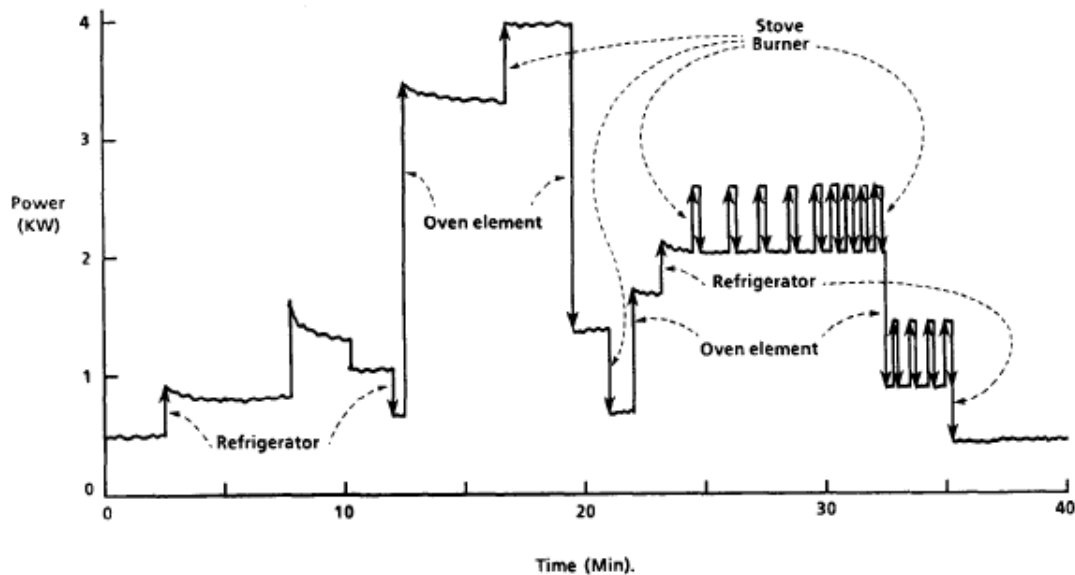


EXECUTIVE SUMMARY

Advanced metering infrastructure (AMI or smart metering) is being installed throughout electric networks both in Colorado¹ and across the country.² From these smart meters, detailed information about consumer electricity usage will flow from residences and businesses to electric utilities. Instead of billing customers for their monthly draw, electric utilities will know what customers are using in half-hour, fifteen-minute, or even five-minute intervals.

Proper management of this new information pool could support energy efficiency efforts and demand-side management (DSM) initiatives.³ However, insufficient oversight of this information could also lead to unprecedented invasions of consumer privacy. Many intricate details of household life can be gleaned from information obtained via advanced metering infrastructure.



Example of an individual's load profile constructed using consecutive load measurements taken in small intervals with various appliance events identified.⁴

A complicated network of risks and concerns bears on this issue. The more information gathered, the better supported DSM initiatives, efficiency investments, and conservation efforts. Yet such efforts are antithetical to traditional utility incentive structures, which tie returns to electricity sales. The use and sale of this information might play a role in reforming the business model of electric utilities; indeed, smart grid information is a potential revenue stream heretofore unexplored.⁵ As such, the formulation of privacy regulations should be seen, not only as consumer protection, but as incentive regulation.

However, information control regimes that centralize smart grid information disclosures by giving principle control to the electric utility may work against innovation in service industries developing at the edge of the electric grid and provide new barriers to market entry. If privacy regulations make customer usage information is too difficult or expensive to obtain, the regulatory regime could dampen the rampant growth and evolution of a promising new sector for economic development. The balance struck among these various factors will define any privacy

