neuroendocrine chemical modulations and behavioral reactions. Already in 1970s it was known that resonant absorption within the cranium may result in the focusing of energy and the production of electromagnetic "hot spots" in the brain (Johnson & Guy, 1972). Microwaves may disturb the critical hormonal regulatory areas including the hypothalamic-pituitary axis through "low intensity" exposure. The body may elicit "different responses relative to the timing of the exposure with respect to circadian rhythm" (Michaelson, 1982). At night, while sleeping, the body is principally in a repair mode and the exposure to microwave radiation from Smart Meters may potentially be more damaging than exposure during the day. It is vital that long-term exposure studies during the night be carried out to determine if Smart Meter pulsed microwave radiation could have an adverse biological effect on our population.

The European Commission's Scientific Committee on Emerging and Newly Identified Health Risks report on "Health Effects of Exposure to EMF" stated that "*No health effect has been consistently demonstrated at exposure levels below the ICNIRP-limits established in 1998. However, the data base for this evaluation is limited especially for long-term low-level exposure*" (SCENIHR, 2009). In other words, we just don't know what will be the long-term

effect of consistent low level exposure of RFR such as those imposed by Smart Meters in addition to the other microwave radiation sources now increasingly being used in our homes.

6. The lack of modeling or actual measurements of the contribution from Smart Meters to the existing background microwave radiation

The CCST report is misleading on page 20 where it says that the exposure levels to people living in metropolitan areas is quite low, around 0.005 uW/cm^2 . They base their assertions on an outdated report from July 1986 made by the U.S. Environmental Protection Agency entitled *The Radiofrequency Radiation Environment: Environmental Exposure Levels and RF Radiation Emitting Sources*, EPA 520/1-85-014. This data is totally outdated since it reflects the situation before the modern cellular telephone networks were put in place.

Already in 2000, in Sweden, the radiofrequency and microwave radiation levels in urban areas were approximately ten times higher than they were in the 1980s—and most of the increase is due to wireless communications, according to Dr. Yngve Hamnerius of Chalmers University of Technology in Göteborg, Sweden. Hamnerius measured radiation levels in the 30 MHz-2 GHz frequency range at 26 sites across Sweden with varying levels of urbanization. In cities, the median power density was 0.05 uW/cm^2 , with a 61% average contribution from GSM cell tower base stations. (*Microwave News*, July/August 2000). In the U.S. we do not have any up-to-date data since the U.S. Environmental protection Agency has not carried out any research studies for two decades. I have personally measured background microwave radiation levels that are hundreds of times higher in many metropolitan areas than the values described in the CCST report using 1986 EPA data.

This increasing amount of background microwave radiation has become of medical concern in many parts of the world. For example in March 23, 2009 European scientists called for a reassessment of the damaging health impacts of increasing levels of electromagnetic radiation (*Electrosensibilité : Appel des scientifiques du 23-03-2009*). Similarly, in November 2009 a meeting of international experts on the biological effects of electromagnetic fields met in Stavanger, Norway to discuss the unprecedented global exposures to artificial electromagnetic fields from communication and power technologies. Many scientists at this meeting recommended that lower limits be established for electromagnetic fields and wireless exposures due to the health impacts at much lower exposure levels than are now considered safe.

The United States government essentially stopped all research on RF radiation effects on the environment, including population exposure, in 1996. The Environmental Protection Agency's budget and staffing for RF radiation activities was \$821,000 from 1990 to 1995 and only \$25,000 between the years 1996 to 2000 (Levitt, 2000, page 271). Essentially, there was no government money spent in the last 15 years by the EPA to fund a reexamination of the RF exposure limits by the National Council on Radiation Protection and Measurement (NCRP). Our changing microwave environment is thus not being studied by our federal government. If the federal government is not looking after our health concerns concerning low level electromagnetic fields, it is imperative that utilities have their new microwave technologies evaluated by state government research laboratories or public health

organizations prior to letting this technology be deployed on a largely unaware California public.

What is needed is an up-to-date series of measurements in dense urban environment that measures the combined RFR levels from all radiating emitters and estimates or measures the cumulative effect of Smart Meters and collectors to radiation exposure levels in homes. This must include all RFR emitters that are connected to the MESH and home area networks (HAN) as deployed by PG&E. Only independent assessments or measurements of these radiation levels ought to be considered, not those conducted by companies that have direct or indirect connection to the utilities. Until these studies are available, it is recommended that the Precautionary Principle be adopted.

7. The lack of health and environmental consideration by the CPUC when the Advanced Metering Infrastructure (AMI) was approved.

On July 20, 2006, the California Public Utilities Commission (CPUC) issued their final opinion, Decision 06-07-027, authorizing Pacific Gas and Electric to deploy an Advanced Metering Infrastructure (AMI) that would lead to the automation of 5.1 million electric meters and 4.2 million gas meters. The CPUC decision was in response to PG&E's application 05-06-028 filed on July 16, 2005. In Section 7 (Technology) of this CPUC decision, the AMI deployment was described as using Power Line Carrier technology for electric meters and a fixed network system with radio frequency communications channels owned by PG&E for gas meters. The system was to have a useful life of 20 years. In section 15 (Environmental Review) of the Decision, it stated that there is no need for an analysis of PG&E's AMI deployment pursuant to the requirements of the California Environmental Quality Act (CEQA). It appeared that due to the suggested Power Line Carrier technology to be employed, the health or environmental effects were not considered at the time and the CPUC felt under no legal obligation to undertake any environmental review before approving the PG&E application.

On March 12, 2009, the CPUC made another Decision 09-03-026 in response to PG&E's application A.07-12-009 filed on December 12, 2007 to expand the AMI program significantly. Now the CPUC approved the establishment of microwave mesh networks as well as incorporating a Home Area Network (HAN) gateway device into advanced electric meters to support in-home HAN applications; and upgrading PG&E's electric meters to solid state meters, now called Smart Meters. In this decision, which conveniently expanded its 2006 AMI deployment decision, there was absolutely no mention of any environmental or health impact even though a whole new radiofrequency technology infrastructure was now approved for deployment on every home and business in California. We believe that this decision represents a gross degree of negligence by the CPUC in protecting the health and safety of the citizens of California. The CPUC needs to readdress the health and safety issues directly and immediately halt the installation of the Smart Meter program pending clarification of the issues raised by many scientific investigators who have commented on the inadequacy of the CCST report.

Conclusions

The time needed for a new technology to be developed and rolled out is much shorter than the time needed for research to investigate the possible health effects on the general population. The current Advanced Metering Infrastructure using microwaves in the 900 MHz frequency spectrum approved by the CPUC is going to adversely impact the physiology and ultimately the health of many Californians over the next twenty years, the anticipated life time of the Smart Meters now being deployed. This program is being implemented without widespread public knowledge or approval and without the specific informed consent in writing from every household.

Already the most sensitive members of our society, those who are especially vulnerable by being electrically hypersensitive, are registering health complaints such as headaches, sleep disturbances, cognitive difficulties, dizziness, heart palpitations, to name only a few. Most of these symptoms could also be related to other medical conditions making it difficult to ascribe their appearance specifically to the Smart Meters radiation directly. Although not yet recognized in this country as a state of physiological imbalance, hypersensitivity of human subjects to exposure to electric and magnetic fields has been reported for over 20 years by many authors in many industrialized countries. If only 1% of California's population were to report symptoms of electrical hypersensitivity after Smart Meter installation, over 370,000 people might be adversely affected by RFR.

