Comments on "Health Impacts of Radio Frequency From Smart Meters" (California Council on Science and Technology (CCST), January 2011)

Submitted to CCST by: Electric Power Research Institute (EPRI)

EPRI is pleased to have the opportunity to offer comments on the draft report, "Health Impacts of Radio Frequency From Smart Meters" prepared by the California Council on Science and Technology (CCST), which will be referred to as the CCST Report. Our comments are provided in two sections. Section I focuses on the CCST Report's approach to dealing with the issue of exposures that may produce tissue heating (thermal) and those that do not (non-thermal exposures). The section first provides a background on the question of how exposure guidelines and standards considered the possibility of non-thermal effects, and then enumerates specific sites in the text in which the thermal/non-thermal distinction would, we believe, benefit from clarification. Section II includes comments on all other points in the order in which they appear in the report.

I. Treatment of Potential Thermal and Non-Thermal Effects in CCST Draft

The CCST draft creates an impression that limits for exposure to RF electromagnetic fields, such as those issued by the FCC, are based on a dichotomous approach whereby a conscious decision was made by the FCC to protect against thermal effects to the exclusion of non-thermal effects. It is our opinion that based on the documentation cited below, the FCC considered all of the science published up to its rulemaking, deciding that the literature on exposures below thresholds for thermal effects were as relevant to the rulemaking as the published science reporting effects above such thresholds. However, the literature concerning exposures below thermal thresholds provided no valid evidence upon which an exposure limit could be written.

The notion of a conscious dichotomy between thermal and non-thermal effects is based, at least in part, on a letter to a citizen from a scientist at the Environmental Protection Agency (EPA's), dated July 16, 2002, which was preceded by a letter dated March 8, 2002 from the Director of EPA's Radiation Protection Division (annotated in footnote 18 on CCST Draft page 15). Among other comments, the July 16, 2002 letter states that, "Federal and safety agencies have not yet developed policies concerning possible risk from long-term nonthermal exposures." In a larger context, EPA in 1996 was asked to comment on FCC's proposed rule, with the Administrator (Carol Browner) responding in a letter received by the FCC on July 25, 1996 that, "This new approach is consistent with our comments made in 1993 and addresses our concerns about adequate protection of public health." The Administrator made no distinction between protection from thermal or non-thermal effects. In that same time frame, the FCC also received letters of support from the Food and Drug Administration (FDA), the National Institute for Occupational Safety and Health (NIOSH), and the Occupational Safety and Health Administration (OSHA).

A subsequent letter dated April 30, 1999 to FCC's Chief, Office of Engineering and Technology from the EPA's Acting Deputy Assistant Administrator states:

> The FCC guidelines expressly take into account thermal effects of RF energy, but do not directly address postulated non-thermal effects, such as those due to chronic exposure. That is the case largely because of the paucity of scientific research on chronic, non-thermal health effects. The information base on non-thermal effects has not changed

> significantly since the EPA's original comments in 1993 and 1996. A few studies report that at non-thermal levels, long term exposure to RF energy may have biological consequences. The majority of currently available studies suggests, however, that there are no significant non-thermal human health hazards. It therefore continues to be EPA's view that the FCC exposure guidelines adequately protect the public from all scientifically established harms that may result from RF energy fields generated by FCC licensees.
>
> I hope this letter has clarified EPA's position regarding the FCC's RF exposure guidelines. I look forward to further cooperation between our agencies.

Then a letter dated September 16, 2002 (i.e., after the March 8/July 16, 2002 letters cited by the CCST) from the EPA's Director, Radiation Protection Division states:

> EPA has not changed its position regarding the FCC's guidelines, which are designed to protect the public from the thermal effects of radio frequency energy. This position stated in an April 30, 1999 letter [cited above] from then Acting Deputy Assistant Administrator Robert Brenner to the FCC remains EPA's policy. There is, however, continued scientific uncertainty regarding the existence of possible non-thermal effects, such as those due to chronic exposure, and EPA supports the ongoing efforts of the National Institute of Environmental Health Sciences and the Food and Drug Administration to pursue additional research into these postulated effects. Until such time as the results of this research are available, it remains EPA's view that the FCC's exposure guidelines adequately protect the public from all scientifically established harms that may result from RF energy fields generated by FCC licensees, and EPA will continue to work closely with the FCC and other federal agencies to review new scientific information.