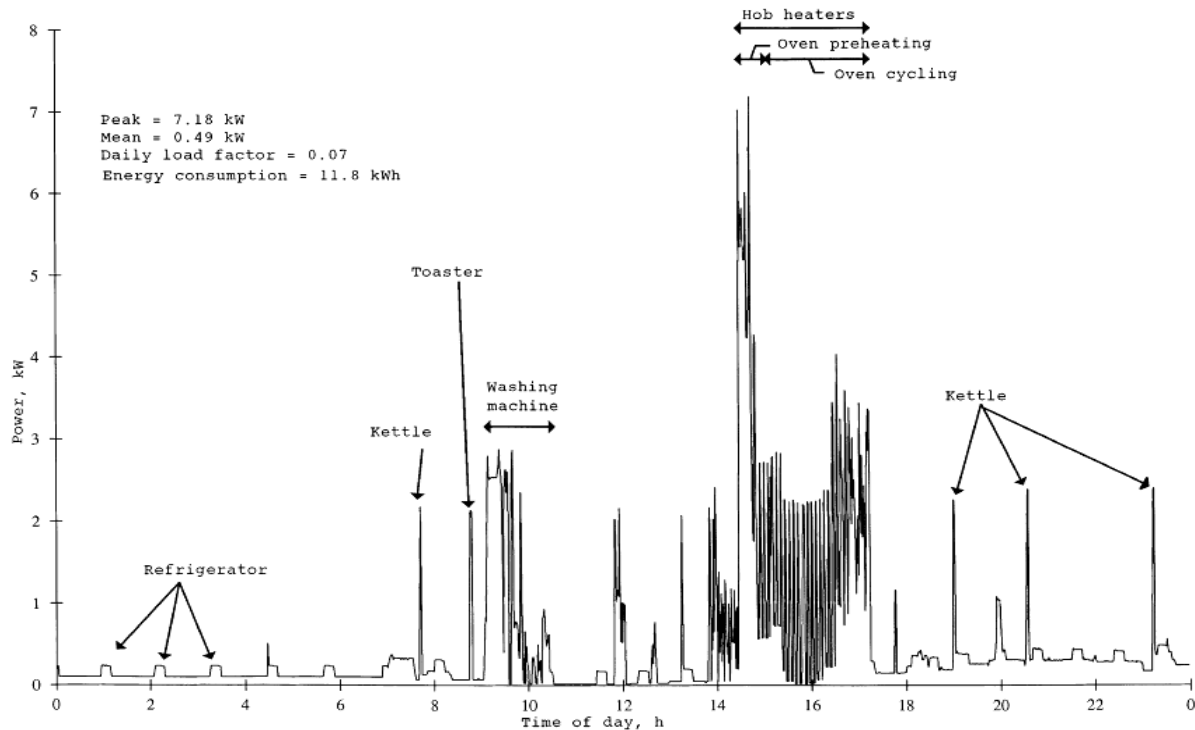


Figure 1: Household Electricity Demand Profile Recorded on a One-minute Time Base⁶

As analytic tools evolve, even information collected at significantly longer intervals—e.g. every fifteen or thirty minutes—can be used to pinpoint the use of most major household appliances.⁷ Such detailed information about the in-home activities of electricity customers can thus be used to piece together a fairly detailed picture of an individual’s daily life or routine. Furthermore, as plug-in hybrid electric vehicles are deployed and customers engage in electricity sales on the grid outside of their homes, an electricity usage profile may become a one-stop-shop for tracking behaviors even outside the walls of the residence. Cataloging and analytic methods advance, and thus the huge volumes of data about electricity usage soon to be unleashed, rather than seen as overly burdensome and expensive to make use of, are likely to be found treasure troves of information.⁸ A more thorough treatment of the technological capabilities and development vectors surrounding smart grid information collection and analysis is set forth in Appendix A.

⁶ G. Wood & M. Newborough, *Dynamic Energy-consumption Indicators for Domestic Appliances: Environment, Behavior, and Design*, 35 ENERGY AND BUILDINGS 821, 822 (2003) (citing M. Newborough & P. Augood, *Demand-side Management Opportunities for the UK Domestic Sector*, IEE Proceedings of Generation Transmission and Distribution 146 (3) (1999) 283–293).

⁷ An Italian study published in 2002 used fifteen-minute interval data—the same resolution collected by most smart meters today—to identify heavy-load appliance uses within an electricity usage profile. Researchers there were able use artificial neural networks to pinpoint the use washing machines, dishwashers, and water heaters with accuracy rates of over 90 percent from within the noise of the aggregated load information. See A. Prudenzi, *A Neuron Nets Based Procedure for Identifying Domestic Appliances Patern-of-Use from Energy Recordings at Meter Panel*, IEEE Power Engineering Society Winter Meeting 941, 942 col. 1, 946 col. 1 (2002).