The dissemination of this Smart Meter technology could have been accomplished without using radiofrequency radiation by using much safer power line, fiber optic or telephone communications technology. For example, a Smart Meter power line communications technology was used by Italian utilities in 27 million households using meters designed in California. In the Netherlands, the population concerned about the security and health issues of Smart Meters was given the options to opt out from having the meters installed. Californians were never given this option. Yet this AMI program, costing utility customers over \$2 billion, represents the largest technology roll-out in the history of Pacific Gas and Electric. Ironically, it is being financed by the rate payers without their direct consent.

This program represents an epidemiological experiment involving our unsuspecting population whose outcome will only be fully known after many years exposure. It is being shepherded through the regulatory process by the CPUC who has not seen fit to study the possible adverse health impacts of this technology before approving its usage. It has never shown any willingness to seriously consider the well-documented non-thermal effects of pulsed microwaves on living systems and will undoubtedly use the misleading CCST report to avoid any questions about future health implications of this technology. Because of the uncertainties of adverse long-term health impacts, the CCST ought to have recommended that a Precautionary Principle be invoked that would allow more time to directly study the effect of this pulsed radiation with both in vitro and in vivo testing in realistic settings of the mesh network, especially in high density Smart Meter environments in our cities.

Additionally, in cities the Subterranean Network Deployment System (SUNDS) is now also being installed by PG&E. This will add even higher microwave exposure levels to the general population. Any description of this new system was conspicuously absent from the CCST report. At a minimum, the utilities and CCST ought to have carried out extensive

computer modeling to assess the impact of Smart Meter technology in realistic settings, taking into account the other wireless technologies have already been deployed and which have significantly increased the background microwave exposure of the population over the last 20 years.

In summary, we find that the CCST report is incomplete and misleading giving California State regulators a false sense of security while potentially endangering the future health and well-being of Californians. It is requested that the current Smart Meter deployment be halted pending a more comprehensive scientific investigation of the biological response and health impacts of the non-thermal aspects of this technology. All households should be offered full disclosure about possible exposure levels, modulation patterns, peak power levels and interactions with other parts of the microwave spectrum in their home environments. Additionally, those who are sensitive to this radiation must be given the choice to opt out from having this form of RFR imposed upon their residential dwellings.

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Scientific Panel on Electromagnetic Field Health Risks: Consensus Points, Recommendations, and Rationales

Scientific Meeting: Seletun, Norway, November 17-21, 2009

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Summary: In November, 2009, a scientific panel met in Seletun, Norway, for three days of intensive discussion on existing scientific evidence and public health implications of the unprecedented global exposures to artificial electromagnetic fields (EMF). EMF exposures (static to 300 GHz) result from the use of electric power and from wireless telecommunications technologies for voice and data transmission, energy, security, military and radar use in weather and transportation. The Scientific Panel recognizes that the body of evidence on EMF requires a new approach to protection of public health; the growth and development of the fetus, and of children; and argues for strong preventative actions. New, biologically-based public exposure standards are urgently needed to protect public health worldwide.

Keywords: EMF, wireless telecommunications technology, radiofrequency, non-ionizing radiation, non-thermal effects, long-term effects, public exposure guidelines, public health

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BACKGROUND

In November, 2009, a scientific panel met in Seletun, Norway, for three days of intensive discussion on existing scientific evidence and public health implications of the unprecedented global exposures to artificial electromagnetic fields (EMF).

EMF exposures (static to 300 GHz) result from the use of electric power and from wireless telecommunications technologies for voice and data transmission, energy, security, military and radar use in weather and transportation.

The Scientific Panel recognizes that the body of evidence on EMF requires a new approach to

protection of public health; the growth and development of the fetus, and of children; and argues for strong preventative actions. These conclusions are built upon prior scientific and public health reports /1-6/ documenting the following:

- 1) *Low-intensity (non-thermal) bioeffects and adverse health effects are demonstrated at levels significantly below existing exposure standards.*
- 2) *ICNIRP and IEEE/FCC public safety limits are inadequate and obsolete with respect to prolonged, low-intensity exposures.*

3) *New, biologically-based public exposure standards are urgently needed to protect public health world-wide.*

4) *It is not in the public interest to wait.*

Strong concern has been voiced by the public, and by scientists as well as public health and environmental policy experts, that the deployment of technologies that expose billions of people worldwide to new sources of EMF may pose a pervasive risk to public health. Such exposures **did not exist before the –age of industry and information**]. Prolonged exposure appears to disrupt biological processes that are fundamental to plant, animal and human growth and health. Life on earth did not evolve with biological protections or adaptive biological responses to these EMF exposures. Exceptionally small levels of EMF from earth and space existed during the time that all life evolved on earth on the order of less than a billionth to one ten-billionth of a Watt per meter squared. A rapidly accumulating body of scientific evidence of harm to health and well-being constitute warnings that adverse health effects can occur with prolonged exposures to very low-intensity EMF at biologically active frequencies or frequency combinations.

The Seletun Scientific Panel has adopted a Consensus Agreement that recommends preventative and precautionary actions that are warranted now, given the existing evidence for potential global health risks. We recognize the duty of governments and their health agencies to educate and warn the public, to implement measures balanced in favor of the Precautionary Principle, to monitor compliance with directives promoting alternatives to wireless, and to fund research and policy development geared toward prevention of exposures and development of new public safety measures.

POINTS OF AGREEMENT

☐ Global populations are not sufficiently protected from electromagnetic fields (EMF)

from emerging communication and data transmission technologies that are being deployed worldwide, affecting billions of people;

- ☐ Sensitive populations (for example, the elderly, the ill, the genetically and/or immunologically challenged) and children and fetuses may be additionally vulnerable to health risks; their exposures are largely involuntary and they are less protected by existing public safety standards;
- ☐ It is well established that children are more vulnerable to health risks from environmental toxins in general;
- ☐ It is established that the combined effects of chemical toxins and EMF together is greater than either exposure alone;
- ☐ The Seletun Scientific Panel takes note of international scientific reviews, resolutions and recommendations documenting scientific and public health evidence on EMF exposures;
- ☐ The Seletun Scientific Panel notes that complete “**consistency**” of study findings is not to be expected, and it should not be interpreted as a necessary pre-condition for a consensus linking EMF exposure to health impacts. “**Consistency in nature does not require that all or even a majority of studies find the same effect. If all studies of lead showed the same relationship between variables, one would be startled, perhaps justifiably suspicious**” /7/;
- ☐ The Seletun Scientific Panel acknowledges that some, but not all, of these exposures support preventative and precautionary action, and the need for more stringent public health limits;
- ☐ The Panel takes note of international scientific resolutions and expressions of concern including the Salzburg, Catania, Freiburger Appeal, Helsinki, Irish Doctors (IDEA), Benevento, Venice, London, and Porto Alegre Resolutions (2000-2009);
- ☐ The Panel is guided by previously recommended target limits for EMF exposure

in the BioInitiative Report (2007) and the London Resolution (2009);

- █ The Panel urges governments to adopt an explicit statement that ~~the standard~~ for judging and acting on the scientific evidence shall be based on prudent public health planning principles rather than scientific certainty of effect (causal evidence)]. Actions are warranted based on limited or weak scientific evidence, or a sufficiency of evidence - rather than a conclusive scientific evidence (causation or scientific certainty) where the consequence of doing nothing in the short term may cause irreparable public health harm, where the populations potentially at risk are very large, where there are alternatives without similar risks, or where the exposures are largely involuntary;
- █ The Seletun Scientific Panel urges governments to make explicit that the burden of proof of safety rests with the producers and providers of EMF-producing technologies, not with the users and consumers.