Despite the words in these letters referring to remaining uncertainty about non-thermal effects, nowhere was there an implication that the FCC rule overlooked non-thermal effects when issuing FCC OET Bulletin 65, and made a decision to protect against only thermal effects. The FCC rule took into account all published science to that time, and having no non-thermal effects on which to base a rule, wrote FCC OET Bulletin 65 based on the thermal effects that had been clearly established.

This state of the science was reaffirmed in 1998 after the FCC rule was published, and four years prior to the 2002 letters when the International Commission on Non-Ionizing Radiation Protection published its exposure guideline for electromagnetic exposures from 0 to 300 GHz (Health Physics 74:494-522, 1998). At the time, there was interest in potential athermal (an alternate term for non-thermal) effects associated with low-level amplitude modulated (AM) exposures, with ICNIRP stating:

> Overall, the literature on athermal effects of AM electromagnetic fields is so complex, the validity of reported effects so poorly established, and the relevance of the effects to human health is so uncertain, that it is impossible to use this body of information as a basis for setting limits on human exposure to these fields.

A more general statement in the ICNIRP guideline expressed that:

> Epidemiological studies on exposed workers and the general public have shown no

> major health effects associated with typical exposure environments. Although there are deficiencies in the epidemiological work, such as poor exposure assessment, the studies have yielded no convincing evidence that typical exposure levels lead to adverse reproductive outcomes or an increased cancer risk in exposed individuals. This is consistent with the results of laboratory research on cellular and animal models, which have demonstrated neither teratogenic nor carcinogenic effects of exposure to athermal levels of high-frequency EMF.

In 2005, the IEEE published Standard C95.1-2005, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz." The IEEE stated in that document:

> The recommendations to protect against established adverse health effects from RF exposures have been made on the basis of a comprehensive review of the scientific data. In revising the standard, findings of studies published between 1950 and December 2003 were considered, including those studies that involve low level exposures where increases in temperature could not be measured or were not expected.

Thus, individual judgment aside concerning the interpretation of the scientific literature, it is more than fair to say that, historically, RF exposure limits are based on a review of the research literature addressing potential effects from RF exposures both below and above thermal-effect thresholds, with the latter providing a basis for evidence-based exposure limits.

Against this background, we have identified the following 13 locations in the CCST Report that may represent a misinterpretation of the FCC rule concerning potential thermal versus potential non-thermal effects. To be clear, the FCC OET Bulletin 65 does not include a review of the science as opposed to documents such as those published by ICNIRP and IEEE, but it is rather the specification of a rule governing RF exposure. Following edits to these passages, this commentary will provide all other comments in the sequence they appear in the CCST Report.

1. Page 4, Key Report Findings, point 2

The current FCC standard provides an adequate factor of safety against known ~~thermally induced health impacts~~effects of radio-frequency electromagnetic fields of the same frequencies emitted by existing common household electronic devices and smart meters.

2. Page 7, top paragraph, the following edits are suggested:

Household electronic devices, such as cellular and cordless telephones, microwave ovens, wireless routers, and wireless smart meters produce RF emissions. ~~Exposure to RF emissions may lead to thermal and non•thermal effects.~~ Potential biological and health effects from RF exposures have often been partitioned into those resulting from tissue heating by RF, so-called "thermal" effects, and those that would occur with negligible to very little heating, so called "non-thermal" effects. After extensive study, thermal effects have been very well characterized, but in the absence of heating beyond a threshold determined in experimental behavioral studies, no adverse effects have been identified and validated that could be ~~termed~~categorized as non-thermal. ~~Thermal effects on humans have been extensively studied and appear to be well understood.~~ The Federal Communications Commission (FCC) has established guidelines to protect public health from known hazards associated with ~~the thermal impacts of~~exposure to

RF.~~: tissue heating from absorbing energy associated with radiofrequency emissions.~~ Non-thermal effects, however, including those resulting from cumulative or prolonged exposure to lower levels of RF emissions, ~~are not well understood~~have not been identified. Though ~~S~~some ~~studies~~ sources have suggested non-thermal effects ~~may~~ that include fatigue, headache, irritability, or even cancer~~, .~~ - ~~But~~ these ~~findings~~ have not been scientifically established, and the mechanisms that might lead to non-thermal effects, if they exist, remain ~~uncertain~~unknown. Additional research and monitoring is needed to better identify and understand potential non-thermal effects.