⁸ See, e.g., Ashlee Vance, *Hadoop, A Free Software Program, Finds Uses Beyond Search*, N.Y. TIMES, Mar. 16, 2009, available at <http://www.nytimes.com/2009/03/17/technology/business-computing/17cloud.html?n=Top/News/Business/Companies/Google%20Inc> (discussing new breakthroughs in software managing internet advertising placement based on search queries and the ways in which these programs are being used in other contexts, such as photo-cataloging, facial-recognition software, and biotech applications). See

Question 2:

How many times in total (average and maximum) is a smart meter scheduled to transmit during a 24-hour period?

Response 2:

Electric: Table 2-1 presents scheduled electric SmartMeter™ system messages and their durations. As noted in Response 1, the information presented applies only to the 900 MHz radio. Table 2-1 presents data for all “scheduled” messages; i.e., those inherently required to sustain communications in the network that occur routinely without user intervention. “Non-Scheduled” messages created only at non-recurring times are addressed in Response 3.

TABLE 2-1

Electric System Message Type [a]	Transmission Frequency Per 24-Hour Period: Average [b]	Transmission Frequency Per 24-Hour Period: Maximum (99.9th Percentile) [c]
Meter Read Data	6	6
Network Management	15	30
Time Synch	360	360
Mesh Network Message Management	9,600	190,000
Weighted Average Duty Cycle	45.3 Seconds⁴	875.0 Seconds

The electric system message types are defined as:

- Meter Read Data refers to the messages generated by each meter to transmit energy usage data.
- Network Management refers to network tasks that need to be performed to maintain the health of the network (e.g., route establishment).
- Time Synch refers to network administration messages needed to update the internal clock in the NIC.
- Mesh Network Message Management refers to activities required to forward routed messages.

Gas: Table 2-2 presents scheduled gas SmartMeter™ system messages and their durations.

TABLE 2-2

Gas System Message Type [a]	Transmission Frequency Per 24-Hour Period: Average [b]	Transmission Frequency Per 24-Hour Period: Maximum [c]
Meter Read Data	4.228	4.305
Weighted Average Duty Cycle	0.676 Seconds	0.689 Seconds

⁴ As stated in Response 1, a small number of electric SmartMeters™ communicate somewhat longer than 45 seconds-per-day, which resulted in an overall mean duration of approximately 62 seconds.