**THE SELETUN SCIENTIFIC PANEL
UNANIMOUSLY ENDORSES THESE GENERAL
AGREEMENTS AND GENERAL AND SPECIFIC
RECOMMENDATIONS**

General Agreements from the Seletun Scientific Panel

- █ The Seletun Scientific Panel has identified specific scientific and public health benchmarks for numeric limits and preventative action that are justified now based on the existing body of evidence;
- █ The Panel is relying on scientific evidence as the basis for identifying scientific benchmarks establishing EMF levels associated with adverse health effects. The Panel notes that radiofrequent (RF) levels in some regions may

already exceed scientific benchmarks for health harm identified here, but political expediency is not the guiding criterion in this assessment;

- █ EMF exposures should be reduced now rather than waiting for proof of harm before acting. This recommendation is in keeping with traditional public health principles, and is justified now given abundant evidence that biological effects and adverse health effects are occurring at exposure levels many orders of magnitude below existing public safety standards around the world;
- █ SAR (Specific Absorption Rate) is not an adequate approach to predict many important biologic effects in studies that report increased risks for cancer, neurological diseases, impairments to immune function, fertility and reproduction, and neurological function (cognition, behaviour, performance, mood status, disruption of sleep, increased risk for auto collisions, etc);
- █ SAR fails to adequately address known effects from modulation.

General Recommendations from the Seletun Scientific Panel

- █ The Seletun Scientific Panel recommends an international registry be established to track time-trends in incidence and mortality for cancers and neurological and immune diseases. Tracking effects of EMF on children and sensitive EHS populations is a high priority. There should be open access to this information;
- █ The Panel recommends existing brain tumour registries provide timely age-specific incidence rates. An early indication of brain tumors from mobile (cell) phone use could be in the younger age-specific incidence rates. Where such brain tumors registries to not exist, they should be established;

- █ Intervention-related epidemiological studies are needed to track the efficacy of intervention(s) that reduce or eliminate exposures to EMF;
- █ There is a need for mandatory pre-market assessments of emissions and risks before deployment of new wireless technologies. There should be convincing evidence that products do not cause health harm before marketing;
- █ For occupational exposures, there has been epidemiological evidence as well as clusters and case reports which state the 'case for action' and stringent control measures based on classic industrial hygiene principles (separation, distancing and enclosure). Further, there is need for surveillance markers of hematologic, immunotoxic and chromosome aberrations;
- █ The Panel discourages use of more lenient safety standards for workers, as compared to the general public. Separate safety limits are not ethically acceptable. Workers include women of childbearing age and men who wish to retain their fertility. Occupational environments where wireless exposures are common may be potentially hazardous to fertility and reproduction (retail and restaurant workers, transit workers, telecommunications and broadcast workers, medical workers, educators, administrators, etc) and those with other exposures or special health risks;
- █ The Panel strongly recommends that persons with electrohypersensitivity symptoms (EHS) be classified as functionally impaired rather than with 'idiopathic environmental disease' or similar indistinct categories. This terminology will encourage governments to make adjustments in the living environment to better address social and well-being needs of this subpopulation of highly sensitive members of society.

General Research Recommendations from the Seletun Scientific Panel

- █ Research funding is urgently needed for assays for biological markers [*EMF bioassays as biological markers of EMF dose*] which show promise to measure adverse health effects, and biological effects that, with prolonged or repetitive exposure, can reasonably be presumed to lead to harmful health consequences (biomarkers from cerebrospinal fluid, saliva, immune function changes, and DNA damage to name some);
- █ The Scientific Panel recommends research funding for studies on bioactive modulation which may, based on current knowledge, cause major consequences at far lower exposure levels based on different exposure parameters including modulation, frequency windows, intensity windows, duration, geomagnetic field and other factors;
- █ Research is urgently recommended for effects of prolonged or repetitive wireless exposure on children (cancers, neurological diseases, and impairment of cognition, behavior, performance and mood status, and disruption of sleep, etc);
- █ Research in SAR refinements is given a low priority. The scientific panel is in unanimous agreement that SAR is a poor measurement tool. Yet SARs have been used in many key studies reporting increased risk of DNA damage, increased risk for brain cancer, increased risk for acoustic neuroma, and reduced sperm quality parameters, among others. SAR measures only one aspect of exposure and ignores other critical aspects, such as biologically active frequencies (and modulations) that is essential information needed to understand the biological responses induced by EMF over short and long term exposures (e.g., nervous system response and

tissue/organ development, respectively) that does not cause thermal damage so that effective, biologically protective limits can be developed.

Specific Recommendations from the Seletun Scientific Panel

Extremely Low Frequency (Fields from Electrical Power)

- ☐ Based on the available evidence, the Seletun Scientific Panel recommends a 0.1 uT (1 mG) exposure limit for all new installations based on findings of risk for leukemia, brain tumours, Alzheimer's, ALS, sperm damage and DNA strand breaks. This exposure limit does not include a safety margin;
- ☐ For all newly installed, or newly upgraded electrical power distribution, the Panel recommends a 0.1 uT (1 mG) set-back distance, from residences, hospitals, schools, parks, and playgrounds schools (and similar locations occupied by children) [A 0.1 uT (1 mG) time-weighted average (TWA) using peak loading for transmission lines to ensure that average is about half of this for typical exposures; or equivalent for long-term exposure in interior EMF environments (wiring, trans-formers, appliances, others).];
- ☐ For all newly constructed residences, offices, schools (and other facilities with children), and hospitals there shall be a 0.1 uT (1 mG) max. 24 hour average exposure limit;
- ☐ For all new equipment (e.g. transformers, motors, electronic products), where practical, the Panel recommends a 0.1 uT (1 mG) max. 24 hour average exposure limit. Where not practical (e.g. large power transformers), there should be a fence, or boundary marker, with clearly written warning labels that states that within the boundary area the 0.1 uT (1 mG) maximum, 24 hour average exposure limit is exceeded;

- ☐ The Panel recommends all countries should adopt electrical code requirements to disallow conduction of high-frequency voltage transients back into electrical wiring systems;
- ☐ All new electronic devices including compact fluorescent lamps (CFLs) should be constructed with filters to block high-frequency voltage transients from being conducted back onto electrical wiring systems;
- ☐ The Panel recommends electric field reductions from electrical wiring in buildings based on evidence of increased cancer risk from prolonged or repetitive electric field exposure. The United States National Electrical Code (NEC) and other governmental codes relating to building design and construction should be revised so that all new electrical wiring is enclosed in a grounded metal shield;
- ☐ The United States NEC and other governmental codes that disallow net current on electrical wiring should be better enforced, and ground fault interrupters (GFIs) should be installed on all electrical circuits in order to reduce net current.