3. Page 7, #1 bolded print under Findings

The FCC standard provides an adequate factor of safety against known ~~thermally induced~~ health ~~impacts~~ effects of emissions in the frequency range in which smart meters and other electronic devices ~~in the same range of RF emissions~~operate.

4. Page 8, 1st and 3rd paragraphs

1st: Additional research ~~is~~ would be needed to determine whether non-thermal mechanisms are operative. ~~better understand and verify these potential mechanisms.~~

3rd: CCST notes that in some of the studies reviewed, contributors have raised ~~emerging~~ questions ~~from some in the medical and biological fields~~ about the potential for ~~biological impacts other than the thermal impact that the FCC guidelines address~~ non-thermal effects.

5. Page 14, paragraph labeled Non-Thermal Effects

This paragraph is vague, with the first sentence alluding to “emerging questions in the medical and biological fields about potential harmful effects caused by non-thermal mechanisms of absorbed RF emissions.” Given the thousands of papers published to date, we consider it unfortunate that a very small handful of studies are cited in support of this statement. The authors of the CCST report had the option of summarizing recent reviews that cover the entire span of research conducted in the RF field, including epidemiology and laboratory science. For example, a 2009 review by ICNIRP stated:

> “The mechanisms by which RF exposure heats biological tissue are well understood and the most marked and consistent effect of RF exposure is that of heating, resulting in a number of heat-related physiological and pathological responses in human subjects and laboratory animals…Whilst it is in principle impossible to disprove the possible existence of non-thermal interactions, the plausibility of various non-thermal mechanisms that have been proposed is very low…the recent in vitro and animal genotoxicity and carcinogenicity studies are rather consistent overall and indicate that such effects are unlikely at specific absorption rate levels up to 4 W kg-1 [the level associated with behavioral disruption in animal experiments].”

This conclusion, provided as an example, is consistent with those in numerous consensus documents, which will not be presented here. In fact, in the very next paragraph at the top of page 15, the CCST Report authors acknowledge the lack of evidence for non-thermal effects, referring to “general concerns or speculation about possible unknown and as yet unproven non-thermal effects...” and …”if there are non-thermal effects of RF absorption on human health, such effects are not so profound as to be easily discernable.” This passage appears to be in

contradiction to the idea that non-thermal effects were left off the table for rulemaking.

6. On Page 15, comments elaborated above apply to the section heading, “FCC Guidelines Address Known Thermal Effects Only, not Non-thermal Effects.” In fact, the NCRP (1986) report cited in CCST footnote 17 states (pp 278-279), “In the frequency range of primary interest, i.e., 30 to 300 MHz, and also at higher frequencies in the microwave bands, a review of the data of the previous sections indicates that behavioral disruption appears to be the most statistically significant end point that occurs at the lowest SAR.” The “lowest SAR” referred to is the 4 W/kg that serves as the basis for virtually all published exposure limits.

7. Page 15, last paragraph: The introduction to this section described briefly the various interagency transmittals and rationales for contemporary RF exposure limits. Again, these limits are based on a study of all the literature, not a literature with a thermal/non-thermal filter.

8. Page 16: Discussion of SAR and MPE

The authors engage in a discussion of characterizing exposure to RF. There are two parameters to consider, yes (SAR and MPE), but not exactly in the way described. The following is offered as an alternative description:

Limits for controlling human exposures to radio-frequency (RF) electromagnetic fields, such as those published in FCC OET Bulletin 65, are based on the principle that such limits will assure that the rate of electromagnetic energy absorption within a body will be restricted to no greater than a maximally permissible level. This latter quantity is given the term Specific Absorption Rate or SAR, and is expressed in units of watts per kilogram (W/kg). The FCC rule’s limit for maximally permitted SAR for the whole body and localized sites is based on food-motivated behavioral disruption in laboratory animal studies that reported an effect threshold at about 4 W/kg, which corresponded to a body core temperature rise of about 1° C. The FCC rule stipulates that for the general public, SAR should not exceed 0.08 W/kg - 50 times lower than the effect threshold - averaged across the body, and should not exceed 1.6 W/kg for any single gram of tissue (SAR is relaxed for hands, wrist, feet and ankles to 4 W/kg over any 10 grams of tissue). SAR is a function largely of body size and frequency, and people absorb RF energy most efficiently at frequencies between about 30 MHz and 300 MHz. The frequency of maximal absorption of electromagnetic energy is inversely related to body size, and the 30 to 300 MHz range conservatively covers people of all sizes.

