DRA

Division of Ratepayer Advocates
California Public Utilities Commission

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To: California Council on Science and Technology (CCST) Smart Meter Project
From: David Ashuckian, Deputy Director
Date: January 31, 2011

RE: Report on "Health Impacts of Radio Frequencies for Smart Meters"

The Division Ratepayer Advocates (DRA) submits these comments on the CCST's Report on "Health Impacts of Radio Frequencies for Smart Meters" issued on January 11, 2011 ("the Report").

Introduction and Summary

DRA is an independent division of the California Public Utilities Commission (CPUC) whose mission is to obtain the lowest possible rates for service consistent with reliable and safe service levels. (Cal. Public Utilities Code § 309.5(a).) DRA has represented the interests of residential and small business customers in CPUC proceedings involving deployment of advanced metering infrastructure (AMI) systems, also known as smart meters. DRA has not taken a position on whether the meters pose health risks, but it has called on the CPUC to review reliable information on this subject and to address customers' concerns in a public proceeding. DRA welcomes the CCST's contribution to public understanding of the health impacts of RF emissions from smart meters.

In these comments, DRA identifies several questions that warrant additional explanation or analysis. We address three topics, in the following order:

- There are additional factors that can impact RF exposure from SmartMeters that are not addressed in the Report, and should be considered.
- Exposure from multiple co-located meters should be examined more closely.
- CCST should more clearly explain the basis for its conclusion that: "At this time there is no clear evidence that additional standards are needed to protect the public from smart meters or other common household electronic devices." (Report, p. 8.)

Comments

1. CCST should consider additional factors that can impact RF exposure from smart meters.

The Report concludes that it is unlikely that California's smart meter population will result in human exposure that exceeds FCC guidelines (which, as explained in the report, address only thermal impacts). While there appears to be consensus that exposure from smart meters in a wide range of installation scenarios will be significantly lower than FCC guideline limits, a new report from Sage Associates (Sage

Report) indicates exposure may exceed FCC guideline levels under certain circumstances.[1] For example, this report calculates that the exposure in a highly reflective environment ("1000% reflection" per the report) adjacent to a bank of 8 meters exceeds FCC guideline levels.[2] DRA questions whether the exposure levels calculated by Sage in this situation would be achieved in real buildings, but believes that Sage raises issues that merit further consideration.[3] A December 2010 EPRI report also discusses physical factors that are not explicitly addressed in the CCST Report.[4]

The Report identifies six "key factors to consider, when evaluating exposure to RF from smart meters," (Report, p. 25). DRA finds this list of factors a useful tool for policymakers. However, the December 2010 EPRI Report and the January 2011 Sage Report indicate that there may be additional factors that should not be overlooked. DRA has prepared a list of such factors, which is attached to these comments. DRA recommends that CCST consider the degree to which the factors listed in this Attachment (particularly environmental conditions such as building materials and exterior conditions) apply to smart meter RF exposure, and augment the table and supporting discussions as appropriate.[5]

2. The exposure from multiple co-located meters should be examined more thoroughly.

The CCST Report addresses the issue of exposure in a multiple- meter setting by citing the EPRI report's field measurements (8% exposure level with 10 meters operating). But other information provided by EPRI indicates that it may be imprudent to draw broad conclusions from these measurements, for at least two reasons.

First, this measurement applies only to Itron meters, which have a nominal power output approximately four times lower than the electric meters used by PG&E. Second, according to a November 2010 summary of the EPRI Report, power density did not diminish as rapidly with distance with multiple meters for a single meter.[6] These factors suggest that actual statewide RF exposure levels may be higher than the EPRI measurement cited in the CCST Report.[7]

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[1] "Assessment of Radio Frequency Microwave Radiation Emissions from Smart Meters", January 1, 2011. Available at http://sagereports.com/smart-meter-rf/.

[2] Sage Report, Table A7. FCC guidelines exceeded at 9" from source with a 1% duty cycle, and at 2.5' with a 10% duty cycle.

[3] Sage bases the existence of a "1000% reflection" scenario on studies by Hondou and others, in which the RF source was operating within a reflective chamber, such as when a cell phone is used in an elevator. In contrast, smart meters will generally be located outside of occupied building spaces, and outside of any reflective surfaces inside the building. Because of this difference, RF emissions by the smart meter would be reflected away from the occupied space, and any RF transmitted into that space would be greatly attenuated. The Hondou studies may be relevant to the propagation of RF signals from Smart appliances.

[4] "An Investigation of Radio frequency Fields Associated with the Itron Smart Meter," EPRI report number 1021126.

[5] The December EPRI report provides discussion and data on many of these additional issues. It should be noted, however, that the specific measurements and resulting data only apply to one type of meter deployed by SDG&E and SCE, and to walls of metal lathe construction.