Radiofrequency/Microwave Radiation

Exposure Limit Recommendations

Present guidelines, such as IEEE, FCC, and ICNIRP, are not adequate to protect humans from harmful effects of chronic EMF exposure. The existing scientific knowledge is, however, not sufficient at this stage to formulate final and definite science-based guidelines for all these fields and conditions, particularly for such chronic exposure as well as contributions of the different parameters of the fields, e.g. frequency, modulation, intensity, and window effects. The values suggested below are, thus, provisional and may be altered in the future.

- ☐ For whole-body (in vivo experiments) or cell culture-based exposure, the Seletun Scientific Panel finds sufficient evidence to establish a

scientific benchmark for adverse health effect at 0.0166 W/kg based on at least 32 scientific studies reporting low-intensity effects (defined as studies reporting effects at exposures of 0.1 W/kg or lower) /8-39/.

- █ The Panel recommends a provisional whole-body limit of 0.00033 W/kg by incorporation of an additional 50-fold safety margin applied to the scientific benchmark of 0.0166 W/kg. This is consistent with both ICNIRP and IEEE/FCC safety factors. An additional 10-fold reduction is applied to take prolonged exposure into account (because 29 of the 32 studies are acute exposure only), giving a final whole-body limit of 0.000033 W/kg (33 μ W/kg). No further safety margin or provision for sensitive populations is incorporated. This may need to be lowered in the future.
- █ Based on power density measurements, the Seletun Scientific Panel finds sufficient evidence for a whole-body scientific benchmark for adverse health effect exists down to 85 mW/m² (0.0085 mW/cm² or 8.5 μ W/cm²) based on at least 17 scientific studies reporting low-intensity effects on humans. Taking more recent human studies conducted near base stations, or at base-station RF levels, Kundi and Hutter /57/ report that the levels must exceed 0.5-1.0 mW/m² (0.05 to 0.1 μ W/cm²) for effects to be seen; /40-57/.
- █ The Panel recommends a provisional whole-body (far-field) limit of 1.7 mW/m² (also = 0.00017 mW/cm² = 0.17 μ W/cm²) by incorporation of an additional 50-fold safety margin applied to the scientific benchmark of 85 mW/m². This is consistent with both ICNIRP and IEEE/FCC safety factors. This may need to be lowered in the future.
- █ It can be argued that a further 10-fold reduction is not justified since 13 of the 17 studies are already testing for long-term RF exposure. However, considering that the latest human population studies as reported by Kundi & Hutter (2009) do not show effects

below 0.5-1.0 mW/m², it can also then be argued that an additional 10-fold reduction on precautionary grounds is justified. If another 10-fold reduction is applied, the recommended level would then be 0.17 mW/m² (also 0.000017 mW/cm² = 0.017 μ W/cm²);

- █ The Seletun Scientific Panel recommends these numeric limits to governments and health agencies for adoption in place of ICNIRP, IEEE/FCC and other outdated public safety guidelines and limits in use around the world. This approach is based on traditional public health principles that support taking actions to protect public health when sufficient evidence is present. Sufficient scientific evidence and public health concern exist today based on increased risk for cancer, adverse fertility and reproductive outcomes, immune disruption, neurological diseases, increased risk of road collisions and injury-producing events, and impairment of cognition, behaviour, performance, mood status, and disruption of sleep;
- █ Numeric limits recommended here do not yet take into account sensitive populations (EHS, immune-compromised, the fetus, developing children, the elderly, people on medications, etc). Another safety margin is, thus, likely justified further below the numeric limits for EMF exposure recommended here;
- █ The Scientific Panel acknowledges that numeric limits derived here for new biologically-based public exposure standards are still a billion times higher than natural EMF levels at which all life evolved.

Specific Recommendations for mobile (cell) and cordless phone use

- █ The Seletun Scientific Panel recommends that users keep mobile (cell) phones away from head and body;
- █ The Seletun Scientific Panel recommends that users keep mobile (cell) phones and PDAs* switched off if worn or carried in a pocket or

ELECTROMAGNETIC FIELD HEALTH RISKS

holster, or on a belt near the body.

*PDA is generic for any type of Personal Digital Assistant or hand-held computer device;

- ☐ The Panel strongly recommends against the use of mobile (cell) and cordless phones and PDAs by children of any age;
- ☐ The Panel strongly recommends against the use of mobile (cell) and cordless phones and PDAs by pregnant women;
- ☐ The Panel recommends that use of mobile (cell) and cordless phones and PDAs be curtailed near children or pregnant women, in keeping with preventative and precautionary strategies. The most vulnerable members of society should have access to public places without fear of harm to health;
- ☐ Public access to public places and public transportation should be available without undue risk of EMF exposure, particularly in enclosed spaces (trains, airplanes, buses, cars, etc) where the exposure is likely to be involuntary;
- ☐ The Panel recommends wired internet access in schools, and strongly recommends that schools do not install wireless internet connections that create pervasive and prolonged EMF exposures for children;
- ☐ The Panel recommends preservation of existing land-line connections and public telephone networks;
- ☐ The Panel recommends against the use of cordless phones (DECT phones) and other wireless devices, toys and baby monitors, wireless internet, wireless security systems, and wireless power transmitters in SmartGrid-type

connections that may produce unnecessary and potentially harmful EMF exposures;

- ☐ The Panel recognizes that wired internet access (cable modem, wired Ethernet connections, etc) is available as a substitute;
- ☐ The Panel recommends use of wired headsets, preferably with hollow-tube segments;
- ☐ The Panel recommends avoidance of wireless (Bluetooth-type) headsets in general;
- ☐ The Panel encourages the removal of speakers from headsets on wireless phones and PDAs;
- ☐ The Panel encourages auto-off switches for mobiles (cells) and PDAs that automatically turn off the device when placed in a holster;
- ☐ The Panel strongly discourages the technology that allows one mobile (cell) phone to act as a repeater for other phones within the general area. This can increase exposures to EMF that are unknown to the person whose phone is ~~piggy-backed~~ upon without their knowledge or permission;
- ☐ The Panel recommends the use of telephone lines (land-lines) or fiber optic cables for SmartGrid type energy conservation infrastructure. Utilities should choose options that do not create new, community-wide exposures from wireless components of SmartGrid-type projects. Future health risks from prolonged or repetitive wireless exposures of SmartGrid-type systems may be avoided by using telephone lines or fiber-optic cable. The Panel endorses energy conservation but not at the risk of exposing hundreds of millions of families in their homes to a new, involuntary source of wireless radiofrequency radiation.

The undersigned recognize the duty of governments and their health agencies to educate and warn the public, to implement measures balanced in favor of the Precautionary Principle, to monitor compliance with directives promoting alternatives to wireless, and to fund research and policy development geared toward prevention of exposure.

The undersigned urge governments and their health agencies to adopt new interim numeric limits and new timetables for implementation of biologically-based precautionary action to limit exposures to EMF.

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(in alphabetical order)

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January 19, 2012

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De Rodgers Fox

Decision Proposed Decision of Commissioner Peevy (Mailed 11/22/2011)
BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA
On the proposed decision 11-03-014

Dear Commissioners:

The Board of the American Academy of Environmental Medicine opposes the installation of wireless "smart meters" in homes and schools based on a scientific assessment of the current medical literature (references available on request). Chronic exposure to wireless radiofrequency radiation is a preventable environmental hazard that is sufficiently well documented to warrant immediate preventative public health action.