SAR is not a readily measurable parameter outside of a laboratory environment. Thus, exposure limits are established that assure that the dose quantities internal to the body are not exceeded. RF exposure is expressed in terms of the power density of an electromagnetic field propagating through space, and it is expressed in terms of watts per square meter (W/m^2) or alternatively as milliwatts per square centimeter (mW/cm^2) or microwatts per square centimeter ($\mu W/cm^2$). The FCC refers to the exposure limits as Maximum Permissible Exposures (MPE), and these are most stringent in the 30 to 300 MHz range in recognition of the greater efficiency of body absorption in this frequency range. In addition, for “source-based” devices such as smart meters, the FCC states that exposures are to be averaged over a 30-minute period. Thus, an instantaneous exposure may exceed the MPE value in the rule so long as the average value remains below the MPE. Furthermore, exposure is also to be estimated over the volume of one’s body situated in an exposed space, with the average power density across the body determining whether compliance is satisfied. At 30 to 300 MHz the general public MPE is 0.2 mW/cm^2, and between 300 and 1,500 MHz is f/1500, where f is frequency in MHz. Beyond

1,500 MHz, the general public MPE is 1.0 mW/cm^2. By this formulation, the MPE is about 0.6 mW/cm^2 for emissions from smart meters, which operate in the 902 to 928 MHz range, about 0.57 mW/cm^2 for cell relays (collectors or access points), which operate at about 850 MHz, and 1.0 mW/cm^2 for HAN antennas, which operate at about 2,400 MHz.

9. Page 17, last line: Even in this 100% scenario the RF emissions would be measurably below the FCC limits for ~~thermal~~ all established effects.

10. Page 22, bottom of sidebar: "…which provides a wide safety margin from known ~~thermal~~ effects of RF emissions."

11. Page 23 under heading, "Is the FCC Standard Sufficient to Protect Public Health?"

The FCC guidelines do provide a significant factor of safety against ~~thermal impacts~~effects that may be associated with tissue heating by RF electromagnetic energy, the only currently understood human health ~~impact~~ effect identified with respect to RF exposure. ~~that occurs~~Smart meters operate at ~~the~~ power levels that result in emissions well below such thresholds ~~and within the frequency band that smart meters use~~. In addition to the factor of safety built into the guidelines, at worst, human exposure to RF from smart meter infrastructure operating at even 50% duty cycle will be significantly lower than the guidelines. While additional study ~~is needed~~may be advisable to ~~understand~~ identify potential non-thermal effects that are currently unknown or unverified, ~~to understand potential non-thermal effects of exposure to RF and effects of cumulative and prolonged exposure to several devices emitting RF,~~ given current scientific knowledge the FCC guideline provides an adequate margin of safety against known ~~thermal~~ effects.

12. Page 23, under heading, "Are Additional Technology-specific Standards Needed?

The paragraph that follows this heading may not be clear to many, as it assumes that further research would validate effects that are currently suggested.

The FCC guidelines protect against ~~thermal~~ known effects of RF exposure, which at this point in time include only those attributable to tissue heating. Many non-thermal effects have been suggested, and additional research is needed to ~~better understand and scientifically validate them~~determine whether or not they are scientifically valid.

13. Page 26, Conclusion #1:

The FCC ~~standard~~ exposure regulation provides a currently accepted ~~factor~~ margin of safety against known ~~thermally induced~~ health ~~impacts~~ effects of RF electromagnetic fields. ~~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.

II. Additional Edits and Comments

Page 4, under Other Considerations:

#2: Given the complicated manner in which smart meters operate, it's not clear how the complexity would be boiled down to meaningful information for the public.

#4: Were carrier current systems introduced as an alternative (i.e., wired systems), RF could be produced from smart meter signals impressed on the electric power system, though at different frequencies than the wireless units.