[6] "Radio-Frequency Exposure Levels from Smart Meters," EPRI report # 1022270, p. 5 and Figure 4.

[7] In addition, EPRI concludes that "beyond three of four meters the aggregate field does not materially increase with additional meters. (EPRI Report, p. 9-7.) However, data in Figure 9-5 and Table 9-2 indicates that this conclusion may not be generally applicable due to the fact that the second meter added, "Meter B", generated the strongest RF field, and may have diminished the impact of the additional meters added.

On the other hand, the EPRI measurements could overestimate actual emission levels, for the following reason. The EPRI report notes that the meters were specially programmed for the tests to emit a constant RF level, although in normal use each meter emits an RF signal intermittently and randomly. Even when two or more meters emit at the same time, their levels will only sum directly if they are perfectly in phase.

The EPRI report highlights a fundamental problem in characterizing RF exposure from smart meters which must be considered by policy makers: the impact of two RF fields only add arithmetically in the limited situation where they are 100% in phase with each other. Outside of this limited condition, additional RF fields will add to a lesser degree, or reduce the combined level due to "destructive interference." This concept applies both to fields from multiple RF radios and reflected fields.

From a policy perspective, at least three methods can be considered for treatment of multiple meters:

1. The combined exposure estimate could be based on a simple addition of multiple fields ***if*** clear disclosure is provided indicating that this method provides a worst-case scenario which would rarely occur, according to information provided by PG&E and EPRI.
2. Actual network operating data could be obtained and used to guide a statistically based estimate of how often meters are operating, and how their fields combine when multiple meters are co-located. This could result in a methodology to estimate "nominal" exposure levels.
3. One could assume the meters never transmit in phase, and account for the multiple meters by increasing the effective duty cycle.

Each of these methods has pro and cons which should be discussed among RF experts in a public venue, as recommended by many parties to the CPUC proceedings. Such a discussion should consider whether the communication network operating algorithms could include constraints to prevent co-located meters from transmitting at the same time.

DRA recommends that the CCST explore this issue in greater depth.

3. <u>CCSF should explain more clearly why it concluded that the available evidence does not indicate a need to limit non-thermal impacts of RF emissions.</u>

The report states that "there is currently no conclusive scientific evidence pointing to a non-thermal cause and effect between human exposure to RF emissions and negative health impacts."[8] While the report cites three studies that claim adverse impacts, it does not explain why these studies are not relevant to the current debate. The same can be said about the Bioinitiative Report, a research survey often cited by parties concerned about RF emissions, which is merely listed in Appendix E as an "unsolicited document."

DRA recommends that the CCST Report be expanded to provide a scientific critique of the Bioinitiative report, and other reports that assert a link between RF emissions and negative health impacts. CCST should explain why, in its opinion, these sources do not constitute evidence that indicates a need to establish limits for non-thermal impacts, if only as a precautionary measure, even if conclusive findings are not yet available.

<u>Conclusion</u>

The CCST's contribution to the public discussion about RF exposure from Smart Meters can be made more valuable by addressing the questions identified in these comments.

[8] CCST Report, p.15.

Attachment: RF Issues That Warrant Additional Consideration

Smart Meter RF Emission Sources

- Does the power and directivity of smart meters vary over time, across all the installed meter "forms," or in "hard to reach" locations?
- How do the horizontal and vertical radiation patterns for each smart meter component impact RF exposure inside and outside of buildings?
- How should the exposure from multiple co-located meters be established, and should it impact the combined power density or duty cycle? (Can published smart meter vendor data help address these questions?)
- Do meter warrantee terms establish maximum permissible duty cycles?
- Can the smart meter network systems be programmed to limit/reduce duty cycle and RF exposure?

Environmental Considerations/Boundary Conditions

- How do reflections from the meter mounting surface, ground, and adjacent structures impact RF exposure for those outside of the building?
- What are the reflection, absorption, and transmission characteristics of common building and ground cover materials?
- What type of real-world smart meter installations result in RF propagation which deviates from free-field predictions?

RF Receivers

- What time and spatial averaging methods are required to accurately characterize thermal impacts from RF exposure? Non-thermal impacts?
- Are FCC guidelines designed to protect all persons exposed by smart meters, including children, the elderly, and those with health issues or medical implants?
- Does reduced mobility of the person receiving the RF exposure increases the level of exposure?

Other

- How will full deployment of home area networks impact RF exposure?
- How will full deployment of the smart grid or other uses of smart meter networks impact duty cycles, and therefore RF exposure?
- Are there administrative measures which could be ordered by the CPUC to limit RF exposure where excessive levels are found to exist?