As representatives of physician specialists in the field of environmental medicine, we have an obligation to urge precaution when sufficient scientific and medical evidence suggests health risks which can potentially affect large populations. The literature raises serious concern regarding the levels of radio frequency (RF - 3KHz - 300 GHz) or extremely low frequency (ELF - 300Hz) exposures produced by "smart meters" to warrant an immediate and complete moratorium on their use and deployment until further study can be performed. The board of the American Board of Environmental Medicine wishes to point out that existing FCC guidelines for RF safety that have been used to justify installation of "smart meters" only look at thermal tissue damage and are obsolete, since many modern studies show metabolic and genomic damage from RF and ELF exposures below the level of intensity which heats tissues. The FCC guidelines are therefore inadequate for use in establishing public health standards. More modern literature shows medically and biologically significant effects of RF and ELF at lower energy densities. These effects accumulate over time, which is an important consideration given the chronic nature of exposure from "smart meters". The current medical literature raises credible questions about genetic and cellular effects, hormonal effects, male fertility, blood/brain barrier damage and increased risk of certain types of cancers from RF or ELF levels similar to those emitted from "smart meters". Children are placed at particular risk for altered brain development, and impaired learning and behavior. Further, EMF/RF adds synergistic effects to the damage observed from a range of toxic chemicals. Given the widespread, chronic, and essentially inescapable ELF/RF exposure of everyone living near a "smart meter", the Board of the American Academy of Environmental Medicine finds it unacceptable from a public health standpoint to implement this technology until these serious medical concerns are resolved. We consider a moratorium on installation of wireless "smart meters" to be an issue of the highest importance.

The Board of the American Academy of Environmental Medicine also wishes to note that the US NIEHS National Toxicology Program in 1999 cited radiofrequency radiation as a potential carcinogen. Existing safety limits for pulsed RF were termed "not protective of public health" by the Radiofrequency Interagency Working Group (a federal interagency working group including the FDA, FCC, OSHA, the EPA and others). Emissions given off by "smart meters" have been *classified by the World Health Organization International Agency for Research on Cancer (IARC) as a Possible Human Carcinogen.*

Hence, we call for:

- An immediate moratorium on "smart meter" installation until these serious public health issues are resolved. Continuing with their installation would be extremely irresponsible.
- Modify the revised proposed decision to include hearings on health impact in the second proceedings, along with cost evaluation and community wide opt-out.
- Provide immediate relief to those requesting it and restore the analog meters.

Members of the Board
American Academy of Environmental Medicine



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26 January, 2011

Susan Hackwood, PhD
Executive Director
California Council on Science and Technology

Lora Lee Martin, Director
Strategic Policy Initiatives and Government Affairs
California Council on Science and Technology

Subject: Letter of Comment on Smart Meter Report

I have been invited by colleagues to submit my Commentary on CCST Report and Recommendations for Smart Meters using RF. My comments are based on the information summarized in the Bioinitiative Report and the Seletun Reports, as well as the other reports in the recent scientific literature, The broader context for my commentary are the consequences of our past failures in environmental epidemiology to heed early warnings from other many population wide exposures in yesteryear, notably lead.

Personal Background: I am a medical epidemiologist who has assessed source-exposure-effect relationships for many chemical and physical agents over the past 40 years. This work has included work on lead, asbestos and smoking, pesticides, solvents, air pollution, and mixed exposures and ionizing radiation. Since the late 1980's I served as Head of the Unit of Occupational and Environmental Medicine in Hebrew University-Hadassah School of Public Health and Community Medicine in

Jerusalem Israel. I have also been involved in issues having to do with the medical ethics in public health, and served for several years as Chairman of the Ethics and Philosophy Committee of the International Society for Environmental Epidemiology and I am a member of the Collegium Ramazzini. I have published more than 100 scientific papers in the peer reviewed literature. Since the 1980's, I have had the opportunity to assess the case for a cause effect relationship with many workers with past cancer and past severe exposures to RF/MW, often after short latent periods. I have also supervised projects assessing community exposures to RF/MW and ELF in Jerusalem. I have reported on cases of brain cancer in individuals with latency periods of less than 10 years and am currently writing an investigation of a cluster of cancer in workers with extremely high occupational exposures to RF. I helped draft the Benevento and Seletun statements. In recent years, I have been particularly active assessing the use and scope of the Precautionary Principle in examining the anticipated risks from alternative technologies.

1. Smart grid networks, if using RF, will generate 24/7 round the clock ubiquitous involuntary indoor exposures to RF – in the everyday background environment of everyone in California in human habitats. The background exposures produced by these grids will be substantially greater than those from point source WI-FI routers, microwave ovens and cell phones. These whole body exposures, though perhaps below levels of current regulatory standards, (INCRIP-WHO, and IEEE), will exceed cumulative time weighted exposures producing the above outcomes, based on the literature.
2. Based on the evidence in peer reviewed studies on the effects on these endpoints and the exposure projections in Sage Associates' landmark report (see Sage, http://sagereports.com/smart-meter-rf/docs/Table7-8ElectricMeters_R1000_TA1-90Final.pdf) this project exposes large percentages of the general population to highly alarming involuntary exposure risk scenarios, taking into account an array of modifying factors e.g. background exposures, distance, reflection, and factors influencing access to exposure areas.
3. Since the publication of the Benevento Resolution and the BioInitiative Report, the body of evidence concerning health risks from exposures to RF continues to accumulate. In particular from cell phone use. Cell phone use involves the delivery of a high concentration of non-ionizing radiation to the skull and brain for relatively brief periods of time over a 24 hour period as result of voluntary decisions by users—a situation far less aggressive to the general population than involuntary exposure from the proposed Smart Meters. Models for predicting penetration into the whole body are now available, based on those developed by Gandhi and by Kuster. These models draw attention in particular to the risks from exposure to the young.

4. The exposures from Smart Meters are the equivalent of exposure of the entire population—the young, the old, the newborn, the unborn, and the sick, to environmental tobacco smoke, even if most members of the population do not smoke.
5. There is a huge body of evidence to refute the claim the so-called “hot muffin theory” that there are no effects from sub-thermal exposures to NIR, and specifically RF/MW (Benevento Statement, BioInitiative Report, London Report) The effects pertain to ROS- Reactive Oxygen Species, cellular changes, effects on DNA, and neurobehavioral effects-- e.g. deficits in memory, mood changes, fatigue, headache, as well as electro hypersensitivity and cancer, and effects on those with electronic medical implants. It is important to note that there are also concerns about the production of dirty electricity, itself a risk factor for many of these outcomes (Milham).
6. Models of carcinogenicity or exposures to toxic and physical agents and cancer postulate that we cannot be certain there is a threshold (based on the DNA single hit model). These models also postulate roughly linear dose response relationships and recognize groups and age windows for special risks—e.g. fetuses, newborns, persons who are immunocompromised and those with sensitivities on the basis of mechanisms which are still poorly understood. For populations, it is probable that similar dose response models for exposure-risk relationships apply even though mechanisms involve resonance models of intensity and frequency.
7. It is fair to say that we are no longer talking about mere precaution of uncertain risk, but about prevention of highly probable and known risks. Based on the accumulating evidence, it is now fairly certain that there will be widespread adverse public health impacts. What remains uncertain is how many will be affected, and whether there are time weighted intensity of exposure thresholds, below which there will be absence of risk.
8. The most plausible scenario is that there will be 'small' increases in individual risk for the incidence of occurrence (e.g. cancer) or incidence and severity (e.g. neurobehavioral effects), applied to the entire population from these networks/ large population wide increases in absolute numbers of people with adverse outcomes. The epidemiologist Geoffrey Rose articulated the principle that small increases in so-called sub-threshold exposures result in many more individuals with illness in the entire population than high exposures delivered to small numbers of people. *This principle applies to the scenario of population-wide effects from exposures to RF from networks of Smart Meters and concerns about dirty electricity.*