Page 5, Figure 1:

Suggest replacing “Always On” with “Instantaneous Power Density While Transmitting”. This way duty cycle need not play a role, as smart meters were not designed to be on 100% of the time; in currently deployed systems, smart meters would not be functional much above 30% duty cycle. Furthermore, the FCC rule permits time averaging for source-based emitters such as smart meters, such that instantaneous values are not applicable to assessing exposure in terms of compliance.

2nd paragraph: Biological mechanisms

With respect to addressing mechanisms, the last sentence states, “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.” The term, “biological mechanisms”, does not specifically represent the core issue of mechanisms. The main challenge has been to identify a “prime mover” interaction that would or, at least, could initiate a cascade of events leading to an observable effect at the cellular level all the way up to the level of the whole organism. This prime mover occurs at the level of a phenomenon describable in the language of physics, and the term “biophysical mechanism” would be more appropriate. If a physical interaction between an electromagnetic field and biological entities (molecules, membrane components, etc.) results in an effect, the next level of the effect’s expression would likely be at the level of biochemistry. At this point, the challenge would be to assess whether this biochemical effect distinguishes itself from normal endogenous, or background, biochemical activity in a manner that would lead to a measurable (observable) biological effect. With a biological effect observed and replicable, the identification and testing of proposed “biological mechanisms” becomes tenable. Given these considerations, the term “biophysical mechanisms” is more appropriate to the context of the sentence in the CCST Report.[1]

p. 8, gray box:

“Scientifically established”, “generally accepted scientific knowledge” and other such references throughout this document are referencing information obtained through the scientific method. A scientific method consists of the formulation of hypotheses and testing them through the collection of data through observation and experimentation~~, and the formulation and testing of hypotheses~~. ~~These steps must be repeatable in order to predict future results.~~The results should be documented, archived and shared within the scientific community to enable independent replication to either support or refute their validity. Scientific inquiry, when properly designed and conducted, ~~is generally intended to be~~ produces data that are as objective as possible. ~~,~~ Even given such objectivity, biased interpretation is possible and should be minimized to every extent

[1] The proposed effect of power frequency electric and magnetic fields on melatonin may serve as an example. Were it verified that magnetic field exposure resulted in a suppression of circulating melatonin levels, plausible links to potential downstream consequences could be formulated (breast cancer had been proposed as a plausible outcome). However, we lack an explanation of how the electric field at the pineal gland induced by the environmental electric or magnetic fields could interact physically with cellular constituents to trigger a cascade of events leading to a biological effect, namely an alteration in the synthesis and release of melatonin.

possible.~~to reduce biased interpretations of results. Another basic expectation is to document, archive and share all data and methodology so they are available for careful scrutiny by other scientists, giving them the opportunity to verify results by attempting to reproduce them.~~ This practice, called full disclosure, also allows statistical measures of the reliability of these data to be established. This final passage is unclear as to its meaning

Page 8, last paragraph:

As detailed in the report, a comparison of electromagnetic power densities of emissions ~~frequencies~~ from smart meters and other devices shows that ~~the~~ RF exposure levels due to smart meter emissions ~~is~~ are very low.

Page 10, Figure 3: Though the implication of the power plant to represent the local utility may be clear to some, others may take the figure to mean that the data are transmitted back to the generating facility. A picture of an office building would be more appropriate.

Page 10, 1st paragraph:

4th line; something is missing here as the end of the line does not appear to make sense.

To cover the state, not just PG&E, please be advised that smart meters in other widespread locations use meters rated nominally at ¼ watt.

3rd from last line: or in some cases where the meter ~~is frequently used as a relay~~collects data from many homes within the mesh network for transmittal to the collection point (or cell relay), as much as 2-4 percent.

Page 11, 2nd line: no scenario is identified whereby meters will be transmitting continuously.

Page 11, 2nd full paragraph: Though PG&E may deploy the access point on a pole, other companies in California include the access point antenna in the smart meter that is mounted usually on a residence's exterior.

Page 11, 3rd full paragraph: HAN stands for Home Area Network (not access); also HAN antennas may operate at power lower than the 0.223 indicated, perhaps down to 60 to 100 mW (0.06 to 0.10 W).

Page 16, bottom line - Page 17, top line: As ~~At higher~~ frequency~~ies~~ increases further, the rate of energy absorption in the human body for a given power density decreases, with the FCC MPE correspondingly increasing to a constant level of ~~the human body absorbs even less energy and the threshold for the 2.4 GHz transmitter for home area network communications is consequently higher,~~ 1000 μW/cm^2~~.~~ at frequencies of 1,500 MHz and above.