Figure 4 from Hirsch; 2011

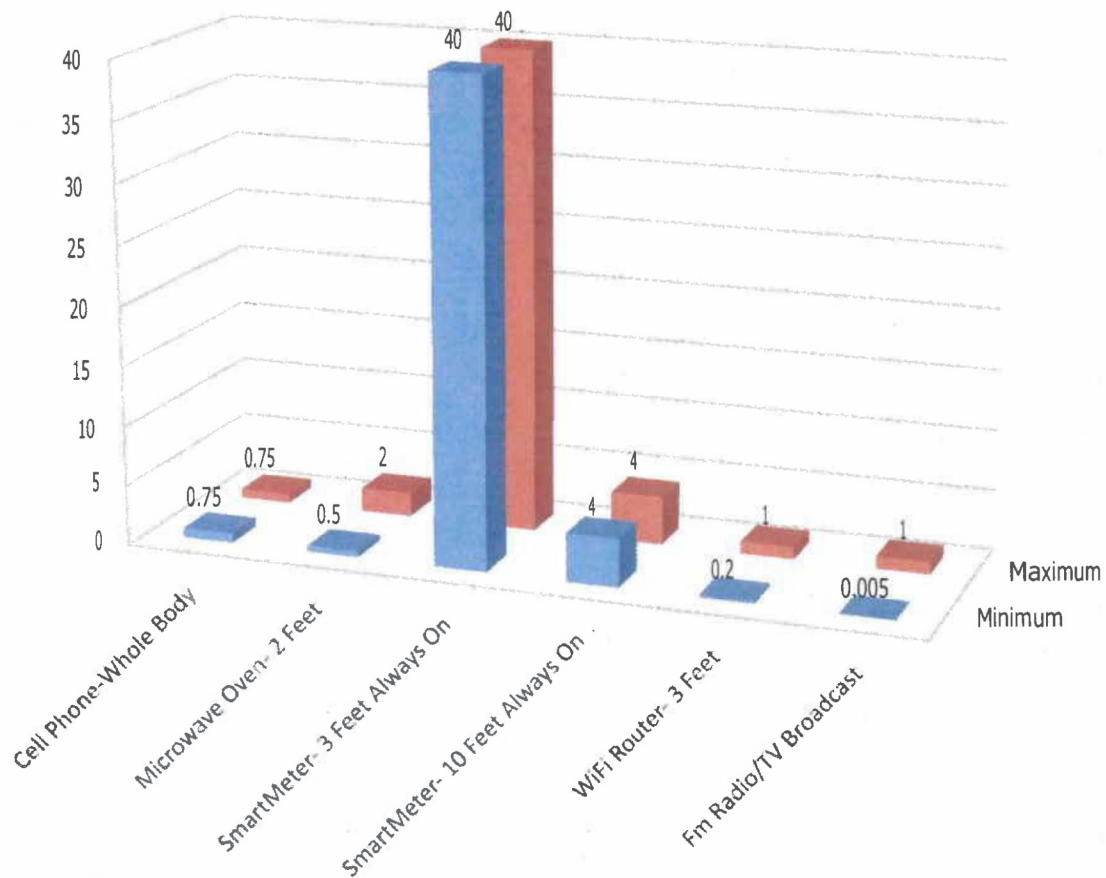


Figure 4. Comparison of Radio-Frequency Levels to the Whole Body from Various Sources in $\mu\text{W}/\text{cm}^2$ over time [corrected for assumed duty cycle and whole body exposure extrapolated from EPRI/CCST SmartMeter estimated levels at 3 feet].

D. IN ADDITION, PLEASE PRINT THIS EMAIL SO THAT WE ALSO HAVE #4 COMMENTS AND #5 COMMENTS BELOW AND THE LIST BELOW OF KEY ITEMS TO DISCUSS without having to scroll on a computer, while on the phone together.

E. Please also have a basic calculator with you if possible when we speak. (okay to have tape recorder if YOU want, NOT necessary)
PLEASE PLAN ON 90 MINUTES + 15 extra minutes if group is large or people want to discuss applications afterwards.

F. The following are the **KEY ITEMS** we will mention and support.

1.1 Information from smart meters available to customers (the basis for utility company conservation claims).

1.2 Information available to Utility company (and hackers) vs customer

2. Smart meter radiation vs cell phone radiation and computing exposure by the INVERSE SQUARE (Page 0265, attachment B1)

3.1 Utility company representation of amount of radiation (45 seconds per day) vs actual exposure 24/7/365, (PG&E document);

3.2 Intentional understatement even to judge of average transmissions per meter (PG&E Document) 10,000 vs 14,000

4. Typical newspaper article comments (below).

5. Points pulled from SC SM Health Report below.

6. Paying for opt-out - accounting

7. No "Proof" of Health Effects

8. "Average" vs "Peak"

4.

Some typical bogus comments by utility companies in the media:

“Consumers can actually reduce energy consumption when they have the feedback on usage available on the utility company website.”

“Customers can purchase home monitoring devices that will help homeowners evaluate consumption by appliances and determine ways to save.”

“There are no truth to complaints that the smart meters can be used to spy on consumers or cause health problems.”

“The radio frequency emitted by the smart meters, for example, is so much less than that emitted by a cell phone”

“Smart meters are a technology that’s been proven.”

“There is "NO PROOF" of any health effects from smart meters.”

5.

Summary points of SC County Health Report done by another:

SMART METER HEALTH REPORT

HEALTH DEPARTMENT SANTA CRUZ COUNTY, STATE OF CALIFORNIA JANUARY 2012.

(Statements, not all 11 pages)

- Smart meters expose persons in the home to FULL BODY RADIATION EXPOSURES 50 TO 450 TIMES GREATER RADIATION THAN CELL PHONES depending on proximity in the home to the smart meter attached to outside wall (calculated using the inverse square).
- Smart meters emit radiation almost continuously throughout the day 24/7, 365 days per year.
- Increased permeability of the blood-brain barrier in the head, harmful effects on sperm, double strand breaks in DNA which could lead to cancer genesis, stress gene activation indicating exposure to a toxin, and alterations in brain glucose metabolism.
- Electro Hypersensitivity is a real and sometimes debilitating problem for the affected persons. . Above affects are occurring to all persons, not just those who are hypersensitive (added for clarification).
- FCC guidelines are irrelevant and cannot be used for any claims of Smart Meter safety unless heat damage is involved.
- Smart meter exposure is Involuntary exposure. 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.

Report link - <http://emfsafetynetwork.org/wp-content/uploads/2009/11/Health-Risks-Associated-With-SmartMeters.pdf>