9. Were these population-wide exposures to smart meters to be part of a project carried out in a medical setting, to test the risks and benefits of a new technology on human health and well being, it would be rejected by a Medical Institutional Review Board on ethical grounds as an unethical exercise in human experimentation.
10. The risks we are assessing today from exposure to RFMW and dirty electricity from Smart Meters placed everywhere recalls the story of population-wide exposure to lead in gasoline – a subject concerning which I have much direct personal experience. In the 1970s, a mere 35 yrs ago, we were arguing as to whether or not an everyday blood lead level of 30ug/dl was a health risk. By 1979, that threshold dropped to 20ug/dl and thereafter through the 1980s to 10ug/dl for children, and now we are not certain whether there is a threshold below which there are no discernable adverse neurobehavioral effects, especially for *in utero* and newborn exposures. We now know, in retrospect, that the entire urban population, notably children, were receiving exposures which were impairing their IQ, emotional well being, and long term growth and development. These findings led to the elimination of lead from gasoline. In retrospect, we were not heeding the early warnings regarding an impending population-wide hazard with disastrous effects. I suggest that in the case of population-wide exposure to RF, the situation is similar, with one exception: The warnings may no longer be early.
11. Population-wide exposure to man-made NIR represents a scenario relatively new in the history of biology. It is difficult to assess risks from these new exposures and their frequencies and wave patterns using experience based on exposure to background naturally occurring NIR. Instead, we are required to rely on experimental studies and epidemiology of exposure-effect relationships, using endpoints such as effects on stem cells, leaks from the blood brain barrier, as well neurological, cardiac and cancer endpoints. In addition, there are additional vulnerabilities to the eyes and to the testes.
12. I warn that we may be on the cusp of a similar scenario here with regard to community wide exposures to RF/MW and dirty electricity from Smart Meters — with one exception: there are safe alternatives.
13. The Precautionary Principle, in its various formulations, specifies that where there is uncertainty concerning the possibility of health risks from a new technology, the costs of doing nothing to prevent the exposure (e.g. a false negative) may be greater than a false positive (taking preventive action). I add that in applying the Precautionary Principle, we are required to weigh the risks and benefits from 3 options: doing nothing (i.e. no Smart Meters), and doing something (Smart Meters with RF) or a different kind of Meters using fiberoptics. We recognize that doing

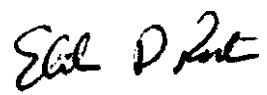
nothing carries itself certain risk having to do with the operations of the electrical ssgrid system.

But alternative technology- smart meters powered by fiber optics, which are without known risk, can be used to achieve the same objective.

- 14. There is no excuse for avoiding this investment with a permanent enduring protection for the public in avoiding and not introducing fiber optics. For reasons just stated, it will be bad ethics and bad technology and, possibly wanton negligence, recklessness and incompetence to wilfully forego the last option.

I thank the Commission for the opportunity to submit my comments.

Elihu D Richter MD, MPH (Assoc Professor)



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Poki Stewart Namkung, M.D., M.P.H.
Health Officer
Public Health Division

Memorandum

Date: January 13, 2012
To: Santa Cruz County Board of Supervisors
From: Poki Stewart Namkung, M.D., M.P.H. *PSN*
Health Officer
Subject: Health Risks Associated With SmartMeters

Overview

On December 13, 2011, Santa Cruz County Board of Supervisors directed the Public Health Officer to return on January 24, 2012, with an analysis of the research on the health effects of SmartMeters.

Background

In order to analyze the potential health risks associated with SmartMeters, the following questions should be asked:

- 1) What is the SmartMeter system and what is the potential radiation exposure from the system?
- 2) What scientific evidence exists about the potential health risks associated with SmartMeters?
- 3) Are there actions that the public might take to mitigate any potential harm from SmartMeters?

SmartMeters are a new type of electrical meter that will measure consumer energy usage and send the information back to the utility by a wireless signal in the form of pulsed frequencies within the 800 MHz to 2400MHz range, contained in the microwave portion of the electromagnetic spectrum. SmartMeters are considered part of 'smart grid' technology that includes: a) a mesh network or series of pole-mounted wireless antennas at the neighborhood level to collect and transmit wireless information from all SmartMeters in that area back to the utility; b) collector meters, which are a special type of SmartMeter that collects the radiofrequency or microwave radiation signals from many surrounding

buildings (500-5000 homes or buildings) and sends the information back to the utility; and c) proposed for the future, a power transmitter to measure the energy use of individual appliances (e.g. washing machines, clothes dryers, dishwasher, etc) and send information via wireless radio frequency signal back to the SmartMeter. The primary rationale for SmartMeters and grid networks is to more accurately monitor and direct energy usage.

The public health issue of concern in regard to SmartMeters is the involuntary exposure of individuals and households to electromagnetic field (EMF) radiation. EMFs are everywhere, coming from both natural and man-made sources. The three broad classes of EMF are:

- extremely low frequency, ELF (from the sun or powerlines)
- radio frequency, RF (from communication devices, wireless devices, and SmartMeters)
- extremely high frequency, known as ionizing radiation (x-rays and gamma rays)

Much of this exposure is beyond our control and is a matter of personal choice; however, public exposure to RF fields is growing exponentially due to the proliferation of cell phones, and wireless fidelity (Wi-Fi) technology. To understand the relationship between EMF from SmartMeters and other sources, it is helpful to view the electromagnetic spectrum:

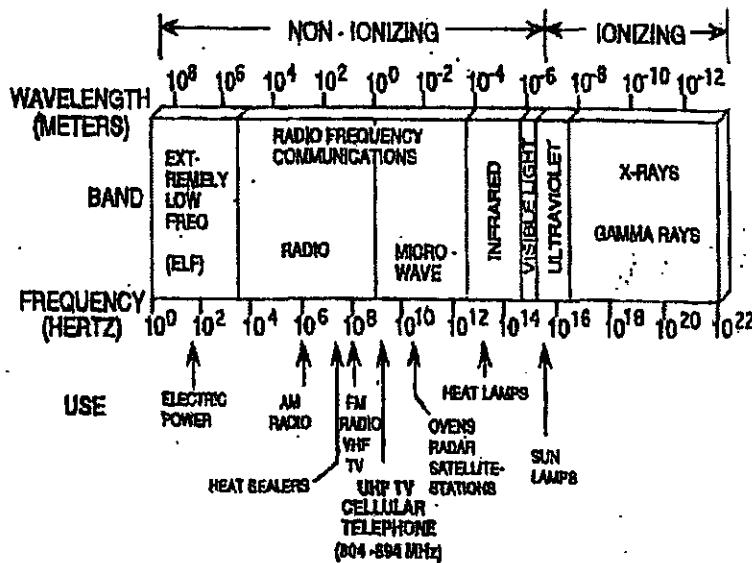


Fig. 1: The electromagnetic spectrum, showing the relations between ELF and RF fields, wavelength and frequency, and the ionizing and non-ionizing portions of the spectrum.