Page 17, 1st full paragraph:

PG&E commissioned a 2008 study by Richard Tell Associates, "Supplemental Report on An Analysis of Radiofrequency Fields Associated with Operation of the PG&E Smart Meter Program Upgrade System." In this study of PG&E's proposed smart meter network it is noted that the FCC ~~limits on~~ MPE ~~include a factor of safety, and the perceived hazardous exposure level is 50 times higher than the FCC limits~~is 50-fold lower than the adverse effect threshold.[26]

The study estimateds ~~that~~ the highest average exposure ~~from smart meters, if~~to an individual ~~were~~ standing directly in front of ~~and~~ or next to ~~the~~ a meter transmitting 2 to 4% of the time~~,~~ would be 8.8 μW/cm^2 ~~transmitting at 2 to 4% of the time~~. The study notes that this is almost 70 times less than the FCC limit and 3,500 times less than the ~~demonstrated hazard level~~adverse effect threshold. In all likelihood, individuals will be much farther away from smart meters and likely behind them, (within a structure) where power density will be much lower. The highest ~~exposure~~ field level from the entire smart meter system ~~would~~ was projected to hypothetically occur immediately adjacent to an access point. It is very unlikely that an individual would necessarily be immediately adjacent to an access point, as, in the PG&E system, they are normally located 25 feet above the ground on a telephone or electrical pole or other structure. The peak power density from an access point is estimated to be 24.4 μW/cm2, or about 25 times less than the FCC limit. ~~From~~ At the ground, ~~exposure to power density~~the RF emission from an access point~~s~~ is estimated to be 15,000 times less than the FCC limit ~~in great part due to~~ because of the greater distance from ground to the device.

Next paragraph, 1st sentence: The PG&E commissioned report by Richard Tell Associates is based only on an AMR duty cycle of transmitting data once every four hours which results in this very low estimated ~~peak~~ average power.

Page 18, Figure 5 caption: FCC maximum permissible exposure limits on power density rise with frequency because the characteristics of RF energy absorption by the human body ~~can safely absorb more energy at higher frequencies~~change with frequency with greater amounts distributed to the body periphery as frequency increases beyond roughly 300 MHz and with a result of a smaller amount of RF energy being absorbed throughout the whole body.

Page 19, 1st paragraph, 1st line: Health concerns surrounding RF from smart meters are similar to those associated with many other devices that we use in our daily lives, including cordless and mobile telephones, microwave ovens, wireless routers, hair dryers, and wireless-enabled laptop computers.

Page 20, Figure 7, same comment as for this figure on page 5.

Page 21: EPRI can provide an updated table with additional annotation, although the values tabled are the same.

Page 22, gray box, 2nd paragraph: The assignment of duty cycle to cell phone use as described here is inappropriate. The duty cycle refers to the electromagnetic emission itself, not to the usage pattern of the phone. Besides, cell phones do not fall into the FCC's source-based category, and continuous exposure is assumed for compliance purposes.

Page 22, gray box, Table: Please note that the values are inferred from the EPRI White Paper. Also, the right-hand heading of the table presenting "Scaled Hypothetical Maximum Use Case" implies an operating mode that device manufacturers have informed us are not possible in real-world applications. Much beyond 30%, they claim the devices will not be able to function properly when deployed.

Page 23, 1st paragraph: In a November 2010 study Electric Power Research Institute (EPRI)[35] field tested exposure levels from a bank of 10 continuously transmitting meters of about 250 mW…

Note: these meters had to be specially programmed to transmit continuously, a mode that does not apply to meters operating in a mesh network environment.

Page 24, 2nd paragraph: The deleted words do not appear to add meaning to the paragraph.

An ongoing regularly updated source of unbiased information on the state of scientific research~~, both proven and as yet unproven causal effects being studied~~, if presented by an independent entity, would provide consumers a credible and transparent source from which to obtain facts about RF in our environment.

Page 24, bottom paragraph: This discussion is highly speculative and in this reviewer's opinion, tangential to the CCST Report's major themes (which address smart meters).

EPRI appreciates the opportunity to offer these comments.

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