The Federal Communications Commission (FCC) has adopted limits for Maximum Permissible Exposure (MPE) that are based on exposure guidelines published by the National Council on Radiation Protection and Measurements (NCRP). The limits vary with

the frequency of the electromagnetic radiation and are expressed in units of microwatts per centimeter squared. A SmartMeter contains two antennas whose combined time-averaged public safety limit of exposure is $655\mu\text{W}/\text{cm}^2$ (Sage, 2011). According to the California Council on Science and Technology (CCST) Report (2011), within distances of three to ten feet, SmartMeters would not exceed this limit. However, CCST did not account for the frequency of transmissions, reflection factors, banks of SmartMeters firing simultaneously, and distances closer than three feet. There are numerous situations in which the distance between the SmartMeters and humans is less than three feet on an ongoing basis, e.g. a SmartMeter mounted on the external wall to a bedroom with the bed placed adjacent to that mounting next to the internal wall. That distance is estimated to be one foot. The CCST Report also states that SmartMeters will generally transmit data once every four hours, and once the grid is fully functional, may transmit "more frequently." It has been aptly demonstrated by computer modeling and real measurement of existing meters that SmartMeters emit frequencies almost continuously, day and night, seven days a week. Furthermore, it is not possible to program them to not operate at 100% of a duty cycle (continuously) and therefore it should not be possible to state that SmartMeters do not exceed the time-averaged exposure limit. Additionally, exposure is additive and consumers may have already increased their exposures to radiofrequency radiation in the home through the voluntary use of wireless devices such as cell and cordless phones, personal digital assistants (PDAs), routers for internet access, home security systems, wireless baby surveillance (baby monitors) and other emerging devices. It would be impossible to know how close a consumer might be to their limit, making safety a uncertainty with the installation of a mandatory SmartMeter.

This report will focus on the documented health risks of EMF in general, the relevance of that data to SmartMeters exposure, the established guidelines for RF safety to the public at large, and then provide recommendations to ameliorate the risk to the public's health.

Evidence-based Health Risks of EMFs

There is no scientific literature on the health risks of SmartMeters in particular as they are a new technology. However, there is a large body of research on the health risks of EMFs. Much of the data is concentrated on cell phone usage and as SmartMeters occupy the same energy spectrum as cell phones and depending on conditions, can exceed the whole body radiation exposure of cell phones (see Attachment B1, Figure 4). In terms of health risks, the causal factor under study is RF radiation whether it be from cell phones, Wi-Fi routers, cordless phones, or SmartMeters. Therefore all available, peer-reviewed, scientific research data can be extrapolated to apply to SmartMeters, taking into consideration the magnitude and the intensity of the exposure.

Since the mid-1990's the use of cellular and wireless devices has increased exponentially exposing the public to massively increased levels of RF. There is however, debate regarding the health risks posed to the public given these increased levels of radiation. It must be noted that there is little basic science funding for this type of research and it is largely funded by industry. An intriguing divide, noted by Genuis, 2011 is that most

research carried out by independent non-government or non-industry affiliated researchers suggests potentially serious effects from many non-ionizing radiation exposures; most research carried out by independent non-government or non-industry affiliated researchers suggests potentially serious effects from many non-ionizing radiation exposures research funded by industry and some governments seems to cast doubt on the potential for harm. Elements of the controversy stem from inability to replicate findings consistently in laboratory animal studies. However, analysis of many of the conflicting studies is not valid as the methodology used is not comparable. Despite this controversy, evidence is accumulating on the results of exposure to RF at non-thermal levels including increased permeability of the blood-brain barrier in the head (Eberhardt, 2008), harmful effects on sperm, double strand breaks in DNA which could lead to cancer genesis (Phillips, 2011), stress gene activation indicating an exposure to a toxin (Blank, 2011), and alterations in brain glucose metabolism (Volkow, 2011).

In terms of meta-analyzed epidemiological studies, all case-control epidemiological studies covering >10 years of cell phone use have reported an increased risk of brain tumors from the use of mobile phones (Hallberg, 2011). Other studies have pointed to an increasing risk of acoustic neuroma, salivary gland tumors, and eye cancer after several years of cell phone use and the tumors occur predominantly on the same side of the head as the phone is used. The analysis of brain cancer statistics since the mid 20th century in several countries reveals that brain tumor formation has a long latency time, an average of over 30 years to develop from initial damage. (Hallberg, 2011). Therefore using studies such as the Interphone Study which looked at shorter latency periods for the development of specific brain cancers will result in inconclusive data.

Another potential health risk related to EMF exposure, whose legitimacy as a phenomenon remains contentious, is electromagnetic hypersensitivity (EHS). In the 1950's, various centers in Eastern Europe began to describe and treat thousands of workers, generally employed in jobs involving microwave transmission. The afflicted individuals often presented with symptoms such as headaches, weakness, sleep disturbance, emotional instability, dizziness, memory impairment, fatigue, and heart palpitations. Clinical research to verify the physiological nature of this condition did not begin in earnest until the 1990's and found that the EMF involved was usually within the non-ionizing range of the electromagnetic spectrum. In the early 2000's, estimates of the occurrence of EHS began to swell with studies estimating the prevalence of this condition to be about 1.5% of the population of Sweden (Hilleert et al., 2002), 3.2% in California (Levallios et al., 2002), and 8% in Germany (infas Institut fur angewandte Sozialwissenschaft GmbH, 2003).

In 2004, WHO declared EHS "a phenomenon where individuals experience adverse health effect while using or being in the vicinity of devices emanating electric, magnetic, or electromagnetic fields (EMFs)... Whatever its cause, EHS is a real and sometimes debilitating problem for the affected persons (Mild et al., 2004)."

Currently, research has demonstrated objective evidence to support the EHS diagnosis, defining pathophysiological mechanisms including immune dysregulation in vitro, with

increased production of selected cytokines and disruption and dysregulation of catecholamine physiology (Genuis, 2011).

Until recently, the diagnosis of EHS has not received much support from the medical community due to lack of objective evidence. In an effort to determine the legitimacy of EHS as a neurological disorder, however, a collection of scientists and physicians recently conducted a double-blinded research study that concluded that "EMF hypersensitivity can occur as a bona fide environmentally-inducible neurological syndrome (McCarty et al., 2011).

Safety Guidelines

The guidelines currently used by the FCC were adopted in 1996, are thermally based, and are believed to protect against injury that may be caused by acute exposures that result in tissue heating or electric shock. FCC guidelines have a much lower certainty of safety than standards. Meeting the current FCC guidelines only assures that one should not have heat damage from SmartMeter exposure. It says nothing about safety from the risk of many chronic diseases that the public is most concerned about such as cancer, miscarriage, birth defects, semen quality, autoimmune diseases, etc. Therefore, when it comes to nonthermal effects of RF, FCC guidelines are irrelevant and cannot be used for any claims of SmartMeter safety unless heat damage is involved (Li, 2011).

There are no current, relevant public safety standards for pulsed RF involving chronic exposure of the public, nor of sensitive populations, nor of people with metal and medical implants that can be affected both by localized heating and by electromagnetic interference (EMI) for medical wireless implanted devices. Many other countries (9) have significantly lower RF/MW exposure standards ranging from 0.001 to 50 $\mu\text{W}/\text{cm}^2$ as compared with the US guideline of 200-1000 $\mu\text{W}/\text{cm}^2$. Note that these recommended levels are considerably lower than the approximately 600 $\mu\text{W}/\text{cm}^2$. (time-averaged) allowed for the RFR from SmartMeters operating in the low 900 MHz band mandated by the FCC based on only thermal consideration.

In summary, there is no scientific data to determine if there is a safe RF exposure level regarding its non-thermal effects. The question for governmental agencies is that given the uncertainty of safety, the evidence of existing and potential harm, should we err on the side of safety and take the precautionary avoidance measures? The two unique features of SmartMeter exposure are: 1) universal exposure thus far because of mandatory installation ensuring that virtually every household is exposed; 2) involuntary exposure whether one has a SmartMeter on their home or not due to the already ubiquitous saturation of installation in Santa Cruz County. Governmental agencies for protecting public health and safety should be much more vigilant towards involuntary environmental exposures because governmental agencies are the only defense against such involuntary exposure. Examples of actions that the public might take to limit exposure to electromagnetic radiation can be found in Attachment B2.

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Figure 4 from Hirsch; 2011

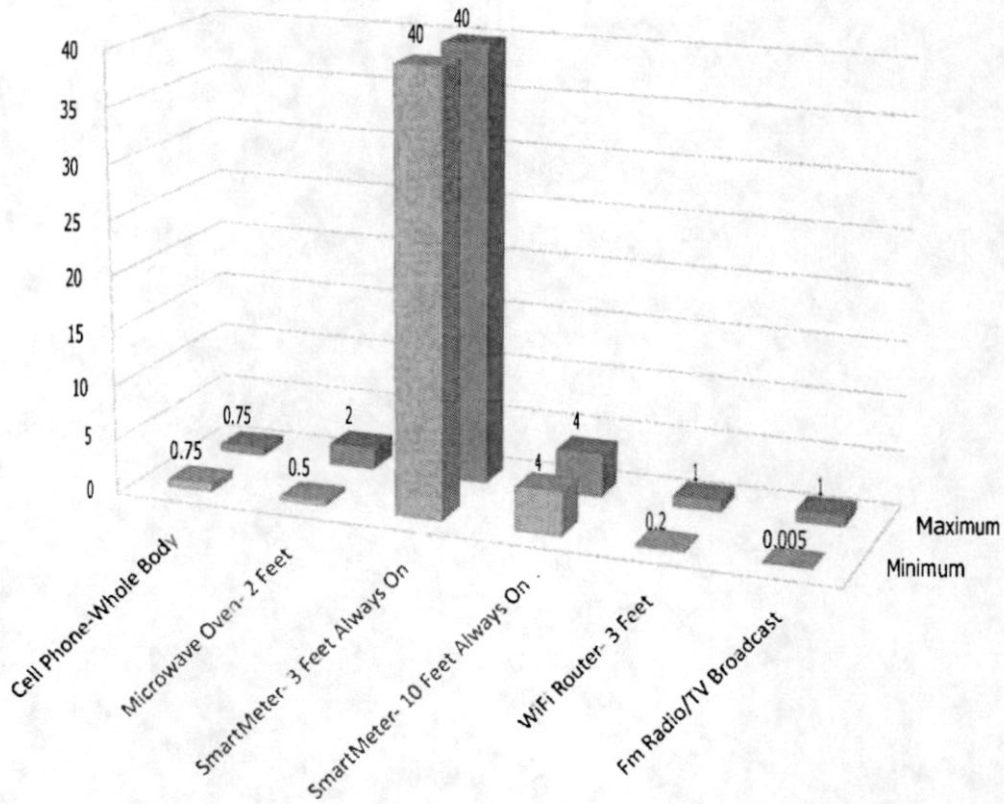


Figure 4. Comparison of Radio-Frequency Levels to the Whole Body from Various Sources in μ W/cm² over time [corrected for assumed duty cycle and whole body exposure extrapolated from EPRI/CCST SmartMeter estimated levels at 3 feet].

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End

Examples of strategies to reduce electromagnetic radiation.

(Genius SJ, 2011)

Sources of adverse EMR	Considerations to reduce EMR exposure
Cell phones and cordless phones	<ul style="list-style-type: none"> • Minimize use of cell and cordless phones and use speaker phones when possible • Leave cell or cordless phone away from the body rather than in pocket or attached at the hip.
Wireless internet	<ul style="list-style-type: none"> • Use wired internet • Turn off the internet router when not in use (e.g. night-time) • Use power line network kits to achieve internet access by using existing wiring and avoiding wireless emissions.
Computers releasing high EMR	<ul style="list-style-type: none"> • Limit the amount of time spent working on a computer • Avoid setting a laptop computer on the lap • Increase the distance from the transformer. • Stay a reasonable distance away from the computer
Handheld electronics (electric toothbrush, hair dryer, Smart phone, electronic tablets, etc.)	<ul style="list-style-type: none"> • Limit the use of electronics and/or revert to using power-free devices • Turn devices off before going to sleep • Minimize electronics in bedrooms
Fluorescent lights	<ul style="list-style-type: none"> • Consider using alternate lighting such as incandescent (Uncertainty exists about the safety of LED lights) • Rely on natural sunlight for reading
Household power	<ul style="list-style-type: none"> • Measure levels of EMR and modify exposures as possible • Avoid sleeping near sites of elevated EMR • Filters can be used to mitigate dirty power
High voltage power lines substations, transmission towers, and emitters (cell phone tower, radar, etc.)	<ul style="list-style-type: none"> • Consider relocating to an area not in close proximity to high voltage power lines • Maintain considerable distance from emitters • Consider forms of shielding (shielding paints; grounded metal sheets)
Utility neutral-to-ground bonded to water pipes	<ul style="list-style-type: none"> • Increase size of neutral-wire to substation and install dielectric coupling in water pipe.

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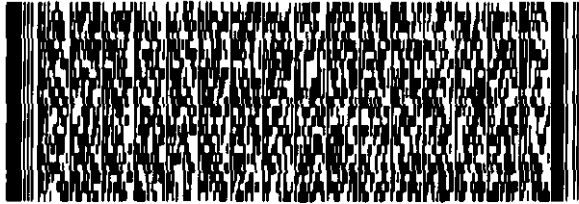
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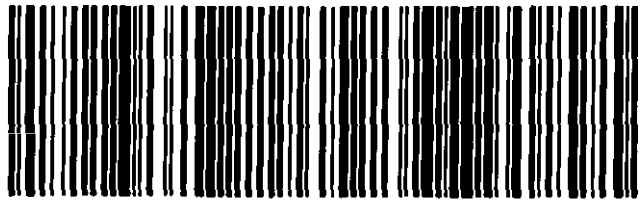
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